The means of promoting and preserving health / [Thomas Hodgkin].

Contributors

Hodgkin, Thomas, 1798-1866

Publication/Creation

London : Simpkin, Marshall, 1841.

Persistent URL

https://wellcomecollection.org/works/ckcudftf

License and attribution

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

29,008/B

C.II

19/h

53350

THE MEANS

OF

PROMOTING AND PRESERVING

HEALTH.

BY T. HODGKIN, M.D.

SECOND EDITION, WITH ADDITIONS.

LONDON:

SIMPKIN, MARSHALL & Co.

STATIONERS-HALL COURT.

1841.

Dr Luigi Longhi

LONDON:

RICHARD WATTS, CROWN COURT, TEMPLE BAR.

WELLCOME
HISTORICAL
MEDICAL
LIBRARY

TO

HIS FATHER,

JOHN HODGKIN,

AND

TO HIS NEPHEWS,

JOHN ELIOT HODGKIN,

AND

THOMAS HODGKIN JUN.

THE LINKS WHICH CONNECT HIM WITH THE PRECEDING AND

SUCCEEDING GENERATIONS,

IN TOKEN OF GRATEFUL AND UNFEIGNED REGARD TO THE FORMER,

AND OF CORDIAL GOOD WISHES FOR THE LATTER,

THIS

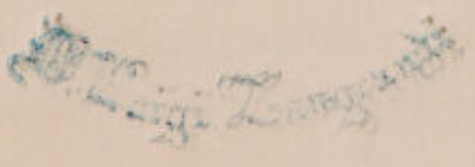
LITTLE ATTEMPT TO PROMOTE THE WELFARE OF HIS COUNTRYMEN

IS,

WITH THE WARMTH OF AFFECTION,

INSCRIBED,

BY THE AUTHOR.



PREFACE

TO THE

FIRST EDITION.

THE following Lectures were delivered at the Mechanics' Institution, in Spitalfields, rather more than five years ago. I have been repeatedly pressed to print them; but a variety of engagements has not allowed me time to do so, until the confinement occasioned by a severe accident furnished me with an opportunity of proceeding with the task.

I feel it necessary to state, in apology for the want of uniformity in style which may be observed in these Lectures, that they were partly written in full, and partly given extempore, from short heads. In printing the latter portion, I have been under the necessity of employing, with some correction and addition, the notes which were taken by one of my hearers.

These Lectures, I must observe, are designed for that class of readers for whom the series of publications, styled the "WORKING MAN'S COMPANION," has been commenced by the Society for the Diffusion of Useful Knowledge. At the same time, I must observe, that as I cannot contemplate their being wholly confined to the hands of individuals of that class, I have not rigidly restricted myself to those materials which are exclusively or peculiarly adapted to them.

I have only to add my earnest desire, that those who may read this little book, and unite with the suggestions which it contains, may not be wanting in using their exertions to urge their general adoption with more cogent and effectual persuasion than I have been able to employ. And I would further recommend, that this little volume might not wholly be confined to private reading; but that advantage might arise from its being read by the Operative Class, when met together, either in their Mechanics' Institutions, or in any of those associations into which, under the name of Clubs or Benefit Societies, they may have entered, for the purpose of promoting their own welfare:—nor would I even exclude those occasions on which they avowedly meet for more convivial purposes. It would perhaps

be not unreasonable, to hope that a few, at least, might be induced to combine, with mutually strengthened resolutions, to carry some of my hints into execution, with more zeal and alacrity than is likely to be brought into operation as the result of merely individual and private reading.

T. H.

London, 11 . 2 . 1835.

PREFACE

TO THE

SECOND EDITION.

THE First Edition of this work has now been for some years out of print. The assurances of numerous persons, of various classes in Society and of every shade of religious and political opinion, have led me to hope that it has not altogether missed the object for which it was designed; viz. that of imparting, in an intelligible form, practical hints calculated to promote the healthful condition of the people, but more especially of the laborious and productive classes.

I have therefore been encouraged to bring out a Second Edition. I have judged it best not to disturb the original Lectures, which were composed for a particular purpose, and designed for a particular class; but have preferred giving the new matter in the form of Notes appended

to each Lecture. To these Notes I particularly invite the attention of the reader. They have not been written with an exclusive and special view to the operative class; and though there is much which is more immediately designed for them, and for those who may take an interest in measures for their welfare, there are, besides, several points of more general application.

Whilst the well-being of a country essentially depends on the moral, physical, and intellectual well-being of the individuals whom it contains, the healthful condition of the people is equally dependent upon general influences. Hence, I have not thought it foreign to the object of this little work to touch upon some points, which, to be effectually carried out, require the attention of the magistrate, of the man of wealth, and of the statesman. In doing this, I have endeavoured so to treat the subjects as to avoid giving offence to any. If I have failed, I beg that the will and design may be remembered by those who may award the censure.

The Second Lecture will perhaps be generally regarded as that possessing the most practical character; since it treats of various articles of food, the modes of their preparation, and their application to individual circumstances. Some

parts relate to culinary processes, and might doubtless be improved or extended by a writer practically acquainted with these matters: but I believe, that, by following accredited guides, or limiting myself to the explanation of principles, I have adopted no recommendations but such as are free from any serious practical error.

Daily observation teaches us, that, in all classes, those who are in the enjoyment of robust health are apt to be regardless of the causes which are likely to injure it; and consequently, that though a large amount of good might be obtained by attention to precautionary measures, much real but needless disease and suffering will continue to exist. The sick and the suffering may therefore be expected to pay more attention to the means of recovering health, than the sound do to those of preserving it. This consideration has led me to embrace an opportunity for offering some observations on the means of recovering health; which it is my intention, before long, to present to the public.

T. H.

Lower Brook Street,
23 . 10 . 1841.

WORKS BY DR. HODGKIN.

LECTURES ON THE MORBID ANATOMY OF THE SEROUS MEMBRANES.

VOL. I. ON THE SEROUS MEMBRANES.

This Volume contains the Author's investigations respecting Cancer, Fungoid Disease, Melanosis, &c.; and, as appended subjects, Parasitical Animals, and the pathological indications afforded by colour.

VOL. II. PART I. ON THE MUCOUS MEMBRANES.

This Volume, which treats of the Gastro-pulmonary System, as far as the termination of the small intestine, comprises the subjects of Pneumonia, Phthisis, Gastro-enteritis, the *Affection Typhoide* of Louis and Fever.

Published by SIMPKIN, MARSHALL & Co.

A CATALOGUE OF THE ANATOMICAL MUSEUM OF GUY'S HOSPITAL.

Arranged so as to form the Outlines of a Pathological Classification; with numerous interspersed Articles and Directions for the Preservation of Specimens, for the assistance of Medical Men and Travelling Naturalists.

Published by S. HIGHLEY.

ON THE

INFLUENCE OF PHYSICAL AGENTS ON LIFE;

By Dr. EDWARDS.

Translated from the French by Dr. HODGKIN and Dr. FISHER.

With Notes and Additions, by Dr. HODGKIN and Others.

Published by S. HIGHLEY.

WORKS BY JOHN HODGKIN.

CALLIGRAPHIA GRÆCA et PŒCILOGRAPHIA GRÆCA.

EXCERPTA EX FRIDER. JAC. BASTII COMMENTATIONE PALÆOGRAPHICA, cum Tabulis Lithographicis XX.

SPECIMENS OF GREEK PENMANSHIP, with Directions, in English, for forming the Characters.

SKETCH OF THE GREEK ACCIDENCE, arranged in a manner convenient for Transcription.

INTRODUCTION TO WRITING AND GRAMMAR.

SKETCH OF THE GEOGRAPHY OF ENGLAND.

GEOGRAPHICAL and ASTRONOMICAL DEFINITIONS.

Published by SIMPKIN, MARSHALL & Co.

CONTENTS.

LECT. I.

LECT. II.

ADDITIONS AND NOTES TO LECT. II.

LECT. III.

MUSCULAR MOTION AND INTELLECTUAL FACULTIES.

ADDITIONS AND NOTES TO LECT. III.

LECT. IV.

ON SUCCESSIVE GENERATIONS, AND THE EDUCATION OF YOUTH.

ADDITIONS AND NOTES TO LECT. IV.

APPENDIX.

MEANS

OF

PRESERVING HEALTH.

LECT. I.

INTRODUCTION.

Some of you, I trust, need not be told, that it was at one time my duty to endeavour to alleviate the miseries induced by sickness in the district which surrounds us. How far I was successful in my efforts for this purpose, I must leave for you to decide.

One thing I confess that I have left undone. When I entered on the duties of my office of Physician to the London Dispensary, I quickly perceived that to cure or to alleviate actual sickness was not all that was necessary to be done. Whilst I saw that it was far more important to confirm and preserve health, I saw that there were many causes constantly operating to disturb, ruin, and destroy it. Had the remedies for these evils been as obvious as the evils themselves, I should have been guilty of heinous negligence, not to say cruelty, in so long delaying to bring them forward. Two great and almost insurmountable obstacles started, to oppose the design which I was not backward to form.

The greater and more important difficulty was, the selection of means capable of bringing about the end so earnestly to be wished.

The other difficulty was, to find a plan by which the desired means, when discovered, might be brought into practice. This difficulty was far less than the former. In casting my eyes around me, over this district, they were soon fixed on your Institution; and I immediately perceived its importance in reference to the object which I had at heart.

Let me tell you, that in countries which are not blessed with the same degree of freedom as this, the diminished liberty of the subject receives some compensation in the zealous care which their Governments exercise over the state of the public health. To us, Englishmen, these laws, however useful, could never be tolerable. What cannot be done by law, must, therefore, be done by persuasion. To many, if not most of the inhabitants of this district, the reasons on which depend the precepts which I am about to offer would be unintelligible. To *you*, who have imbibed the principles of those sciences which are taught in this Institution, they will, I hope, be found both clear and convincing.

Whilst, in the name of our common country, I call upon you to increase her prosperity, by seeking your own well-being, let me intreat you to furnish a plain and irresistible answer to those who call in question the propriety and advantages of an Institution like yours; and who conceive, that to cultivate the native talent, and increase the knowledge of the operatives, is to render them unfit for the discharge of their duties, and to make them dissolute private characters and disaffected subjects.

A celebrated ancient philosopher was one day asked what was the advantage of the doctrines which he taught his disciples. He replied, "That his disciples

did those things of their own accord, which others performed only through the influence and terror of the law." It is for you, in the loud language of actions, to give a similar reply to those who would withhold from you the benefits of philosophy.

It is my intention, in this and in my succeeding Lectures, to explain some of the principal causes which operate injuriously on the condition of the *public health*, more especially in districts situated as that around us (Spitalfields), and briefly to point out the principles on which the remedies should be founded.

It is needless that I should attempt to describe what is to be understood by a state of perfect health; or even that I should enter minutely into the different operations which, during life, are going forward in our bodies. You must all have often heard life compared to a flame; and this simile will suit my purpose tolerably well.

The combustible materials—say, the wick and oil—must not merely be raised to the proper temperature: they must be surrounded by an atmosphere containing a principle capable of supporting combustion; which in this, as in most instances, consists of oxygen, which, as you know, forms a most important part of the air in which we move. So long as the flame is burning, the oxygen is being consumed; and if its supply be limited, the flame becomes fainter and fainter, and ultimately goes out.—The case is the same with life. The supply of oxygen must be constant. The functions of life languish as it is removed; and the portion so consumed enters into a combination, which is as injurious to life, as it is destructive to combustion.

It is not merely necessary that the combustible should have access to oxygen, and be ignited: it is

often necessary, for the continuance of the flame, that protection should be afforded against those accidents which might endanger it.

Thus much of my simile points to those precepts which bear on our relation with the atmosphere; viz. those which treat of AIR and CLOTHING.

When the flame is kindled, when proper air is supplied, when wet and wind, and other causes capable of extinguishing it, are effectually guarded against, a continual supply of the oil or other combustible material is absolutely necessary for the maintenance of the flame. So with respect to human life: our ease and comfort, and even our existence, cannot be assured by air and clothing alone; but from time to time we are under the necessity of repairing the loss of those materials which, in a visible or invisible form, are constantly passing off from our bodies. This, you know, is effected by the food, solid and fluid, which we take into our stomachs, and which, by the important process of digestion, become converted into a part of our bodies.

As the Virgins in the Parable merited the appellation of wise or foolish according to the provision which they made for the burning of their lamps; so, with respect to the preservation of life and health, wisdom or folly may be shewn by our use or abuse of the various articles which we consume in the daily acts of eating and drinking.

To furnish you with some hints on this part of the subject, I shall devote my Second Lecture to the consideration of DIGESTION and DIET.

As I proceed to the next branch of our subject, the simile of a lamp, which I have employed in the illustration, becomes less strictly applicable. But let us help it a little, and carry it somewhat further.

In order that the lighted lamp, or candle, may burn in situations in which its light may answer some useful or agreeable purpose, it is often necessary that it should be conveyed from place to place. Something beyond the mere phænomenon of combustion is called for; and the instrument, which we have made use of as a simile, is brought under the influence of a new and external power, which, if well directed, may render it a source of advantage or enjoyment: and, on the contrary, this force may be misapplied;—the light may be useless, or the flame may be extinguished, or become the cause of mischief and evil.

In that most perfect and complicated of instruments, the human body, we find combined with that which we have compared to the lamp—with its oil, wick, and flame—organs, by which, although possessed of this power of self-motion, it reduces other forces to its subjection, and compels them to become the agents of its locomotion.

It is as needless for me to attempt to enumerate, as it would be difficult to know where to leave off enumerating, what may be done by the combined agency of those powers which man possesses in his own person, and of those which he derives from the objects, animate and inanimate, which surround him.

It is evident, then, that abundant materials for the Third Lecture may be found in the consideration of the LIMBS, the organs or instruments by which the MOVEMENTS of the body are effected.

To this division of the subject will, of course, belong the influence which the health receives from the various bodily exercises performed, either in the way of business or recreation.

Nor can this subject be dismissed without a transient

and cursory glance at those intellectual faculties which have been bestowed on man for the government and direction of the powers of which I have been speaking.

Hence I shall have to notice the mysterious functions of the BRAIN and NERVES, which constitute the parts of our bodies which are in the nearest relation to the intellectual faculties; and to touch on that highly-interesting and important subject, the cultivation and right use of the MIND.

Notwithstanding the strictest attention to the best principles and rules which can be laid down for the preservation of life and health, man, like the lamp to which I have been comparing him, sooner or later yields to the all-conquering hand of time;—the admirable and complicated machine is dissolved, and its place is supplied by a new machine.

The process by which the perpetuation of the species is insured, notwithstanding the dissolution of the individuals who compose it, has no counterpart amongst the works of man's contrivance.

Here, then, I abandon my simile; after remarking, that as, before the flame ceases to flicker in the exhausted socket, the vital spark may be communicated to another lamp, and burn with renovated vigour; so the passing generation will live in that which succeeds it, and the energies of an emulous posterity may be conspicuous, either as a shining light, or as a burning shame.

My Fourth Lecture will be devoted to this subject; in reference to which, the duties of the PRESENT and the claims of the SUCCEEDING GENERATION will be pressed on your serious attention.

The limits to which I must confine myself in the

Four Lectures, of which I have given the outlines, will necessarily prevent me from entering into minute details. I shall endeavour briefly to explain principles, and offer a few suggestions; which must be regarded rather as specimens of the application, than the notice of all that should be done.

AIR, LIGHT, CLEANLINESS, CLOTHING.

A function or process, in its nature resembling what we call respiration or breathing, is performed by all living beings. Even plants breathe; and their leaves are the organs by which their respiration is performed. Polypi, of which you have an example in the jelly-fish, and zoophites, of which you may take sponge for an example, which constitute the lowest links in the chain of animals, perform this function by the whole of their exposed surfaces; but in all animals higher than these, there is a special apparatus for this purpose. In those which live in the water we find various modifications of gills. Thus in the lobster and crab, which belong to a class of animals called crustacea, you know there are spongy bodies, called by some persons *dead-men's flesh.* The oyster, which belongs to another class of animals called mollusca, breathes by means of that part which resembles a fringe, and is called the beard; whilst in the true fish, such as the herring and the shark, we find for the same purpose those parts which are generally known by the name of gills; but even in these there is some variety. On the other hand, those animals which either live in air, or at least breathe it, are provided with lungs, or with organs bearing some resemblance to them. The snail, which I mention as a specimen of the soft animals, or mollusca living in

air, has a kind of lung. The caterpillar, and the animals allied to it, of the insect class, are furnished with two tubes, one on each side of the body, for the reception of air, which finds its way into and out of them by two corresponding rows of small pipes or pores called stigmata. Frogs, turtles, serpents, and other reptiles, have regular lungs, but of a coarse texture: birds breathe by means of lungs of a fine texture, which have, as accessories, various large cavities which receive air from the lungs.

Man, as you know, and those animals which belong to the same class with him, breathe by means of very perfect lungs, which occupy a considerable part of the trunk. The air enters them by the windpipe: this divides; and its branches again and again divide and sub-divide, till its small and delicate branches have conveyed the air into the soft and spongy structure of the lung, in which it is brought into intimate contact with the organ. In man, and in those animals which resemble him in their mode of breathing, the process of respiration is partly *mechanical*, and partly *chemical*.

The mechanical part consists in the admission of air, by the *expansion* of the cavity; which is brought about by the raising of the ribs, and the descent of the diaphragm or midriff; and in the expulsion of the air, when the capacity of the chest is diminished by the falling of the ribs and the raising of the diaphragm. In its passage between the mouth and lungs, the air may be stopped at a narrow part, a little behind the tongue, called the *rima glottidis*. This may happen at our own will, or, at times, by serious or even fatal accident. The air, as it is put in motion in the lungs by the act of taking in and

sending out breath, produces a sound which may be heard through the ribs, and which differs in the healthy and the diseased states of the lung. On this fact is founded the use of the cylinder or stethoscope, an instrument of great advantage in the investigation of the diseases of the chest.

The chemical part of the process consists chiefly in the loss of oxygen gas, and the formation of carbonic acid gas: the one is generally equal to the other. There is, however, some difference, in this respect, between summer and winter. Sometimes there is not merely a loss of a part of the oxygen in the respired air: the quantity of the azote, the other component part of the atmosphere, may likewise be altered: this seems to depend on the season of the year, and on the state of the animal, and particularly on the situation in which it had been placed previously to the examination. The number of respirations per minute varies in different persons, and also in the same person at different times: the mean may be stated at twenty. About one-eighth of the air in the chest is changed in each ordinary act of respiration and inspiration; and, on an average, 666½ cubic feet of air are breathed in twenty-four hours.*

The general conviction of the close connexion between breathing and life is shewn by the expressions, "breath of life," "breathing one's last," "expiring," and the like. The absolute necessity for the constant performance of the changes effected by respiration is fully demonstrated by experiments on animals

* For further details respecting the quantity of air inhaled and vitiated by respiration, consult Dr. Edwards on the Influence of Physical Agents on Life; translated by Dr. Hodgkin and Dr. Fisher, Sir H. Davy, Dr. Bostock, and Dr. Menzies.

which perform the function in water, as well as on those which breathe air. Thus fish die in limited quantities of water, if contact with air be prevented; and the effect will be more striking if the air contained in water has been expelled by boiling.

We need not, then, be surprised at the serious and not unfrequently fatal consequences of those circumstances which interfere with respiration. I shall notice these under different heads.

I.

1. Man, or any other animal, may die from having only a limited quantity of air, which he contaminates himself, and renders unfit for the purposes of life; as when a small animal is placed under a receiver, or when human beings have been confined in air-tight chambers, cases of which kind have occurred in mines, on the irruption of water. As our rooms are not air-tight, it is rare for immediately fatal effects to proceed from the contamination of the air in them by means of the continued respiration of the same portion; yet instances have occurred of persons perishing from close crowding in a confined apartment, of which few instances are more fatal or striking than the case of our countrymen confined in the Black-Hole at Calcutta. This was in 1756; when the Indian Nabob, Surajah Dowla, consigned 146 prisoners to the dungeon so named.

"It was about eight o'clock when these unhappy persons, exhausted by continued action and fatigue, were crammed together into a dungeon about eighteen feet square, in a close sultry night, in Bengal; shut up to the east and south, the only quarters whence

the air could reach them, by dead walls, and by a wall and door to the north; open only to the west by two windows strongly barred with iron, from which they could receive scarce any circulation of fresh air.

"They had been but a few minutes confined, before every one fell into a perspiration so profuse, that no idea can be formed of it. This brought on a raging thirst, which increased in proportion as the body was drained of its moisture. Various expedients were thought of, to give more room and air. Every man was stripped, and every hat put in motion. They several times sat down on their hams; but at each time several of the poor creatures fell, and were instantly suffocated or trodden to death.

"Before nine o'clock, every man's thirst grew intolerable, and respiration difficult. Efforts were again made to force the door, but still in vain. Many insults were used, to provoke the guards to fire upon the prisoners, who grew outrageous, and many of them delirious. 'Water, water!' became the general cry. Some water was brought; but these supplies, like sprinkling water on fire, only served to raise and feed the flames. The confusion became general and horrid, from the cries and ravings for water; and some were trampled to death. This scene of misery proved entertainment to the brutal wretches without, who supplied them with water that they might have the satisfaction of seeing them fight for it, as they phrased it; and held up lights to the bars, that they might lose no part of the inhuman diversion.

"Before eleven o'clock most of the gentlemen were dead, and one-third of the whole. Thirst grew intolerable; but Mr. Holwell kept his mouth moist

by sucking the perspiration out of his shirt-sleeves, and catching the drops as they fell like heavy rain from his head and face. By half-an-hour after eleven, most of the living were in an outrageous delirium. They found that water heightened their uneasiness, and 'Air, air!' was the general cry. Every insult that could be devised against the guard, all the opprobrious names that the Viceroy and his officers could be loaded with, were repeated, to provoke the guard to fire upon them. Every man had eager hopes of meeting the first shot. Then a general prayer to Heaven, to hasten the approach of the flames to the right and left of them, and put a period to their misery. Some expired on others; while a steam arose, as well from the living as the dead, which was very offensive.

"About two o'clock in the morning they crowded so much to the windows, that many died standing, unable to fall by the throng and equal pressure around. When the day broke, the stench arising from the dead bodies was insufferable.

"At that juncture, the soubah, who had received an account of the havoc death had made among them, sent one of his officers to inquire if the Chief survived. Mr. Holwell was shewn to him; and it was near six when an order came for their release.

"Thus they had remained in this infernal prison from eight at night until six in the morning; when the poor remains of one hundred and forty-six souls, being only twenty-three, came out alive, but most of them in a high putrid fever."

In large assemblies, collected in disproportionately small or ill-contrived rooms, a slighter degree of the

same inconvenience is felt; and the accumulation of heat adds to the evil. The lights, if there be any present, burn dimly; the robust are oppressed; and those less able to bear the altered state of the air, faint.

From the extent to which the air of an apartment may be changed through very small crevices, it seldom happens that the diminution of oxygen, or the excess of carbonic acid, produced by the respiration of human beings, is sufficient to lead to any very serious contamination of the air.

Less degrees of it escape attention; yet the constant or frequently-repeated application of the cause cannot fail to produce injurious effects: nor can I doubt that the unhealthy appearance of the poor, who happen to have large families, crowded into small and ill-contrived chambers, and more especially the sickly state of their children, *in part* originate in its agency.

The means of preventing or remedying the evils to which I have alluded, most naturally present themselves, on the consideration of the causes giving rise to them: and you will perhaps say, that I might as well spare you the trouble of listening to a relation of deficiencies produced by the severe and resistless force of poverty, rather than proceeding from ignorance or negligence. Personal observation, however, has convinced me, that in this, as in many other instances, evils are allowed to pass unheeded, or are tamely submitted to, not because they are concealed or trifling, but, on the contrary, because their general and frequent occurrence has rendered them familiar. Thus a room is sometimes rendered insufferably close in consequence of a window, which ought to let in air as well as light, not being so constructed as to allow of its being opened; although the occupier, with a

little pains and ingenuity, might make it do so, by giving a small portion of time to it before or after work, supposing that he may not have the means to get it done by another. Sometimes a window, which might be opened, is kept close, to avoid the draft; although a little management might protect the inmates from this inconvenience. Sometimes a chimney, which is scarcely less useful as a ventilator than as a part of the fire-place, is either blocked up, or wholly wanting. These are defects, for which the greatest poverty can hardly be urged in defence; and those who let apartments to the poor, and more especially those who contrive or construct dwellings for their reception, should be careful to observe and avoid them. (1)

The quantity of carbonic acid is liable to be increased from other causes: and this leads me to the second head.

II.

Combustion, as I have already remarked, like respiration, produces carbonic acid, and often in much larger quantity.

You must all be aware that many persons have lost their lives by exposure to the fumes of charcoal. It is the carbonic acid which is the cause of this.

When this acid exists in small, yet pernicious quantity, it is imperceptible to our eyes and noses: its pernicious effects are insidiously produced; and from its being a much heavier gas, or air, than common air, it occupies the lower part of the room; and thus the victim, as he sinks under its influence, falls more completely into the poison.

Although the effects of the vapour of burning charcoal has been so long known, scarcely a year passes

without several persons coming to an untimely end through its means. Amongst these cases, I cannot, for the purpose of illustration, relate any one more instructive than the following; which, while it sufficiently proves the deadliness of the poison, also shews what may sometimes be successfully done to counteract it.

William Smith, aged 38 years, and a lad 13 years of age, went to bed as usual, on the night of the 23d of November 1807; but they allowed a chafing-dish of burning charcoal to remain at the foot of the bed, whilst the door of the chamber was closed. Between six and seven o'clock the following morning the lad was found dead on the floor—the situation in which, as I have said, the carbonic acid would be the most abundant. The man, who remained in bed, was in a state of suspended animation; but still exhibited some signs of life, like one labouring under an apoplectic fit. Fortunately for this poor fellow, he was almost immediately seen by a physician, no less remarkable for his active benevolence than for his great professional skill. He was quickly removed to another room, to which the fresh external air was freely admitted. It presently occurred to (the late) Dr. Babington, that the influence of galvanism offered the most likely means of recalling the energies of life, and by his prompt exertions the use of a powerful apparatus was soon procured. No time was lost in the interval; and friction, warmth to the extremities, and a moderate bleeding, were had recourse to; though with but little effect, compared to that which was obtained by the galvanic pile, which produced deeper and more efficient inspiration. A supply of pure oxygen-gas was afterwards obtained, and contributed in no small

degree to the completely successful result of the treatment.

The smoke, pyroligneous acid, and other perceptible and in general offensive matters, which, as well as carbonic acid, proceed from the burning of most other combustibles, not only prevent their giving rise to the fatally insidious production of this gas, but are, in most cases, insuperable objections to their being burnt like charcoal, in situations in which danger could arise.

Effects similar to those occasioned by the burning of charcoal may be produced by the fermentation of beer and other liquors; and from the same cause, viz. the formation of carbonic acid. I once knew a lady, who being under the necessity of destroying a favourite lap-dog, had it drowned in this gas, by suspending it in a vat over working beer. Brewers themselves have, I believe, fallen a sacrifice in the same way, by desending into their vats, unconscious of the presence of this invisible poison.

Some soils pour out this gas; and if circumstances favour its accumulation, fatal accidents may occur. A curious, rather than dangerous example of the collection of carbonic acid, from this source, is seen in the far-famed *Grotto del Cane*. Near the floor of this little grotto or cave, the carbonic acid exists in sufficient quantity to prove quickly fatal to dogs taken into it: but at a few feet from the ground this effect is not produced; hence, men enter without danger, and can only perceive the presence of the gas by stooping. I did so, when I visited this grotto; and felt the same stinging sensation in the nose which is excited by placing the head over working beer, or drinking a glass of sparkling cider. The choke-damp, so dan-

gerous an enemy to our coal-miners, is a more serious instance of the evolution of carbonic acid from the earth. It is well for every one to be aware of two or three facts connected with this gas; viz. that it is heavier than common air, and consequently, like water, seeks the lowest place, and that it instantly extinguishes flame. Its presence may thus be easily detected; and should always be sought for, as a matter of precaution, by those who are about to enter mines, or other subterraneous chambers. When discovered, it may often be absorbed by quick-lime, when it cannot be drawn off, or dissipated by ventilation.

III.

There are other gases, which may be mixed with the air, and produce dangerous and fatal effects. Of these, sulphuretted hydrogen is the most important. It is to this gas that rotten eggs, soap-boilers' lees, and many of the fœtid mineral waters, owe their insufferably offensive odour. Undiluted, this gas is one of the most active poisons with which we are acquainted. I have seen a bird introduced into a receiver containing sulphuretted hydrogen, and in the twinkling of an eye it was dead. It is but a few years since a lady lost her life, in Paris, by going into a bath artificially charged with this gas.

Sulphuretted hydrogen is copiously produced by the putrefaction of animal matters: hence its presence in cesspools, drains, and sewers, and the fatal accidents which have repeatedly occurred from exposure to the air of these places. A less abundant mixture of this gas, though not absolutely fatal, must nevertheless be very injurious. Many are the pernicious effects arising from defective draining; and not the

least of these may be ascribed to the gas of which I am speaking. In some districts, remarkable for the pernicious fevers to which they give birth, this gas is so abundant, that silver is quickly tarnished by it. Medical men engaged in extensive practice in this city and its neighbourhood have remarked the much more frequent occurrence of fever in some situations than in others; and they have noticed that these unhealthy spots are precisely those in which imperfect draining allows the air to be loaded with offensive effluvia. A fever of a serious character extensively prevailed in one of the largest establishments in the neighbourhood of Paris, and was apparently, with good reason, attributed to the effluvia of a large open drain which passed close to the premises.

Other poisons besides any of the known gases may be mixed with the air, and render it productive of disease. Our noses convince us that different substances, such as musk and asafœtida, may be dissolved in the air. This is the case with the seeds of many diseases. Hence they often affect great numbers of persons in the same place, and at the same time. They seem to be generated by excrementitious matter of every description thrown off from the body, and also by many other species of filth. The fact, that such matters in the worst state are frequently collected without producing immediately perceptible mischief, is no proof that they are innocent. Certain states of the atmosphere, such as complete and continued calm, greatly promote the operation of these poisons, by favouring their accumulation; whilst an opposite state dissipates and counteracts them. Moreover, sudden changes of temperature, and various debilitating causes, acting generally on the inhabi-

tants, may concur to promote the prevalence of disease, by increasing their liability to it. When we consider how large a portion of the divine moral law relates to our duty to our neighbours, and how much filthy habits are injurious to them, as well as to ourselves if we unhappily adopt them, we surely need feel no hesitation in admitting the truth of the remark, that *cleanliness is next to godliness.*

Many of the precepts in the Mosaic Law are admirably calculated to promote individual and public health. There is one in particular, which enjoins the careful removal of offensive matter; the spirit of which might with advantage be religiously observed in the present day. Sir John Pringle, who most carefully studied the health of our armies, informs us, that, in two or three campaigns in which he was present, the want of care with respect to the camp privies was as destructive to our soldiers as the valour of the enemy. A few years ago, I was myself a witness to the prevalence of a severe dysenteric affection which prevailed amongst a number of Belgian brick-makers who were employed in the neighbourhood of Paris, and in whom the malady appeared, in great part at least, to depend on the extreme negligence with which they allowed excrementitious matters to accumulate, in hot weather, around the hovel which they inhabited. There is no one, who has taken any interest in the history of our nautical affairs, who can be ignorant of the vast improvement in the health of our sailors, and of the impunity with which they have made the longest voyages, since the importance of cleanliness and ventilation has been so well understood in our navy, and by the masters of private vessels. You are probably aware, that the

plague, in its most fearful forms, used formerly to visit, with almost exterminating severity, many cities in which it has long since been wholly unknown:—London affords one of the most striking examples which I could adduce. It is to the improved construction of these cities, and still more to the improved and more cleanly arrangements of their inhabitants, that this happy change is to be, in a great measure, attributed.

When we learn from modern travellers the present state of those places in which the plague is known still at times to prevail, we need feel no surprise that they do not participate in the exemption with which we are blessed. In some of these places, troops of wandering dogs are almost the only scavengers, to whom the filthy inhabitants supply abundant employment. In others, not only is drainage neglected, but the paths, being in part composed of wood, retain moisture, and add to the corrupting sources of disease.

Though our country has long been favoured to escape the plague, yet we are at times visited with prevailing fevers of greater or less severity. Now, it is notorious that these epidemics almost invariably break out in the closest and most filthy and crowded parts of our large cities and towns; such as, London, Edinburgh, Dublin, and Cork. To these parts they are often confined; and when they spread beyond these limits, it is still within them that they are the most severely felt. (2)

The arrangement of houses in narrow streets, confined courts, and closes without thoroughfares, tends very powerfully to make the different causes of disease existing in the air more certainly noxious.

In the district of Spitalfields, many of the evils which I have been pointing out must by many of you be well known to exist. In some parts the arrangement of the houses is badly contrived. This is an evil which we cannot hope to see remedied; unless from time to time, when favourable opportunities occur, something were to be done by the rebuilding or removal of badly-placed houses. The neglect of these opportunities is a sin of omission springing from negligence or avarice; and repeats, on a smaller scale, the folly of our predecessors, when they allowed London to rise from its ashes with its original deformity.

In quarters like this, which are inhabited by the poor, and in which thickness of population combines with many other causes for the production of refuse and filthy matter of every description, the means for their removal ought at least to be nearly as much attended to as in situations less productive of offensive matters. Though the expense of underground draining precludes the adoption of this salutary measure in those situations in which it would otherwise seem to be peculiarly called for, the superficial gutters ought at least to be so far attended to, as to provide for the spontaneous running off of foul waters; and the persons charged with the inspection of the streets ought not to be suffered to relax in their duty of seeing that more solid matters are not suffered to accumulate. Both of these points I have noticed to be, in some places, very nearly or altogether neglected. The pavement, sunk into large and deep holes, presents pools of stagnant and offensive water, which, being excluded from the influence of the sun and wind, are never dried up by the greatest heats of

summer; but are constantly present, to assist, by maceration, in the corruption and putrefaction of the various animal and vegetable offals which are thrown into them.

In one street which I had occasion to visit week after week, my attention was attracted to the broad gutter which occupied a large portion of the middle of the road. It was filled rather with mud than water: long stagnation had covered its surface with a filthy green scum. I watched its condition, as shewn by various old utensils collected in it; but could discover no change, but that of increase. I had a patient sick of fever in this street; and when he happily recovered, in spite of his disadvantageous residence, I found a difficulty in allowing him to go out of doors into the air, which, under different circumstances, would have been extremely desirable.

Circumstances were almost as bad in some of the immediately adjoining streets. I might describe nearly the same state of things in other situations: but were I to single them out and describe them, it might be imagined that I had selected glaring exceptions to the general state of things, rather than specimens pretty faithfully affording an idea of a large portion of the district. It will suffice to mention Flower-and-Dean Street, and Pelham Street, which, from my having frequently had occasion to pass through them, more particularly recur to my recollection*. They appeared almost wholly to have escaped

* The striking exceptions to cleanliness, cited in this Lecture, by way of illustration, have been materially altered for the better since my observations were made; yet in these, as well as in many other situations, there is great room for further amendment.

the attention of both the paviour and the scavenger; and as they are by no means contiguously situated, it was clear that this neglect was not limited to one part of the district.

Some parts of Petticoat Lane, Wentworth Street, and the adjoining alleys, are often dirty fords, rather than paths.

I will cite only one more instance, and that on the opposite side of Bishopsgate Street.

In one of the low, confined courts in that direction, I observed a considerable pile of filth. As it was manifestly no recent deposit, I inquired what length of time it had been there; and was informed, not less than between two and three months, and that during the heat of autumn.

These evils are not wholly produced by the negligence of those appointed to clean the streets; but are, in part, occasioned by the uncleanly habit of throwing all sorts of refuse, solid and fluid, out at the front doors, producing holes which retain moisture. Even where desirable but expensive improvements cannot be made, much might be effected by the cleanly habits and united exertions of the inhabitants. Their attempts at cleaning, when made, are often limited to washing two or three small stones near the door; which, like the streaks washed by the tears rolling down the cheeks of a climbing-sweep, seem to heighten the effect of misery.

The state of the streets, which I have been pointing out, cannot fail to have a most injurious effect on the interior of the houses.

If we proceed to examine how far this is the case, we shall very likely find the mother of a family who had spent the flower of her age and the prime of her

strength in service, in which she may have been a pattern of order and cleanliness, but who, from the difficulties which surround her, and from the influence of pernicious example, may have allowed all her cleanly habits to give place to the most disgusting filth. Much must be admitted in her excuse.

In situations such as I have described, without unremitted and painful exertions, cleanliness cannot be maintained.

The father of the family is perhaps engaged in some laborious employment, which unavoidably and constantly occasions the soiling of his person and clothes: fatigued by his exertions, he, at first occasionally, but afterwards habitually, neglects the healthful practice of cleansing himself after work, which he had probably been scrupulous to observe whilst seeking to obtain his neat and cleanly wife. She, on her part, no longer stimulated by the emulation of her equals, or the praise or censure of her superiors, not only countenances, but imitates the neglect, and allows the accumulation of the dirt, unavoidably brought into the house by her husband, or carelessly permitted to be done so by her children, who play in the streets of which I have described the condition.

As it would be in vain to attempt to make one part clean whilst others remain dirty, the floor, the walls, and the furniture, are alike neglected; whilst it may be, that an ill-constructed chimney fails to carry off the smoke, which blackens the ceiling, and darkens the room. Filth, thus brought into the dwellings, not merely contaminates the air which is breathed, but acts directly on the surface of the body.

To make myself intelligible on this point, I must say a few words on the part performed by the skin.

Besides the excrementitious matter which we part with, in a visible form, from the kidneys and bowels, there is a constant but invisible loss, both from the lungs, producing carbonic acid and moisture dissolved in the air, and also from the surface of the body, in the form of vapour or perspiration. This varies in different individuals, and at different times of the day; but probably amounts, on an average, to about two pounds in the course of the day.

You must all be aware that many diseases are attributed to checked perspiration. The right performance of this excretion must, then, be of great importance. For this the skin must be healthy. Want of cleanliness deranges it, and obstructs its pores.

The unhealthy secretion, by being allowed to remain on the skin itself, or the clothes which cover it, becomes not only offensive, and favourable to the multiplication of every species of vermin, but highly irritating, and productive of a great variety of loathsome and distressing eruptions.

Far be it from me to express, or even to entertain an idea approaching to a want of feeling for the miseries and privations inseparable from poverty; but I do not hesitate to declare, from repeated and careful observation, that the habits of too many of the poor promote and foster various errors of negligence and omission, which not only render poverty more distressing and degrading, but which also tend to perpetuate it, and at the same time render it more exposed to the attacks and ravages of disease.

It is too often from habitual negligence and indifference, rather than from unavoidable necessity, that the females, in the dwellings of the poor, suffer and permit the state of things of which I have com-

plained; and a day's, or even half a day's absence from work, to which the males have for the most part only too often to submit, would, if not idly wasted, afford them ample opportunity to purify and enliven the walls and ceilings, by the very healthful application of white-wash or lime.

The temporary sacrifice of some useless, or, it might be, even necessary indulgence would be profitably submitted to, to procure the requisite but unexpensive materials. The apartments would then be cheerfully light; and the appearance of the furniture and the inmates would amply repay the pains of keeping them clean and in order; and would recommend the family to the respect of their neighbours, and to the regard and patronage of their superiors.

Much might be said in favour of the healthful influence, and numerous other advantages of cleanliness; but I trust I need not urge them further, on the present occasion. Nothing is more essential to the maintenance of cleanliness in the interior and on the exterior of the houses, as well as of the persons of their inmates, than a liberal and constant supply of good water. In this city, water is, on the whole, remarkably well distributed: interruptions to its supply may at times accidentally and unavoidably take place, yet the want of it is more often the result of private misapplication than of general deficiency. The application of water to the cleansing of the streets and the interior of the houses, is too obvious to require pointing out. ([3])

Its employment for the purification of the body, in the various forms of baths in which it may be applied, is, however, far too much neglected in this country,

and seems to require that I should say something respecting it. The simplest form is doubtless the cold bath; but as its cleansing effects are inferior to those of the warm bath, and as during a large portion of the year it is not only ungrateful to the feelings in our climate, but of doubtful advantage to those whose constitutions a city life has rendered the reverse of robust, I shall only observe respecting it, that a momentary plunge, if followed by a general glow of warmth over the body, greatly promotes the restoration and preservation of health. The warm bath, which in almost every other country in Europe is regarded by all classes of society as an object of necessity, is, in this country, far too generally considered as an extravagant and effeminate luxury, or shunned as a debilitating indulgence, to be seldom had recourse to, except under circumstances of sickness (4), or other emergency.

I readily admit, that the long continuance in baths of high temperature is likely to impair the health and strength; but I am very certain that the moderate use of the warm bath would be one of the most effectual means of promoting, not only the cleanliness, but also the health and vigour of most individuals of the labouring class in this country.

I am greatly mistaken if the adoption of this recommendation might not be rendered as easily practicable, as I believe it would be salutary.

The numerous steam-engines which are employed in our manufactories are almost continually pouring out, as waste, vast quantities of hot water; which might readily be devoted to the purpose which I have recommended, at so inconsiderable an expense, as would place the warm bath within the reach of the

poorest individual, who finds the means of procuring hurtful and debasing indulgences.

The most economical application of warmth and water to the purposes of a bath is to be found in the vapour-bath. Its cleansing power is equal, if not superior, to that of the warm bath itself: and if we may judge from the eagerness with which it is sought after, as a gratification, both by rich and poor in Russia, we cannot doubt its being equally grateful to the feelings.

If neither the cold, nor the warm, nor the vapour bath can be had recourse to, a valuable substitute may be found in the daily sponging of the whole surface of the body with cold or tepid water. This practice ought to be strictly adhered to by those whose occupations either expose them to dirt, or excite the skin to copious perspiration. It not only removes impurities from the surface of the body, but, as it were, case-hardens it against vicissitudes in temperature and humidity. (5)

The healthful condition of the skin will be essentially promoted by the means which I have described.

There is another point which claims our attention with respect to the skin; namely, CLOTHING.

The essential objects to be gained by clothing, are, decency, preservation of animal heat, and protection against the inclemencies of the seasons. Of the first I need say nothing: the second and third will generally be regulated by the feelings of the individual, if indigence do not deprive him of the means of attending to them.

It would be foreign to my purpose to speak of the forms of dress, which good or bad taste, as the one or

the other may happen to gain an accidental sway, causes to prevail with the sanction of fashion, if appearance alone were concerned in those vagaries which too often injure the form and health of the body. Both of these evils may be occasioned by too great tightness of the dress. Thus, in men, tight neck-cloths have induced a full state of the head, and occasioned apoplexy; of which I have been told that sufficient evidence was afforded when an evil of this kind prevailed amongst our troops. Tight belts, and the stays of dandies, give an unnatural form to the body; and not only disturb respiration, but interfere with the viscera of the abdomen. Tight garters promote an untractable disease of the veins. Tight boots and gaiters have produced permanent lameness, by injuring the legs; and the suffering and distortion from the pinching of shoes is so common, that comparatively few adults have sound feet.

Such are the evils to which men are subjected by the faults in their clothing. But they are trifling, when compared with those which females voluntarily inflict on themselves, by similar means. Amongst the foremost of these mischiefs are the results of tight-lacing in stays. This not only interferes with the breathing, the prime importance of which I have already explained, but permanently distorts the figure. In examining the bodies of the dead, I have frequently found the lower ribs of females greatly compressed and deformed; contracting that which should be the most capacious part of the chest, and limiting its very necessary movements. I have repeatedly seen the liver greatly misshapen by the unnatural pressure to which it had been subjected, and the diaphragm or midriff very much displaced. It is not only by these

sins of commission that the health of females is perniciously influenced. Whilst the important movements of the waist are impeded by forcible compression, the upper portions, for some distance above and below the collar-bones, are often left unprotected. It can scarcely be doubted, that to this circumstance must in some measure be attributed the fact, that in a large majority, probably not less than nineteen cases out of twenty, that fatal disease, consumption of the lungs, commences its destructive effects at these parts. (6)

In seeking to preserve the warmth of the body by clothing, care should be taken not to promote too great a degree of heat, either by quantity or quality of the clothes. By error in this respect, the body is weakened, the skin becomes too sensitive, perspiration is too much excited, and the probabilities, as well as the dangers of its suppression, are increased.

In rendering the dress a protection against the inclemencies of the seasons, care should be taken that it may not retain that which ought to pass off as insensible perspiration from the skin. The materials should be light, and not conductors of heat; and though such as defend from wet, they ought not to be what is called water-proof. Coverings of this kind are, however, not only allowable, but very useful as a temporary protection to other garments; but they ought on no account to be worn for many hours, and should not envelope the body, either closely or entirely. Another important quality in the materials for clothing, is, a ready capability of purification.

Woollen articles possess most of the qualities which I have now mentioned as requisite; but they are not so easily cleansed as some others, which, on this account, admit of more frequent renewal, and are gene-

rally placed next to the skin. Beneath these last, a flannel waistcoat might nevertheless be generally worn with advantage, during the day-time, without prejudice to cleanliness.

Sir John Pringle, who accompanied our army into the North at the time of the Rebellion, relates, that the health of the soldiers was greatly promoted by their wearing flannel-waistcoats, with which they had been supplied, on their march, by some of the Society of Friends; who by this act proved at once their loyalty, and their desire to preserve life.

I need not take up your time by noticing the comparative merits of linen and cotton. The greater cheapness of the latter must necessarily cause it to be generally employed; and would allow even the poor to make those frequent changes which it peculiarly requires.

There yet remains one other point for me to notice, before I conclude this Lecture.

Every one may be convinced, by his own observation, of the great effect of the presence or absence of light on the growth of plants.

As animal life exhibits less striking changes, the influence of light upon it is, in general, wholly lost sight of.

The following experiment, performed by Dr. Edwards, can leave no doubt as to its reality and power.

Frogs, you know, in passing from the egg to maturity, go through an intermediate state, in which they are called tadpoles. They then not only have no limbs, and possess a tail; but, like fishes, live in water, and breathe by means of gills, instead of lungs.

Dr. Edwards took a considerable number of frogs

in this state; and, dividing them into two portions, placed them under water in perfectly similar circumstances; except that the one portion was exposed to light, and the other excluded from it.

This difference had the very remarkable effect of retarding the transformation of the latter to the state of perfect frogs.

Whilst the tadpoles in the light had undergone this change, several of those in the dark retained their original form, but had greatly increased in size. The effect of the absence of light appears likewise to be shewn in the colour and structure of the proteus, and some other animals which inhabit situations into which light never enters.

We cannot suppose that man is altogether insensible to the influence of an agent which is capable of producing so marked an effect on inferior animals; and we can scarcely refrain from in part attributing to this cause, not only the peculiar appearance and the prevalence of a particular kind of rickets, accompanied by idiocy, and known by the name of cretinism amongst the inhabitants of some deep and shaded valleys, but also the sallow and sickly complexions of the inhabitants of confined cities, when compared with the ruddy glow on the cheeks of the peasant.

The recommendation which I have already given, with respect to the white-washing of the interior of the houses, would improve their light as well as cleanliness.

The narrowness of the streets, in conjunction with the height of the houses, offers a great and almost irremediable obstacle to the free access of light: and as we can only hope to see it partially removed, it becomes the more important to turn the admitted rays

of the sun to the greatest advantage. This is far from being done.

The dark and almost black external walls absorb nearly all the light which falls upon them: hence little or no benefit is gained from reflection.

An easy remedy is to be found, in whitening the walls. The means of doing this are within the reach of all; since the object might be effected by the cheapest lime-wash, as well as by the most costly stucco.

I would strongly recommend, that in narrow and confined streets the process should be performed regularly and annually. The fall of the year would be the best season, as the fresh white would then afford some compensation for the shortness and dulness of the days. In doing so, we have Nature herself for our guide; for we see her in winter overspread every thing with a covering of the purest white. Before the return of long and bright days could render the general prevalence of white injurious or unpleasant to the eyes, the smoke of innumerable chimneys would have sufficiently changed the colour, to do away all danger of this kind. The influence of the measure which I am suggesting, would not be confined to day-time and twilight. In increasing the effect of the street lamps, its advantages would be still more conspicuous. ([7])

I shall here conclude the remarks which I have thought it necessary to offer respecting the promotion of health, by the management of those agents which, like the air, exert their influence on the exterior of our bodies. I do not pretend to have advanced any new principles: I have merely endeavoured to bring forward some, which, though well known and salutary, have been too much lost sight of and neglected.

In the suggestions which I have offered for carrying them into operation, I have scrupulously endeavoured to confine myself to measures which experience has shewn to be practicable.

In proof of this assertion, I do not merely appeal to insulated examples of individuals, whose superior sense and good management have led them to make the best of their circumstances and insure their present com fort and future prosperity, whilst they afford a bright contrast with the majority which surround them.

I need not point out limited districts, in which the poorer classes have adopted a higher and a better standard; but I will refer you to the entire population of a neighbouring country, who have long been in the practice of most of the salutary measures which I have inculcated. The Dutch, in spite of a general slowness of motion, which cannot fail to be very striking to those who visit their country, by their perseverance, fore-thought and order, and by an attention to cleanliness which seems to border on devotion, maintain that universal evidence of neatness, purity, and comfort, which, whilst it is delightful for others to behold, provides for themselves, amongst many other advantages, the surest protection against the unhealthy influence of the low and fenny district which they inhabit. The streets, the houses, and the persons of all classes in Holland, plainly manifest how completely the care which I have been recommending has become a part of their national character. Whilst it affords a general safeguard against the miseries of extreme indigence, it induces those who form the unhappy but rare exceptions to be cleanly in their rags and meanest dwellings.

I now take leave of you for the present occasion,

with the ardent wish that the poorest of my neighbours and countrymen would so strive to imitate this delightful and encouraging example of their neighbours, as to prove that British zeal and activity, which have so often triumphed over difficulties, are not excited to emulation in vain, only when their own well-being is the prize.

ADDITIONS AND NOTES

TO

THE FIRST LECTURE.

ADDITION TO PAGE 12.

An accident occurred a few years ago, in one of the mines in this country, which, from some of the circumstances attending it, seems to deserve brief relation in these Notes. Several miners were suddenly cut off from retreat, in a gallery of the mine in which they were at work. They had not been very long shut in, when their own uneasy sensations, and the faint burning of their lights, evinced the deterioration of their limited quantity of air. They were not without a small supply of water; and one of the men happened to have with him some provision for a meal, which he had not taken before the accident. The men were perfectly aware of their perilous situation; but they were not without hope that efforts would be made for their deliverance. They awaited the result with patient and, I believe, Christian resignation. This state of mind, together with some regulations to which they agreed to conform, doubtless favoured their safety, as well as comfort, during the period of anxious waiting to which they were subjected. The man who had brought some provisions with him gave them up for the general good: and I must observe, that this act of disinterested kindness to his companions was no less advantageous to himself than to those whose wants he was able to relieve. From the difficulty of getting at the men from without, some days elapsed before succour could reach them.—It is difficult to account for even the small supply of air by which the little company was enabled to live. Possibly a part was supplied by exhalation from the sides of the mine; and a part may also have arisen from the water in which it might have been dissolved.

The prevailing tranquillity of these men was a most favourable circumstance, since it tended to keep down both

respiration and circulation ; as the opposite state would, in all probability, have affected both. This certain fact should be borne in mind by all those who may be exposed to similar dangers. The almost total privation of food, though it threatened the company with death by starvation, was a most important advantage as regarded their capability of enduring the deterioration of the air ; since it has been shewn that after a meal a larger quantity of oxygen is required to be consumed, and the want of supply is exhibited in the greater distress felt by those who have eaten : hence the workman who generously devoted his little stock of food to his companions was perhaps the greater gainer by the sacrifice. I may observe, by the way, that fasting is found to be very conducive to the comfort of those who ascend lofty mountains. The same reasoning holds good in this case, as in that of those who are threatened with asphyxia by confinement in small apartments. One precaution was omitted ;—and I mention it here, in order to extend a hint which may be advantageously remembered by any individuals who may happen to be similarly shut up in a limited amount of air. It would have been better, had they contented themselves in total darkness.

Situations like that in which these miners were shut up, are apt to become distressingly warm as well as close. It is therefore desirable to check the production of animal heat ;—a point best secured by the absence of all exercise, and the diminution of clothing. The judicious employment of means, in the treatment of those who may be rescued from such a lengthened confinement, is of great importance ; and every kind of stimulant, and, in particular, the supply of food, both liquid and solid, should be made with great reserve.

NOTE (1.) PAGE 14.

From personal observation, I fully concur in the following remarks, extracted from a Circular issued by the Poor-Law Commissioners :—

" The Commissioners have seen frequent occasion to regret that the abodes of the labouring classes—and more especially those in which the greatest proportion of cases of destitution

arise—are rarely visited, and in many districts are entirely unseen and unknown by their superiors in station. The facts set forth in the Medical Reports to which the Commissioners refer, were received with surprise by persons who were not aware of the condition in which their own labourers were living, or of the neglected and dangerous condition of their own immediate neighbourhoods. The Commissioners have been informed, that the knowledge already promulgated on the subject has led to much voluntary and beneficial exertion for amendment, in draining and cleansing, and in various other improvements in the external economy of the labourers' residences. In the administration of relief, the Guardians act upon imperfect information when they have not the knowledge of the habits and important circumstances influencing the condition of the pauperized classes, which can only be obtained by a personal inspection of their usual places of residence."

The importance of providing suitable dwellings for the working-classes is a subject which has never obtained the general consideration which it merits. There is not an apartment, however miserable, whether in a garret reached by a dark and broken staircase, or in a cellar without light or ventilation and to which access is gained by a ladder,—or a hut, consisting of one small apartment on the ground, devoid of the most necessary accommodations, and without drainage, —which does not meet with ready occupancy, wherever there happens to be a numerous poor population. The many and serious evils inseparable from such dwellings are incalculably aggravated by their accumulation: and yet, in connection with nearly all our cities and large towns, and even in some of smaller size, quarters may be found in which the evil exists. A recent investigation of a part of Westminster has furnished a picture of one of these districts; and it is to be feared that it only bears too close a resemblance to several others in and about London. It is easy to conceive the physical evils of such crowding, want of ventilation, and filth; and to imagine the numerous forms of bodily disease, and the serious epidemics, which are likely to be generated and extended in such

quarters. It is equally obvious, that where decency and decorum are violated, and the most corrupting and revolting associations are not only promoted but rendered unavoidable, the moral evils which result from them must be enormous; and it is no marvel that such quarters are nurseries of the criminals who fill our jails.

I cannot regard those who construct the miserable tenements to which I have alluded, or who devote the apartments of larger houses to the kind of occupancy which I have pointed out, as less than criminal, since they are guilty of sinning against the best interests of their country. When once families or individuals have been driven to these haunts —and necessity may drive some to take refuge in the worst dwellings, and under the worst shelter which may offer itself —their doom is almost necessarily fixed. How are they to rise from such a sink, in which every surrounding influence tends farther to depress them? and how can they extricate themselves from the contaminations of an association, the name of which is an injury to their character, which causes them to meet with repulse when they attempt to escape from it? The contrast of these evils is exhibited in the very laudable attempts which, in some instances, have been made to increase the comforts and accommodations of the dwellings of the poor. It is not my object to enter into a description of these, or to inquire what we may do, or how far we may go for this purpose, by means of Societies and the like, without in some degree defeating our object, by creating a state of dependence and a want of exertion: yet I cannot omit to commend the recent efforts of the Poor-Law Commissioners to promote improvement in regard to many of the points to which I have adverted.

My friend Joseph Marriage, of Chelmsford, has long devoted a portion of his time and property to exhibit the practical result of providing suitable dwellings for the labouring classes; and he has had the great satisfaction of witnessing the success of the arrangements which he recommends, not merely in instances in which he has himself put it to the test, but on a much larger scale, upon the

estates of extensive landed proprietors. Instead of a miserable peasantry, crowded into dwellings insufficient in the number and convenience of their apartments, and who deteriorated rather than enriched the property on which they were settled, the poor people have been reformed themselves in the reformation of their dwellings; and the benevolence of the landowner has been rewarded by the increased value of his estate, and by the larger and more regular returns derived from it.—Joseph Marriage has laid it down as a principle, that every labourer's tenement should consist of at least a day-room, and three sleeping-rooms; being one for the parents, and one for the children of each sex. When the family does not require this number of bed-rooms, the spare room may be occupied by single men, to whom residence in an orderly family may prove both a comfort and a protection.

The evils which result from defective ventilation being so considerable, as has been pointed out, it is evident that the application of the best means to secure a proper supply of air in private rooms and places of assembly is a subject of great and general importance. Dr. Arnot, to whom we are indebted for an admirable method of obtaining cheap warmth, has likewise pointed out the scientific and practical means by which the requisite renewal of the air may be secured, and the loss of our open chimneys, consequent on the introduction of his stoves, may be completely made up. The foul air escapes, as it ought to do, from the upper part of the apartment; and that which supplies its place is admitted without producing a dangerous and disagreeable current of air.

Dr. Jackson, an army physician of great talent and industry, which he devoted for a long time, with the advantage of the most varied and extensive opportunities, to the investigation of the diseases of soldiers, after insisting on height of roof as a property of great importance in a house appropriated to the sick of armies, assigns as a reason, that the air being contaminated by the breathings of a crowd of people in a confined space, disease is originated, and mortality is multiplied to an extraordinary extent. It was often proved, in the history of the late war, that more human life was destroyed

by accumulating sick men in low and ill-ventilated apartments, than by leaving them exposed, in severe and inclement weather, at the side of a hedge or common dike.

In the summer of 1831, a low typhoid fever broke out in the 4th battalion of the Royals, then quartered in Stirling Castle. In many instances, violent inflammation of the lungs supervened, and the result of the two diseases was generally fatal. On investigating the circumstances of this fever, it was found, that rooms of 21 feet by 18 were occupied by sixty-eight men, and that others of 31 feet by 21 were occupied by seventy-two men, To prevent suffocation, the windows were kept open all night; so that the men were exposed at once to strong currents of air, and to the heated and concentrated animal effluvia necessarily existing in such crowded apartments; thus subjecting them to the combined efforts of typhus fever and of pneumonic inflammation. In the less-crowded apartments of the same barrack no instances of fever occurred.

A Memoir by the late Dr. Joseph Clarke of Dublin, read before one of the Meetings of the British Association at Edinburgh in September 1834, consisted of an abstract of a Registry kept in the Lying-in Hospital in Dublin from 1758 to the end of 1833; from which it appeared, "that, in 1781, every sixth child died within nine days after birth, of convulsive disease; and that after means of thorough ventilation had been adopted, the mortality of infants, in five succeeding years, was reduced to nearly one in twenty."

ADDITION TO PAGE 16.

At Pyrmont, in the territories of the Prince of Lippi Detmold, there is a grotto which, like the Grotto del Cane, is remarkable for the accumulation of carbonic acid which takes place in it. It is on a much larger scale than the Grotto del Cane, and presents some interesting phænomena. A semicircular excavation, somewhat resembling a Greek theatre, has been cut in the side of a hill. The curved side of this excavation presents a gradual slope, forming a sort of half funnel: the straight side is vertical; and at the bottom of

this side a second excavation forms a chamber of considerable size. The carbonic acid rises both in this apartment and at the bottom of the excavation before it; but it rises to a variable height, dependent on the state of the weather and other causes. Its height may be ascertained by lowering a wisp of lighted straw, which is extinguished immediately on entering the gas; but it will sometimes burst into a flame again, if quickly withdrawn from it. The bottom of the semicircular excavation, when I visited the grotto, was strewed with the dead birds, which, from the invisibility of the gas, had most likely flown into it, unconscious of their danger; just as workmen have lost their lives by descending into wells and pits in which this gas had been collected.

NOTE (2.) PAGE 20.

I HAVE no doubt that it is to the existence of such quarters that the larger proportion of fever-cases reported from city districts, as compared with those of the country, is to be attributed. If the comparison were made between dwellings in those parts of London in which the drainage is good and cleanliness carefully attended to in the streets and houses, and an equal number of farm-houses, I believe the result would exhibit the proportions completely reversed. In the former, we rarely find typhus fever affecting several members of one family, whilst this is often the case in the latter. It is to the faulty drainage which often manifestly exists in the neighbourhood of farm-houses, that this fact, so inconsistent with their otherwise healthy situation, must, I conceive, be mainly attributed.

In the poor districts in and about London, which produce the great majority of fever-cases, many streets are wholly deficient in underground draining. It is satisfactory to know that this subject has obtained the serious attention of the Select Committee on the Health of Towns, which has received the important depositions of many able and experienced persons. My friend M. F. Wagstaffe has, in particular, furnished much valuable information regarding the Lambeth District. In connection with this subject, I cannot

withhold the expression of my deep regret at the rapid increase of houses of an inferior or moderate description in low and perfectly level situations, in which adequate drainage cannot possibly be obtained. Many families will doubtless be transferred to these quarters, with the hope of finding purer air, who, in this respect, might be better off in the City itself.

NOTE (3.) PAGE 26.

WITH respect to the application of water to the cleansing of streets, canals, sewers, drains, and in short all those purposes which belong to public rather than private cleanliness, it may not be amiss for me here to introduce an extract from my "Hints relating to the Cholera in London," published since the delivery of these Lectures.

"In many of the superior parts of the town, conspicuous, and I may say liberal attention, has already been paid to the promotion of cleanliness: nevertheless, the well-intended measures which have been adopted, require, in some instances, considerable amendment. In illustration of this remark, I may point out the misapplication of the very important and abundant supply of water, which has been so laudably afforded. I have regretted to see it wasted in torrents, from the fire-plugs to the kennels; while the purity with which it flowed, shewed the little part which it performed in removing the impurities against which it was ostensibly directed. Almost the only beneficial influence of the flow of water is directed to the large under-ground drains; which perhaps require the least attention of this kind, since they almost exclusively receive the whole amount of rain which falls over the city, and, after all, from their size, can be very little affected by any temporary artificial supply of water. The water afforded ought to be so generally and extensively applied, as effectually to cleanse the streets: instead of which, it merely produces partial injury to the pavement. I lay the more stress on this, because the quantity of rain which has lately fallen has not been sufficient to effect the general washing of the streets; and experience has shewn, that, in sickly times, disease is promoted by the rains which follow a

comparatively dry period. The care which I am anxious to obtain would tend to obviate this. It is quite as important that the supply of water should be devoted to the cleansing of small streets and courts, with their drains and sewers: and special attention should be paid to house-drains, which not only receive the largest quantity of absolute filth with the smallest proportion of fluid to carry it off, but are necessarily so situated, as to apply their noxious effluvia permanently and closely to the persons of the inhabitants."

NOTE (4.) P. 27.

The portable warm-baths which have been introduced, in imitation of our neighbours the French, are not only a valuable addition to our comforts, but, in cases of illness, the benefits to be derived from them are very important. They are not, however, within reach of the labouring classes, by whom the use of the warm-bath is most required.

NOTE (5.) P. 28.

I am desirous of more strongly impressing the great advantage to be derived from the daily general washing of the body with cold or cool water. No difficulty of expense or loss of time can be urged against it; since the operation can be performed in a very few minutes, and requires nothing more than a bason of water and a coarse towel. Many persons also use a sponge; but a wet towel is more convenient, more effectual, and less unpleasant to the feelings. It may be employed by the most delicate and susceptible persons, in the very coldest season of the year, if they will only take care, at the commencement, to avoid long exposure, and the use of a large quantity of water. I believe this kind of ablution to be the most powerful means of guarding against the injurious influence of our variable climate; and I know that it affords the most valuable aid to convalescence from various lingering diseases. It restores and preserves the healthful functions of the skin, the importance of which are becoming increasingly known and appreciated. We owe much to the labours of Dr. Edwards, who has followed up the

researches of Sanctorius on this subject. More recently, Dr. Fourcault has received the gold medal of the Royal Academy of Sciences in Paris, for the additional light which he has thrown upon it. He has clearly shewn the intimate relation which exists between the disturbed functions of the skin and several serious diseases. That fatal affection of the kidneys which has been made known by the researches of Dr. Bright may, in many cases, be traced to the interruption of sensible or insensible perspiration: hence there are no means more important for its prevention than those which secure the healthy action of the skin, of which the general ablution here recommended, and the due regulation of clothing, are the chief. I would here take occasion to offer another remark connected with this subject. Although the interruption of perspiration is a serious cause of disease, undue evaporation from the surface is no less to be dreaded. The proverbially ungenial influence of a dry east wind is perhaps chiefly to be attributed to its producing this effect; and I cannot doubt that the convenient and easy mode of travelling by railroad may be liable to some objection on this principle, unless the clothing of the traveller, or the inclosure of the carriage, afford protection against the influence of rapid motion through the air.

NOTE (6.) PAGE 30.

"In ten females, about eight-years-and-a-half of age, belonging to a flax-mill, and who were labouring under no disease, Mr. Thackrah found the average to be only three-pints-and-a-half of air exhaled from the lungs at one effort; while in young men of the same age it amounted to six pints. Some allowance is to be made for the naturally smaller capacity of the lungs in females than in males; but Mr. Thackrah is satisfied that the above remarkable difference is attributable chiefly to the lacing of the chest."

The folly of the mode of dressing the chest now almost universally adopted by females is not confined to the dangerous exposure of the upper and serious compression of the lower part. That part of the garment which belongs to the

shoulder, and should support the dress without interfering with the movements of the arm, is placed nearly midway between the shoulder and elbow, where it manifestly imposes a restraint, which, whether the wearer be a child or an adult, is so inconsistent with comfort as to do away with all idea of taste and ornament.

The injurious consequences of confiding the regulation of the form of our clothes to persons of vitiated taste, and entire ignorance of the economy of the parts of the body which it is their business to cover, may be strikingly seen, as well as painfully felt, in the handy works of the boot and shoemaker, which give abundant occupation to empirical corn-cutters and chiropodists. Whilst the form of the shoe is made to resemble the head and shoulders of a coffin, rather than the natural figure of the human foot, it cannot be surprising that the imprisoned toes should become miserably distorted. The most frequent and general mischief consists in bending outwards the two last joints of the great toe. There is considerable loss of power in this contortion of the great toe, which, from its natural position, and from the muscles which are attached to it, is evidently designed to perform a most important part both in standing and walking. I have often made the contrast between the beautiful form of the human foot, as exhibited in antique statues, and as we find it in flesh and bone at the present day; and the consequence is, that I can discover no beauty in our coffin-shaped shoes, whilst they remind me of the deformity which they may cover. It is not merely deformity, but positive and serious disease; which is at times occasioned by turning the great toe outwards, almost across the foot. The joint is injured by the constant pressure whilst in this position; and the mischief is increased if the heel be raised so as at the same time to throw a disproportionate weight on the toe. Bunion, a painful and untractable as well as unsightly disease of the foot, owes its origin to this cause. This subject has been treated in a learned essay by my friend Dr. Froreip of Berlin: and in this country it has received the attention of Charles Aston Key, who has written a paper respecting it.

NOTE (7.) P. 33.

SINCE the suggestion of giving a white colour to the exterior of houses was thrown out in these Lectures, the utility of the measure has received ample confirmation by its extensive adoption. It is immaterial whether the change is to be ascribed to the imitation of the good example of our foreign neighbours, or to a spontaneous advance in the taste and contrivance of our countrymen. The improvement, however, is almost exclusively confined to the best parts of London, in which the work is generally executed in a costly and elegant manner. It is very desirable that it should be introduced into the poor and confined quarters; in which it is most needed, and in which it could be effected in the most economical manner; a few buckets of lime-white, a knotted rope with a moveable seat to answer the purpose of a scaffold, and a brush, being nearly all that is wanted.

LECT. II.

ON THE

ARTICLES OF FOOD, SOLID AND FLUID.

In conformity with the plan which I sketched in my Introduction, I have now to call your attention to the subject of diet, and endeavour to shew you how essentially the health of all classes is connected with a due attention to the quality and quantity of the articles consumed in eating and drinking.

To render this branch of my subject more intelligible and more interesting, I shall give you a very short description of the process of digestion, by which our bodies are supplied with the materials for growth, and for the reparation of the constant wear and loss which are going forward.

First, the food is received into the mouth;—where, if liquid, it is not long retained, but passes down the throat, through the œsophagus or gullet, into the stomach. If, however, it be a solid substance which has been taken into the mouth, it is, or at least it ought to be, retained there until, by the action of the jaws and teeth, it has been broken up, and so mixed with the saliva or spittle as to be converted into a soft pulpy mass.

You will perhaps wish to know where the saliva comes from. It is formed by three pairs of bodies, called salivary glands; of which, one pair is placed

in the cheeks near to the ears, and two under the tongue. The movements of the jaws and cheeks, and the contact of the food, have the effect of greatly increasing the quantity of saliva produced; and it is, from this cause, most abundantly poured into the mouth exactly at the time when it is most wanted. When, by the action of the jaws and teeth, and the due intermixture of saliva, a mass has been prepared to pass through the œsophagus, it is carried backwards, by the tongue, to the enlarged upper extremity of the gullet, which at this part is called the pharynx. At the same time that the mass of food is thus carried backwards, the pharynx is prepared to receive it, by the raising of the fore part, which is attached to the back part of what is called "Adam's apple," the movement of which you may any of you perceive by placing the fingers upon it when you are in the act of swallowing. Another great advantage obtained by the movement of this part in conjunction with the carrying back of the tongue, is, that the food is prevented from getting into the windpipe, because its narrow mouth is closed by a little body called the epiglottis, which is situated at the root of the tongue, and is shut down when these two movements take place. You must all of you be sufficiently aware of the great inconvenience produced by the accident of a particle of food happening to make its way into the windpipe, to be quite sensible of the importance of this provision of nature. The pharynx and gullet, which now receive the food, are not an inert tube through which the food descends by its own weight, but have a complicated apparatus of circular and longitudinal fibres, which, successively contracting, carry forward the mass, in whatever position the body may be placed. Hence, most quadru-

peds feed without difficulty with their heads extended to the ground, and even man himself is able to swallow with his head placed perpendicularly downwards. The œsophagus conveys the food directly into the stomach; but does not readily allow it to pass in the opposite direction, because its circular fibres, and perhaps, in some degree, its mode of insertion into the stomach, tend to oppose entrance at this extremity. A very important part of the process of digestion now takes place in the stomach. This organ consists of a very elastic bag, differing very much in size in different individuals, and indeed varying at different times in the same person. Its shape somewhat resembles that of a pear, being large and rounded at one extremity, and small and tapering at the other. It is furnished with two openings; namely, the one already mentioned, and situated near the large end by which the food enters; the other quite at the small extremity through which the food passes into the intestines. Both of these openings are habitually closed; and are only opened by the occasional passage of the food, or other matters, either entering into, or escaping from the stomach. The stomach is lined by a soft and tender skin or membrane, which, except when the stomach is distended, forms numerous folds or plaits, which doubtless contribute to enable the stomach to accommodate itself to the ever-varying quantities which it is called upon to contain. When this lining membrane is carefully and closely examined, either by a good naked eye or with the help of a magnifying glass, it is found not to be smooth, like that which lines our lips and cheeks, but to present an infinite number of very minute elevations, which have been compared to the pile of plush or velvet. I do not, however, consider this

comparison correct. The internal surface of the lining membrane of the stomach appears to me remarkably indistinct and undefinable. This membrane is always moist, and covered with a viscid slimy substance, called "mucus"; which, amongst other uses, affords a great protection to the lining membrane, and enables it (notwithstanding its very soft and tender structure) to bear with impunity the frequent contact of hard, rough, acid, and hot substances. This mucus appears to be in part poured out on the internal surface, as perspiration is upon the skin; and in part to be the produce of little glands, scattered in different parts of the membrane. This humor, or mucus, with which the stomach is constantly moistened, is by no means simple and uniform: sometimes it is very copious and watery; sometimes it is acid; at others, mawkish, salt, or sweet. The membranous lining of the stomach is covered by a double or treble layer of muscular fibres, which take different directions, and, by their contraction, modify the form as well as the size of the stomach. These layers of muscular fibres—which unitedly form, as it is commonly but erroneously called, the middle or muscular coat of the stomach—are covered by another skin or membrane, which forms the third or outer coat of the stomach. This membrane is not like that which I first described to you; but is smooth and polished; and though thin, is firm and tough. It is a very important membrane; and covers not only the stomach, but also the bowels and most other parts in the abdomen or belly. Besides these three coats, the stomach has a great many blood-vessels, absorbent vessels, and nerves.

Various opinions have at different times been formed respecting the nature of the process which

the food undergoes in the stomach. By some, it was supposed to resemble cooking, and to be chiefly effected by means of heat and moisture: others imagined that it resembled fermentation, or putrefaction; and others, that the food was rubbed or ground down by the action of the muscular coat of the stomach. The only ground for some plausibility which this last idea can be admitted to possess, is to be found in what takes place in those birds which are furnished with powerful and really-muscular gizzards, in which they are known to grind down not only the hardest grains, but even stones and metals. The structure and necessities of these birds differ so widely from those of man, that it would be obviously absurd to force an analogy between them. I shall not take up your time by refuting any of the theories of digestion to which I have alluded, further than by remarking, that if they were sufficient to explain the process, we might not only be able more or less accurately to imitate it out of the body, but we should not find the difficulty which continually meets us in endeavouring to accommodate our food to our various constitutions. One thing seems to be certain; namely, that the juices of the stomach have the power of dissolving the articles of food which are received into the stomach. This fact was first clearly shown by Spalanzani, a distinguished Italian physiologist; who having enclosed portions of food in hollow balls of metal, which completely protected the materials from the influence of pressure and friction, yet allowed them to be saturated with the juices of the stomach through a multitude of small apertures, observed that their solution was not prevented. Even when food is swallowed in a liquid form, it is still necessary that it should be acted upon by the juices of the stomach: and

for this purpose, it sometimes requires to be coagulated before it is dissolved. This fact is strikingly shewn in the case of milk: and it is a great mistake, when infants or others, after swallowing milk, reject it, through excess or other causes, in the form of curds, to suppose that this coagulation is a proof that milk disagrees with them. It is only when thus separated from the fluid part that the solvent juices of the stomach can properly act on that which is nutritious. It is a strong proof of what I have stated, that there is no substance that has so powerful an effect in causing the coagulation of milk as the coats of that stomach in the calf which is destined to receive milk. If a very small piece of this stomach be soaked in a large quantity of water, a few drops of this liquor will be sufficient to turn a quart of milk. It is probably on account of the nutritious principles being too much diluted to be brought under the action of the juices of the stomach, that broths and other slops are often of difficult digestion in weak stomachs. When the food has remained a sufficient length of time in the stomach to allow of the whole or at least of the greater part of it being duly prepared in the stomach, the lower or second opening of the stomach, which is called the pylorus, begins to allow the prepared food to pass into the intestine, which at this part is called the duodenum. Here the half-digested food is mixed with the bile or gall, which flows in upon it from the liver, and with a fluid very much like saliva, which it receives from the pancreas or sweetbread. These two fluids, together with that produced by the intestines themselves, are mixed with the food in the process of digestion, and prepare the nutritious portion to be taken up by an infinite number of very small vessels or tubes, called absorbents, or lac-

teals: these vessels convey the dissolved nutritious part, which is called chyle, and bears a considerable resemblance to milk, through several rounded, fleshy bodies, called mesenteric glands, and afterwards, by a circuitous route, pour it into the blood, not far from the heart. As the food is carried along through several feet of intestine, this process of absorption deprives it of nearly all its nutritive principles. It is not only by means of the vessels which are called absorbents or lacteals that a part of our food finds its way from the intestines into the blood; the veins of the intestines receive some of it; and this portion, instead of going through the mesenteric glands, is carried through the liver, before it can reach the heart. It is therefore by no means surprising that improper eating and drinking should be frequent causes of bilious disorders and liver complaints. The last few feet of the intestinal canal are, for the most part, much broader and more capacious than the upper portion. It is not until the rejected part of the food has quitted the small, and entered the large intestines, that it acquires the peculiar odour and consistence of excrement. To prevent the rejectible excrementitious matter, or even the offensive gases which escape from it, from ascending and mixing with those portions which still contain nutritious matter, an effectual valve is placed at the termination of the small intestines. After quitting the small intestines, the excrementitious matter is often long detained in the large intestines, in which it generally loses a considerable portion of its watery part. A strong circular muscle, called a sphincter, surrounds the extremity of the large intestine, and effectually opposes the propelling power of the coats of the intestines, except when we obey the call to relieve the bowels. In most of the higher

animals the process of digestion is very similar to that which I have described as taking place in man; but the stomach and intestines are generally much more complicated, and form a longer canal in those animals which feed on vegetable matters possessing little nutritious property; and, on the other hand, they are more simple and of less extent in those animals which nature has designed habitually to feed on the highly nutritious flesh of other animals.

It has often been questioned, what is the kind of food on which man is by nature destined to feed. To answer this question, as well as for other purposes unconnected with our present object, the digestive organs in man have been carefully compared with those of other animals. As this interesting investigation has shewn us that the digestive organs in man hold an intermediate place between those of animals which, in a state of nature, feed wholly on vegetables, and those of others which as exclusively subsist on flesh, there can be but little doubt that we are acting in obedience to the dictates of our nature in feeding partly on vegetable and partly on animal substances. It is, however, the opinion of those most competent to decide the question, that the structure of man is most consistent with a diet very nearly, if not wholly, vegetable; although they readily admit that the habits and modifications which civilization has introduced, and the varieties of climate in which man has artificially placed himself, not only sanction, but render almost needful, that admixture which in most situations he is wont to employ. I have said almost; — for experience has taught us, that man may live exclusively on either animal or vegetable food. Thus some of our East-Indian fellow-subjects, whose superstitions prevent them from

shedding any blood but the human—of which they are sometimes lamentably regardless,—live wholly on rice and other vegetable food, and are, nevertheless, capable of great exertion. In spite of the heat of the climate, those who are employed as servants will often carry their languid, though flesh-eating, English masters, at a rapid pace, for hours together. And others of the same race and mode of life, who are employed as soldiers in our armies, not only bear equal fatigue with the troops sent from this country, and who are allowed a more nutritious diet, consisting in part of animal food; but are even not behind in that steady courage which those who glory in warlike exploits so highly value, and which, by some, has been supposed to be promoted by eating flesh. Instances, I have been told, have occurred, in which they have even exhibited proofs of superiority, and have successfully attacked posts when British troops had been defeated.

On the other hand, there are nations whose diet is almost or altogether animal. The Esquimaux can procure little else but fish, and the flesh of whales and seals. Their diminutive size does not prove much in favour of this kind of food: but it must be observed, that there are other causes which are quite as likely as their food to produce their inferiority of stature. Like the Hottentots and Bushmen, and also the Guanchees, the ancient but now extinct inhabitants of the island of Teneriff, there can be little doubt but that the Esquimaux, in great measure, owe the smallness of their stature to the peculiarities of race. That this is the case with the Hottentots and Bushmen, is clearly shewn by the contrast which exists between them and their almost gigantic neighbours, the Caffres, who feed on animal food, and enjoy the same climate. There are

many tribes which subsist chiefly by hunting, and whose diet is almost exclusively animal.

I have been told by a North-American Indian, that his countrymen in the winter season live, with little exception, entirely on dried meat, and that they then consider themselves peculiarly capable of exertion. — Such is the force of habit in respect of the kind of food, that some of the inferior animals, whose digestive organs are unquestionably calculated for one or other kind of food exclusively, may be brought to subsist entirely on the opposite kind. This was proved by John Hunter. By habit, he brought an eagle, whose stomach (for it possesses a stomach rather than a gizzard) is that of a strictly animal feeder, to subsist entirely on bread and other vegetable substances: and by similar management, he brought a sheep, which is as perfect a specimen as he could obtain of vegetable feeders, to live wholly on meat.

The experiment is made on a larger scale on the sea-coasts of some poor districts, where the cows, for a season at least, are almost entirely fed on fish.

Notwithstanding the wonderful power of accommodation to circumstances—which the stomach of man exhibits more strongly than that of any other animal—there can be no doubt that particular kinds of food are far more conducive to health and longevity than others.

The articles which man takes into his stomach, for the purpose of counteracting hunger, and of being digested themselves, or of assisting in the digestion of other substances, may be derived either from the mineral, the vegetable, or the animal kingdoms.

Some of you may, perhaps, be surprised that I should mention the mineral kingdom, as contributing to the diet of man. I would recall to your recollection,

that salt is a mineral production;—that it exists in some situations in such abundance, as almost to form mountains; or lies beneath the soil in such deep and extensive beds, as to allow of the mines, which are worked to obtain it, being amongst the most extensive human excavations, equalling, if not surpassing, those which are made to obtain copper, tin, or coal.

The water of the ocean belongs to the mineral kingdom: and when you reflect, that this water, in every part of the globe, contains salt dissolved in it, you may form some idea how abundant a mineral salt must be. Salt is not to be regarded as a mere luxury, which we employ to render the food more agreeable to the palate: it appears to be absolutely essential as an article of food, both on its own account, and to promote the digestion of other articles.

It might almost be considered as a proof of this necessity, that salt is universally employed by almost the entire human race, whether civilized or uncivilized, and in whatever climate man may exist. A merely temporary privation from it is almost intolerable; and even ashes are had recourse to, with the hope of obtaining some saline substance. Amongst the abuses which existed in France prior to its memorable Revolution, there was probably none more sensibly felt than the monopolies of salt; which raised to a distressing price this essential article, with which none could dispense. In some countries in which salt, notwithstanding its general abundance, happens to be extremely scarce, it is eagerly sought, notwithstanding the heavy expense of its conveyance; and portions of it are employed as a medium of exchange, scarcely less important than gold itself. The necessity for salt is shewn, not only by its general employment, and the

pains which are taken to surmount difficulties in obtaining it, but by the injury which the health sustains from the privation of it. It once constituted a part of the punishment of certain prisoners in Holland, wholly to deprive them of the use of salt; and this abstinence was found not only painfully disagreeable, but a source of serious derangement to the health. "The effect," says Lord Somerville, "was horrible: these wretched criminals are said to have been devoured by worms engendered in their own stomachs." Vide *Lord Somerville's Address to the Board of Agriculture.*)

Some persons have been known, through a strange peculiarity of taste, to have so great an aversion to salt, as wholly to reject the use of it. Ill health was the consequence, which the use of salt speedily removed. It would seem that salt is particularly required when the diet is wholly or principally vegetable: and nature has implanted so strong a desire for it in those animals which feed wholly on vegetable matter, that salt-springs are eagerly sought after by them, when they have liberty to do so. From time immemorial, the salt-springs or licks in the wilds of America have been the favourite resort of deer and buffalo: and from the fossil remains which are found in abundance in their neighbourhood, it is evident that they were likewise frequented by animals of enormous size, whose species have long since been extinct upon our globe.

It is not, however, to salt alone that I referred, when I stated that the mineral kingdom contributes to the food of man. In different parts of the globe in which the inhabitants are at times subjected to a scanty supply of ordinary food, different kinds of earth are had recourse to, to compensate for the deficiency. This is particularly the case in Africa and in South America.

In the latter region, according to the accounts of that distinguished and accomplished traveller, Baron Humboldt, there are whole tribes of natives who annually, during three or four months of scarcity, to a great degree depend on a soft and plastic earth, which they slightly bake and mix with water. It is a remarkable fact, that nearly all the earths employed in this manner by imperfectly civilized nations possess a certain degree of unctuousness and plasticity, and contain alumine and magnesia. It is difficult to conceive that the wants of the system can in any degree be supplied by these materials; and we are therefore led to conclude, that if they are in any degree effectual in mitigating the sensation of hunger,—a peculiar state, which seems to depend on the general want or inanition of the system, conjoined with the local affection of the stomach, constantly subjected to the action of its own powerful and unmixed juices,—it must be by counteracting the influence of these latter, by admixture with them, and by affording a bland and soothing application to the irritated lining membrane. Some degree of confirmation is supplied in the fact of the occasional employment of another kind of earth, which is had recourse to for the same purpose. It is said that the Indians of North America, when subjected to severe and protracted abstinence in their hunting expeditions, are in the habit of employing boluses of carbonate of lime and tobacco, which seem to allay the irritability of the stomach. It seems probable that simple distension has a grateful effect upon the stomach, and, through the intimate connexion which this organ has with other parts of the body, on the whole system generally.

That the vegetable and animal kingdoms supply

numerous articles of food, is too well known to need pointing out.

Before I proceed to speak of some of the most important articles of food individually, I shall notice the general heads under which they may be classed. Some articles may be strictly considered as alimentary, or directly contributing to supply the materials of our growth and reparation. These may be divided into solids and fluids: the solids may again be subdivided, and treated of as belonging either to the class of vegetable or animal substances. Other articles seem rather to contribute to our nourishment or enjoyment, by acting as stimulants: and some of these, which are called condiments or provocatives, when taken in moderation, appear to be of essential service, in promoting the digestion of the articles of the first class. Salt, of which I have already spoken, is the most remarkable of these substances.

Of ALIMENTARY VEGETABLE SUBSTANCES. — The farinaceous seeds are unquestionably the most important of this class. Their introduction has been marked amongst the earliest steps in the progress of civilization, and may be noticed amongst the first historical traditions of the most ancient nations of the Eastern and Western hemispheres. Thus the Greeks paid divine honours to Ceres, as the introducer and cultivator of wheat and other grains; and the ancient Peruvians paid similar honours to Manco Capac, who gave them maize or Indian-corn, and taught them how to cultivate and use it.

Of WHEAT.—This appears to be the oldest and most valuable grain with which we are acquainted; but we know not the country to which we are indebted for it. It contains a large quantity of starch; a highly nutri-

tive principle; and a larger quantity of gluten, the most nutritious of all the vegetable principles, than any other grain. (') It likewise contains sugar; and a small portion of phosphate of lime, the essential constituent of bones, on which their firmness depends. It is far superior to every other kind of grain, for the formation of bread, which is emphatically termed the "staff of life;" and, in all civilized countries, forms so large and considerable a part of our diet, that the word "bread" is become almost equivalent with that of "food."

Seeing, then, that wheat, in the form of bread, is of so great importance as an article of diet, it will be worth while for us to dwell a little upon the varieties of bread, and on some points connected with its use. In bread, such as is generally used, the principles are by no means in the same state in which they exist in the ripe grain: they have been subjected to a fermentation, which is closely allied to, if not identical with, that which takes place in the formation of beer. In this fermentation, which is called "panary fermentation," and is excited by the addition of leaven or yeast, a considerable quantity of carbonic acid, spirit, and acetic acid, are driven off: it is on the extrication of these principles, in the form of vapour, on which depend the number of minute cells with which properly-made bread is everywhere pervaded, and to which its lightness is referrible. It is quite necessary that the ingredients of the bread should not merely be properly proportioned, mixed, and fermented, but that they should be kept for a considerable length of time in a pretty high temperature; in other words, that it should be thoroughly baked. If this be not the case, it will, under the compression of mastication, be again reduced to a tough and heavy mass, ill adapted to

undergo the process of digestion. An objection nearly similar to that which I have mentioned with respect to imperfectly-baked bread, belongs to bread which may have been thoroughly baked, but which is employed for food too soon after it is taken from the oven. Hence the importance, for the sake of health as well as of economy, of avoiding the use of bread which is less than two or three days old. Those who, from the state of their health, require more than the ordinary care in their diet, will do well to select that part of the loaf which is the nearest to the crust. When wheaten flour has been highly dressed—that is to say, very carefully separated from the most minute portions of its own shell or husk—it is extremely white, and very delicate both as to flavour and appearance; but it appears to be particularly disposed to constipate the bowels, and seems far less conducive to health and strength than when less completely separated. The habits of those who reside in large towns and cities seem to be, in various ways, calculated to promote a confined and unhealthy state of the bowels; and brown bread is often very advantageously employed, by the richest, to counteract this effect. It is not, however, on this account alone that I think it right to endeavour to discourage, as prejudicial to health, the too-prevalent disposition of the working classes in this city to seek to indulge and gratify their tastes by the use of the whitest and newest bread. Necessity drives them to obtain it at the cheapest shops; where the bakers, to accommodate the demands of their customers, furnish them with an article of beautiful appearance, but too often manufactured from flour of inferior or doubtful quality, and combined with ingredients more or less injurious, designed either to correct or adulterate it. A genuine

but coarser bread would therefore be abundantly preferable, with respect both to health and economy.

Other kinds of grain, besides wheat, are employed in the making of bread; such as, rye, barley, oats, rice, &c. Although, in some places, bread made from some of these grains constitutes the principal article of food with the majority of the inhabitants, yet I cannot suppose that the study of frugality will induce Londoners to imitate the example. A mixture of wheaten flour, with other kinds of meal, might, however, be very profitably introduced.

It is said by some, that bread made of different kinds of grain is more wholesome than that made of only one sort, as their qualities serve to correct one another.

Barley-bread has a sweetish, but not unpleasant taste: it is, however, rather viscid; and is less nutritive, as well as less digestible, than wheaten bread. It is common to mix peas-meal with the barley, which certainly improves the bread. *Rye-bread* is of a dark-brown colour, and is apt to lie heavy on the stomach: it is also liable to create acidity and purging; but it appears to be highly nutritive. In some of the midland and northern counties of England, where their bread is often manufactured from *oatmeal*, there is a mode of preparing the meal by making it sour: the bread, instead of being hard, is thus rendered of a soft texture, and, from its moderate acidity, is wholesome to strong persons; but invalids should, if possible, avoid it. In bread, however, this grain is more usually in an unfermented state; or it is made into flat thin cakes, which are baked or roasted. The *bannock*, *clap-bread*, *bitchiness-bread*, and *riddle-cakes*, are the names which such productions have received.

The *jannock* is oaten-bread made into loaves. It is evident, from the health and vigour of the people who use this grain as a principal article of diet, that it must be very nutritive; but the stomach will require some discipline before it can digest it.

Notwithstanding what I have said of bread being perhaps the most important article of diet, it is not suitable for exclusive or very abundant use. There is an old remark—so old indeed, that it has been ascribed, though probably erroneously, to Hippocrates, the father of medicine—which implies that the excessive eating of bread is the worst species of gluttony. Though I cannot agree with this opinion, I am satisfied that bread may be too largely taken, to the exclusion of other articles. I shall therefore present you with the followlng quotation.

"Bread, the staff of life, is not the most easy of digestion, if taken in considerable quantity. Very strong organs are requisite to convert it into nutriment; and more especially if it is new, or recently baked, for then it is of a glutinous and heavy nature, and extremely difficult of solution. Cases have been recorded, indeed, in which an immoderate quantity of fresh-baked bread proved to be the cause of death."—See *London Medical Journal*, 1761.

In weak stomachs, a large proportion of bread is indigestible: it turns sour, produces the heartburn and flatulence, and interrupts the perfect concoction of every thing else. On this principle, the necessity of paying much atttention to this capital article of diet ought to be inculcated on valetudinarians in general. They should never abstain from it wholly; but use it with moderation, and consider it as one of those things which, sparingly used, is extremely necessary and bene-

ficial;—if otherwise, the fruitful source of many complaints, which are little expected from this cause.

Biscuit, though in its composition closely allied to bread, presents some peculiarities. It is unleavened bread; and has consequently not undergone the panary fermentation. It is highly dried, by which it is rendered fit for long keeping: this is, perhaps, its greatest advantage. It is supposed that its dryness, and freedom from fermentation, render it desirable for those troubled with bad digestion; but I think its virtues in this respect overrated.

Many of the grains which I have mentioned, form excellent articles of diet in other forms besides bread. Wheaten-flour is converted into various kinds of pudding, which, if neither heavy nor accompanied by much greasy matter, may constitute an important part of the principal meal or dinner. Butter and pie-crust are, at best, of doubtful property, and are frequently injurious. Maccaroni, which consists of wheaten paste dried and subsequently boiled, forms almost as important an article of food as bread itself, in a considerable part of Italy; but though it may certainly be rendered very agreeable to the taste, its close texture must so much injure its digestibility, that we have little cause to regret that it is not more commonly eaten in this country. (2)

Boiled oatmeal might, with great advantage both as to health and economy, be more generally employed, especially in the breakfasts of children. It should generally be eaten with milk and salt; but it may be occasionally sweetened, for the sake of variety. Oats are also very valuable in the form of groats, for the purpose of making gruel: and barley, deprived of its shell, may be safely recommended, both for broth and puddings.

There is, however, perhaps no grain which, after wheat, has more claim to our estimation than rice. On a large portion of the globe it forms the principal article of diet. In this country its employment might be considerably increased. By an improvement in the mode of cleansing the grain, which allows of its being imported with the shell on, we can at all times have it perfectly fresh. The mode of dressing may, I am informed, be much improved, by following the simple mode which every negro slave adopts, and produces a dish of rice which our best cooks in vain try to imitate. I believe the principal points to be attended to, are, to well wash off with warm water a substance which lies beneath the shell, and which remains when that has been removed. The rice is then to be boiled for twenty minutes or half-an-hour in water, with a little salt. The water is then to be poured off; and the saucepan placed, with the lid on, near the fire, or on a slow one, for half-an-hour longer. Each grain of rice is completely done through by the continued heat of the steam; but is not soddened, in which state it is less agreeable and less wholesome than when dressed as I have recommended. When rice is used as a principal article of food, it is more wholesome to eat it with salt than with sweets; and the addition of a little pepper is perhaps useful. There is, however, no objection to eating it occasionally with sugar or treacle, or with dressed fruit, such as gooseberries and currants and apples, when they are in season.

Besides the grain or seeds of which I have mentioned some of the most important, there are several roots which are farinaceous; that is to say, which contain a principle like flour or starch. Arrow-root, which forms so useful an article of food for children

and sick persons, is produced from roots of this description, which grow abundantly in many islands in the Atlantic and Pacific Oceans. The roots of some plants which grow as weeds in our hedges and ditches contain the same principle; and I have tasted very good pudding prepared from them. There is, however, a root, containing this principle, which in this country exceeds all others in importance. The discovery of America would have been a blessing, had it done no more for us than procure us the potatoe. This root is at once wholesome and nutritious; agreeable to almost every taste; highly prolific, and easily cultivated; and an abundant crop may be procured from the land. In fact, it has been shewn that a given number of acres will support a greater number of persons, if used for the cultivation of potatoes, than when devoted to any other kind of produce: hence their abundance and cheapness, which accommodate them to the poorest classes. Being almost entirely free from any peculiar flavour of their own, they seem suited to every palate; and amongst the various dislikes and antipathies which the different tastes of men present, we shall scarcely meet with an instance of the potatoe being found offensive. From the same cause, it may be eaten in conjunction with every other article of food, as well as by itself. (3) Though most frequently taken with flesh or fish, it is often employed in cakes and sweet dishes; yet, after all, for the poor man's comfort, its best as well as cheapest accompaniment, is salt. Another great advantage of the potatoe, is the length of time during which it may, with little or no trouble, be preserved in excellent condition, which enables us to have it in season throughout the year. It may be well, however, to make a few remarks respecting the limits to its

keeping, and the causes which promote its spoiling. With the utmost care, it would be nearly or quite impossible, at least with the ordinary means of keeping, to preserve a stock of potatoes beyond one season, as we do wheat and other grain. This difficulty prevents the years of plenty, as regards the potatoe-crops, from being made to supply the deficiencies of those years in which the crops have failed, or been remarkably scanty. This is an evil most keenly felt where the poor, as in Ireland, place their chief reliance for support on the potatoe-crops, and have not the means of purchasing the comparatively expensive substitutes—bread, oatmeal, peas, and rice. The reason of this is, that in the potatoe the starch or flour is not only accompanied, as in the grains or seeds just mentioned, by other vegetable principles, such as woody fibre, extractive matter, mucilage, &c., but also by water, which very much favours the corruption and decay of the root, especially when the potatoes are not perfectly excluded from the effects of frost. In consequence, too, of the presence of moisture, there is a great disposition in the root and eyes to sprout, when the temperature is favourable: this sprouting takes place at the expense of the nutritious portion of the potatoe; and that which remains is more or less converted into a sweetened substance, which may be regarded as impure sugar. When either of these changes has taken place to any considerable degree, potatoes become unfit for the food of man, and are nearly spoiled for the use of other animals. Were the laws which restrict the preparation of starch not in force, it would, I believe, be very beneficial, both to individuals and to the community, when the crop of potatoes is abundant, to separate this principle from the roots, before decomposition commences.

This may be effected by a very simple process. The nutritious part might then be preserved for an unlimited period.

Such are the principal articles whence the farinaceous principle is generally derived. In situations in which it is not to be procured in sufficient quantity from any of these, recourse is had to other sources. Thus, in some mountainous districts, the fruit of the Spanish or sweet-chesnut is largely employed as an article of diet, after it has been converted into what the Italians call pollenta. The bread-fruit tree, which is of so much value to the inhabitants of the South-Sea Islands, affords another example of this principle being obtained from the fruit of trees. Farina may also be obtained from the pith of trees, the best example of which is seen in sago.

After the farinaceous principle, which unquestionably forms the most important part of the food of man, the next class of vegetables which I shall mention, are, the PULPY, SACCHARINE ROOTS, such as parsnips, carrots, turnips, mangelwurzel, and the like. Most of these owe their nutritious properties to the quantity of sugar which they contain. In some of them, saccharine matter is so abundant, as to have repaid the trouble of extracting it in a pure and separate form. The pulpy saccharine roots are highly nutritious food for the inferior animals, which are often fattened upon them. Instances have also occurred of human beings wholly subsisting upon them; and it seems extremely probable, that some of the simplest and earliest efforts of the cooking art were employed upon this sort of food. Though well adapted to form a considerable part of our diet, it is much better to employ them in conjunction with the farinaceous vegetables and with animal food. The

sweet principle, or sugar, is very abundant in many fruits, such as figs, dried grapes, and the fruit of the palm-tree. As they are objects of luxury, rather than essential articles of diet, in this country, I shall pass them over; and proceed to other sources from which sugar, as a separate principle, is chiefly derived; namely, the sugar-cane, and a certain species of ash, the sap of which, at certain seasons of the year, is richly charged with sugar. That derived from the last-mentioned tree is commonly known under the name of manna; and is seldom used in this country, except for medicinal purposes. The sap of the maple yields, with little trouble, an abundant supply of inferior sugar, which is of the utmost importance, as an article of diet, to those who settle in the back-woods of America. It is from the cane, almost exclusively, that the large quantities of sugar consumed in this, and most other countries of Europe, are derived. SUGAR is a highly-nutritive and fattening principle; and therefore becomes not only a pleasant and attractive, but salutary addition to many other articles of food. It is said that the negroes in the West Indies, notwithstanding the longer-continued and more arduous labours extorted from them during the gathering and preparation of the sugar-cane crop, generally gain instead of losing flesh at that season, in consequence of the abundant use which they make of sugar at such times. It is very essential, however, that this principle be not taken either in unlimited quantities or in a state nearly approaching to purity. Every one whose stomach is at all delicate must be well aware of the great disposition to acidity produced by the too free, or even by a sparing use of sugar. Its injurious tendency, as an exclusive article of food, has been most

distinctly shewn by some very interesting experiments of Professor Majendie. He caused some dogs to be fed exclusively on well-refined sugar. The dogs, by previous habit, had become accustomed to this unnatural food, and had even acquired a taste for it, which induced them to devour it with considerable avidity. For a while they appeared to enjoy their usual health; but ultimately, their flesh and strength declined, and their eye-sight began to fail. Small spots appeared upon the surface of the eye, which, if the experiment was protracted, led to perforation of the eye, and perfect blindness; and, finally, death ensued. Honey is evidently little else than a collection of sugar furnished by a secretion in different plants. It must therefore be regarded rather as a vegetable, than as an animal production; and although decidedly loathed by many persons, is perhaps one of the most wholesome forms of sugar. (4)

PULPY SUCCULENT VEGETABLES.—To this class belong the various kinds of greens or cabbage, cauliflowers, broccoli, spinach, turnip-tops, and the like. All these vegetables possess a very low degree of nutrient power; yet, when recently gathered fresh, and well dressed, they are often extremely serviceable, in combination with other articles of diet; and more especially such as have a heating and constipating tendency. There is an excellent succulent vegetable, much used on the continent, which serves this purpose in an eminent degree: I mean, boiled endive, or succory. It seems more digestible, more grateful to the stomach, and more certainly efficacious in counteracting the tendency to constipation, than any other of the succulent vegetables with which I am acquainted. Most of the succulent vegetables have, besides the low degree of nutrient

power which I have already mentioned, a great tendency to decomposition or corruption, as well when taken into the body as out of it. Worms, flatulence, inordinate distension of the abdomen, and scrofulous swellings, are amongst the evils likely to be produced by taking vegetables of this class, in excessive quantity, or of a bad quality. Most of the vegetables eaten raw may be regarded of this class. They are possessed of still less nutrient power than most of the dressed vegetables. They cannot, under any circumstances, be suitable to form the principal, or even a considerable part of the diet of man; yet, in small quantity, and in warm seasons, they may be suitably used, in conjunction with other food, where the state of the stomach does not forbid it: yet even then they seem to require the addition of salt, and some stimulating principle, which nature herself, in some instances, provides in the juices of these vegetables; as, for example, in green mustard, onions, and radishes. (5)

Peculiar virtues are by many attributed to some of the vegetables which are eaten in a raw state; such as, water-cresses, common cress, scurvy-grass, and the like:—they are supposed to have great influence in curing eruptions on the skin. This idea appears to be founded on a mistaken notion, that there is a similarity between these diseases and that which is properly called scurvy, which was once so common amongst sailors exposed to the hardships of long voyages and poor provisions. The fact is, that these diseases are totally distinct; and that the vegetable diet, which may be useful in the one case, may be decidedly injurious in the others.

ANIMAL SUBSTANCES.—I now proceed to speak of FLESH, or MEAT, derived from the class of animals called

MAMMALIA. This constitutes the chief portion of man's animal food. It is nearly in proportion to the quantity of FIBRIN contained in animal food, that it is substantially nutritious. It is this principle which is the chief constituent of muscle. Hence mutton-chops, beef-steaks, &c., which are cut from parts containing much muscle, are esteemed, as affording the largest quantity of nutritive matter. There is also much of the same property in blood, on account of the quantity of fibrin it contains: and hence the custom of making black-puddings, and other preparations of blood. Neither muscle nor fibrin will dissolve by the mere application of water and heat. There is another substance in our animal food, called GELATINE, which is dissolved by boiling:—this principle is seen in sise and isinglass; which last is perhaps the purest form in which gelatine is used for food. It is highly nutritious, but not so much so as muscle. It constitutes the most important part of tendon and skin, both of which are well known in the feet of calves and oxen. Gelatine forms also the principal part of bone, when the earthy matter has been removed; which may be done by very weak muriatic acid. This process has been adopted, in France, for preparing portable-soup; the basis of which is gelatine in a concentrated form, and flavoured with some of the other principles of our animal food. (6)

ALBUMEN is another animal principle, forming a part of our ordinary food. It is seen in that part of eggs which we call *the white;* and also in the scum which rises on the surface of the cauldron in which meat is being stewed. Albumen is popularly thought to be easy of digestion; but it is not always so. It contains a considerable portion of sulphur, which is easily discoverable by the blackness it leaves upon a silver spoon

used in the eating of eggs. On this account it is apt to produce a fetid gas, and consequently to occasion inconvenience in the stomach. FAT, or ANIMAL OIL, is another principle contained in our food. It is, unquestionably, highly nutritious; but requires great powers of stomach, and is therefore not suited to all persons indiscriminately. When inferior animals are fed solely on oil or fat, they inevitably become the subjects of disease, very much in the same way that I have told you is the case from the exclusive use of sugar.

The last animal principle which it will be necessary for me to mention to you is called OSMASOME. It does not form a large portion of any kind of animal food, and is probably not very nutritious: nevertheless, it is by no means an unimportant element. It is on the osmasome that the fine flavour of most meat depends. It is more abundant in roast than in boiled meat; which last has given up a great part of its osmasome to the broth, which is more or less savoury in proportion to the quantity of this principle which it has acquired. There can be no doubt but the digestibility of our food, and its congeniality with our stomachs, is greatly influenced by the degree to which it is accommodated to our palates. There can, therefore, be no doubt that the osmasome is of essential service, as a kind of natural seasoning.

In the Mosaic law, we read of animals that were forbidden, as unclean. Those proscribed by this law form an inconsiderable part amongst those upon which we feed. The animals deemed clean by the ancient Jewish law seem, by the common consent of all mankind, to furnish the bulk of our animal food. Without doubt, the Lawgiver of the Jews was inspired, in ordering the use of the flesh of some animals, and the absti-

nence from others, for reasons that had in view the temporal advantage of those to whom the restrictions were prescribed. Cutaneous diseases are known to result from the use of certain kinds of animal flesh; and there might be something in the constitution of the Jews which rendered the flesh of swine hurtful to them, while some of their neighbours ate it with impunity.

The flesh of young animals is much esteemed, being regarded as of easy digestion. But this is not the case. It possesses a larger portion of gelatine, and is more readily soluble by heat and water; but is not so readily converted into nutriment as the flesh of older animals; nor does it possess so large a quantity of fibrin. Wild animals are said to be more easy of digestion than those that have been domesticated; perhaps from their living in a more natural state, and enjoying the air and exercise intended for them. The flesh of hunted animals is said to be very light and digestible; and that of bulls, to become tender by their being baited. The feeders of cattle say that the best beef is furnished by oxen that have been accustomed to labour, and are afterwards rapidly fattened. In some parts of the world, the flesh of horses is used for the food of man, and its flavour is reported to be improved by the labour and exercise they undergo. The comparative merits of the different kinds of flesh which we are in the habit of obtaining, deserve some attention: but it must be observed, that so various are the individual peculiarities of our stomachs, that I can offer nothing on this subject to which numerous exceptions may not be made.

Mutton is tolerable to most stomachs, although there are some that cannot bear beef: it is gene-

rally prescribed to the sick, in preference to most other meats. It is better than lamb; but the difference between them is less marked than between veal and beef.

Beef.—This is the most nutritious of all kinds of animal food, and is supposed to impart a peculiar degree of vigour, and firmness of muscle. Hence, those who are engaged in the brutal conflicts of prize-fights, which disgrace our age, and those who undertake the performance of other feats of strength or speed, are usually prepared for their tasks by training; which consists in the employment of regular exercise, and of a diet of which beef forms the chief part.

Veal has a large portion of gelatine in proportion to the fibrin, and very little osmasome. Perhaps a part of these peculiarities in veal may arise from the mode of treatment which the animals undergo before they are slaughtered, and also from the mode in which they are killed. They are fed on nothing but milk, and are frequently blooded; and when killed, the death is slow, and the largest possible quantity of blood is withdrawn: hence the meat assumes a sickly, bloodless hue. It has lost much of its fibrin, and it becomes sour sooner than any other kind of meat.

Pork is a highly nutritious food; and is, in general, not unwholesome, if the animal be healthy. It is particularly convenient, on the ground of economy; as, in the poorest families, there is a certain quantity of offal from their tables, which might furnish food for the pig, though it would otherwise be wasted. The flesh of the hog appears to be highly esteemed by the inhabitants of the South Seas. Hogs abound in those parts. It is, however, a description of food in some degree new to the natives, as the animal is not indigenous

there; but the breed is the offspring of such as have been turned loose into their forests by our navigators. That prince of circumnavigators, Captain Cook, enriched many of the islands which he visited, by presenting them with this species.

Hogs are of great importance to those who settle in new countries; as, for example, in the back-woods of the United States, or of the Canadas; not only on account of the facility with which the animal is propagated and supported, but from its flesh being peculiarly adapted to preservation by salting and drying.

Next in importance to the choice of the kinds of meat, is that of the mode of COOKING. This point involves many considerations, regarding health, economy, and convenience. (7) Generally speaking, the most wholesome form of cooking is ROASTING; by which process a crust is formed on the surface, which preserves the internal part from too sudden or violent a degree of heat, and also prevents the draining away of its juices. The internal part of the joint is best for invalids; as it is not only more juicy, but is lighter, and of simpler and more delicate flavour, and consequently of more easy digestion. The surface, which consists chiefly of burnt fat, is apt to disagree with weak or delicate stomachs. BROILING is only roasting on a small scale; and has this advantage, that as the heat is continued for a short time, it does not render the outside of the lean so dry and parched, or the outside of the fat so rancid, as it is liable to become by roasting. Hence it is less prone to produce that kind of inconvenience which you will all understand by the word "rising."

BAKING is an operation somewhat similar to roasting and broiling, but intermediate between them and boiling, yet not so good as either. The degree of heat is

sufficient to produce an offensive odour—what is called empyreuma; and the closeness of the oven preventing its escape, it unavoidably contaminates the meat.

Boiling, in which the temperature is effectually limited, is free from this evil. It has, however, this disadvantage, viz. that it dissolves much of the gelatine, and washes out the gravy charged with osmasome, but it does not remove fibrin.

Stewing.—There is much economy in this mode of cooking; but the meat itself may be stewed until but little nutriment remains in it. The fibrin may be too completely separated from the other principles, and the gravy or juices spoilt by too long-continued heat.

In frying, you have combined all the bad effects of baking and boiling; as the fat part is burnt or parched, and the flesh soddened. Meats so dressed are highly offensive to some stomachs.

Broths and soups are perhaps the most economical kinds of food; but they are certainly not the most wholesome, as the stomach has much to do to get rid of the watery part. They should be used in moderation; and ought not to have their watery part increased by the addition of drink.

Stews, in some respects, resemble soups: but whilst, on the one hand, they have the advantage of presenting the extracted juices of the meat in a more concentrated state than that in which they exist in soup, they are, on the other hand, often made more injuriously complicated and stimulating by various admixtures. In different countries there often prevails a characteristic difference in the mode of cooking in common use. Thus it has been common to contrast French cookery with the English; a predominance of stews being ascribed to the former, and a prevalence of roast joints to the

latter. A gentleman who had not only had the opportunity of trying the fare of both countries, but who, from being long in South America, and mixing with the native inhabitants, had experienced the invigorating effects of the simplest form of roast and broiled flesh, on which some tribes almost wholly subsist, once made the following remark:—"The English cooking is the cooking of the savage, perfected. The French cooking is the cooking of corrupted man."—The long peace which has happily subsisted between the two countries, and has done so much to exchange the animosity and jealousy, which once prevailed, for mutual respect and reciprocal benefits, has effected a change in the cooking also. Excellent roast and broiled are well prepared and patronized by our neighbours; whilst our love of change appears to have led us in some degree to increase our taste for stews and complicated dishes.

Salting is another mode of preparing meat, which, though only the forerunner to cooking, must not be unnoticed. It should be borne in mind, that the more, or the longer, meat is salted, the more it loses of its capability of affording nourishment; as both meat and salt are altered in their properties. The health of our sailors, without doubt, depends very much on the suitable nature and good condition of their food. Formerly, long voyages were very fatal to the crews of the vessels engaged in them; as was lamentably seen to be the case in Lord Anson's voyage; in which such great numbers were swept off by disease, that some of the vessels were necessarily abandoned. At the present day, the meat used in the navy and merchant-service is better salted and prepared, and suitable antidotes are supplied to the men; in consequence of which precautions, in

addition to greater attention to cleanliness, the sea-scurvy, as it was called, once so formidable, is now but little heard of. The quality of meat is much influenced by the length of time which is allowed to pass between the killing of the animal and the consumption of its flesh as food. Meat is not only more readily subjected to mechanical division, but appears to be more easily digested when it has been allowed to hang a few days. There is, however, a limit to this: for though, by habit, man may be brought to like meat that is somewhat tainted or high, yet there is evidently an instinctive dislike to such food, which, if far gone, would inevitably excite nausea and sickness. It has been supposed, that if meat were to be always eaten in a putrid state, it would produce fever and delirium; but this is not universally true. We know that game is generally eaten in an advanced state of decomposition. Some North-American Indians eat putrid flesh, and appear to prefer it in that state. The state of the animal at the time of its death has a very sensible influence on the quality of the meat. It is one of the most notorious facts connected with the subject of eating, that the flesh of an animal well-fed and in high condition is superior to that of a lean and spare one. Fatted calves, fatted oxen, and the like, are amongst the articles most anciently enumerated in the dainties of a feast. This superiority is not dependent on the larger quantity of food which such an animal supplies, nor entirely on the desirableness of a large quantity of fat, but because even the muscular flesh of a well-fed, plump, and necessarily healthy animal is of a quality greatly superior to that of an animal in the opposite state. Positively-diseased animals may easily be supposed to yield bad and unwholesome meat. During the plague in London,

ill-fed and diseased animals were sold cheap, and in abundance to the poor; and are supposed to have promoted the prevalence of the pestilence amongst them. Numerous instances have occurred, of other epidemics being apparently similarly excited. Consumption has been supposed to prevail in this country from the flesh of our domestic animals being generally in an unhealthy state. This is, however, in all probability, a gross mistake; for there is, perhaps, no other country in which the meat is so good and excellent. Though meat is unquestionably most wholesome when derived from healthy animals, and more agreeable if pretty fresh, yet, kept a sufficient time to become tender, a small quantity of diseased or putrid meat may be eaten with impunity. In Scotland, when sheep die of diseased intestines, they are eaten by the shepherds, who esteem the flesh a delicacy, although the carcass may not have been discovered on the mountains till it has become putrid. We read, too, that the Scythians preferred the flesh of animals which had died a natural death; saying, that what the Almighty killed was better than what man killed.

Birds.—The flesh of birds is said to be very digestible. Some (viz. that of sea-birds) is, however, very strong and fishy, and not so generally good for food as the flesh of other animals. The flesh of the Solan goose is of this description; but little of it can be eaten at a time: this little, however, is sometimes taken at the commencement of a meal, in order to provoke appetite; but this is a practice by no means to be recommended. It may be remembered, that the Israelites brought on disease by an inordinate use of the flesh of quails.

Reptiles.—This class of animals furnishes but very few species which are employed as the food of man: in

this country, indeed, we scarcely hear of any, except the turtle; which is imported into this country as a much-esteemed delicacy, well known at city-feasts, but is never sufficiently abundant in our markets to be an article requiring comment here.

Frogs are, perhaps, the only native reptiles which we possess, adapted for the purposes of the table. The fleshy part of the legs is a delicate, though not substantial kind of food; which, like the flesh of other eatable reptiles, is intermediate, as to nutritious matter, between that of the warm-blooded animals of which I have already spoken, and that of fishes, which yet remains to be noticed. In some parts of Europe, the flesh of the viper is still employed for the purpose of making broth; which is supposed to possess virtues peculiarly applicable to nervous patients. In the West Indies, the flesh of a large species of lizard, called iguana, is eaten as a delicacy.

Fishes.—The flesh of all the eatable species of fish is inferior in nutritious power to that of beasts and birds, and even to that of reptiles; yet it appears to constitute a very wholesome article of diet, and in some insular and other maritime situations forms the principal article of food to the inhabitants. It does not appear to be universally suited to all stomachs; and the influence of habit must probably be exerted for some time, before it can be tolerated as the principal article of daily food. There is considerable difference in the various species of eatable fish, in respect to the quality of their flesh. Some abound in fat or oil, whilst others are almost void of it: some abound in gelatine: some are highly flavoured, others quite insipid: some are remarkably tender, whilst others possess firmness of fibre almost equal to that found in the mammalia. These are

differences which must render them such, as either to be rejected, or employed as articles of food, by particular individuals, on principles too obvious to require pointing out. Where fish seems to disagree, it may not unfrequently be found that this is owing to the mode of dressing, or to the injurious sauces which accompany it. I believe it to be essential to the healthy employment of fish, that it should be eaten fresh, and cooked in the simplest manner. Fish is said to be much less oppressive to the circulation and respiration than the flesh of beasts and birds. It it said that *divers* can remain a longer time under water when they employ fish instead of flesh at their meals. I believe that, in this country, fish is not made so important an article of diet as might with advantage be the case. Were its employment more encouraged, the effects would not only be advantageous in giving occupation to our fishermen, but an increased supply of fish would reduce its price, and render it, and other articles of food, cheaper, and therefore more accessible to the poor. These remarks, perhaps, principally apply to those species of fish which periodically visit our shores in vast profusion. It is a great and fatal error that sometimes prevails among the poor, which leads them to despise not merely fish, but other articles of provision, when they are bountifully supplied in overflowing abundance; and it is important that they should be aware, that these articles of food are never in such high condition, approaching to perfection, at any other time, as they are when thus fully in season. The straggling fish caught out of season, and placed at a high price on the table of the wealthy, is really very inferior to those which are even spurned by the poor when they occur in abundance. Another point, which I would recommend as

second only to the due appreciation and employment of fish when they are in season and abundant, is, a careful attention to and adoption of the best means of curing or preserving the surplus, so as to prolong the period of their utility.

SHELL-FISH.—These do not, in a natural, historical point of view, belong to the class of Fishes, but rather to the Crustacea and Mollusca. Some of these are both nutritious and easy of digestion: the oyster, perhaps, possesses these qualities in the highest degree Some are possessed of a delicacy of flavour which renders them objects of particular esteem; such as, the lobster, the scollop, and the prawn. The flesh of some is hard and indigestible; of which, whilks are an example. Some possess a peculiar property, which acts like a poison on some individuals, whilst it is perfectly innocent to others: thus, muscles, crabs, and crayfish, cause some to suffer severely from urticaria or nettle-rash, and other affections of the skin.

Having described the principal articles of solid food derived from the animal and vegetable kingdom, I must now notice their respective merits, and the principles on which, in different cases, an animal or vegetable diet should be exclusively or principally employed.

Vegetable diet is characterized by its consisting of principles less substantially nutritious than those which enter into the composition of animal food: their nutritious powers, as I have already sufficiently pointed out, differ very much amongst themselves. The vegetable principles are not merely less nutritious than the animal, but they appear also to be less easily appropriated as nourishment by the body. This is a point which it is quite as important to bear in mind, in directing their employment, as the actual amount of

nutrition which they are capable of yielding; since, though the more substantial vegetable principles may be quite sufficient to bring an individual of good digestive powers, adapted to this kind of aliment, to a high condition of flesh and strength, yet there are individuals whose weak stomachs are so ill adapted to this kind of food, that their strength would sink if actually restricted to it, although there may be no limitation as to quantity. Vegetable food, even when easily digested, is much less liable than animal food to raise the temperature and quicken the pulse: it seems, therefore, peculiarly adapted to form the principal diet of those who are so constituted as to be inclined to a too high temperature of body; who are liable to attacks of severe inflammation, especially of the head and chest; who are threatened with a tendency to apoplexy, as indicated by giddiness and fulness of the head, with suffused eyes and flushed face; and also for those who are of a highly irritable, irascible, or choleric temper. These indications will be additionally important, if the individual be subject to confined bowels, and dry and parched skin. On the other hand, the disadvantages of diet wholly or exclusively restricted to vegetable matter consists in its tendency to produce a disordered state of the stomach, marked by flatulence or acidity, or the production of that degree of indigestion which is called pyrosis or water-brash; a disease very prevalent in the northern parts of this country, where the poor chiefly subsist on meal, potatoes, and other vegetable matter. It is characterized by frequent pain about the pit of the stomach, followed by the bringing up of a considerable quantity of nearly colourless watery fluid, which procures temporary relief from pain. Diet in which vegetables predominate is improper for those

persons who are of a pale, puffy, flabby habit of body, who with difficulty maintain due animal temperature, and are technically distinguished as belonging to the lymphatic or leuco-phlegmatic temperament. There are also some districts in which it seems to be important for the health of the inhabitants to avoid the predominance of vegetable matter: such are, low, damp, and marshy situations, and crowded, ill-ventilated towns. In these situations, especially the low and marshy, poor, vegetable diet appears to be extremely favourable to the production of worms and other parasitical animals.

An exclusively animal diet is scarcely endurable; and is rarely, if ever recommended, except in some cases of the disease called diabetes. As animal food is characterized by the abundance and substantial character of its nutritious principles, and by the facility with which, unless injured by the process of cooking, it is appropriated to supply the wants of the system, it is obvious that a predominance of animal food is particularly suited to those cases in which it is desirable to give nourishment in a compact form, and when it is wished speedily to raise the system to the highest degree of bodily vigour. The utmost limits to which these objects can be carried, are seen in the training of men for pugilistic and other feats of bodily strength.

The ancient Greeks used to prepare those who were designed to combat at their games, by means of vegetable diet: but this mode was afterwards laid aside, and a very liberal allowance of animal food substituted for it. In the present day, when the art of training is better understood but more abused, whilst excess is strictly guarded against, an animal diet, consisting of underdone muscular beef, is given with great regularity as to time and quantity: the compactest farinaceous

vegetable matter is alone allowed to be eaten with it: the quantity of drink is carefully reduced, and confined to sound, well-fermented beer. In the mean time, the tendency to plethora, which this mode of diet is calculated to produce, is counteracted by the rigid exaction of regular and active exercise, carefully increased as the strength and capability of the individual advance, always taking care to avoid positive exhaustion. When the individual's condition is in this way carried to the highest pitch, the muscles are well developed and hard: they are prominent and visible, from the removal of the puffiness which usually conceals them: they are capable of the greatest exertion for the longest duration, without afterwards suffering from stiffness: the breathing is long, and not easily disturbed; and the weight of the body is reduced by the absorption of superfluous fat. It might be supposed that this state, which seems to be that of the highest possible health, is precisely that which it should be the object of dietetic regulations to produce and maintain: it is found, however, that this highest pitch, or acme, as it is called, cannot be made permanent; but that, after it has been kept up for some time, the individual, so managed, sinks in condition. This effect of over-training is called training off: it is therefore found to be expedient to keep men and other animals, who are subjected to training, a little under their acme; and much nicety is required to complete what may be wanting, by the exact time that the utmost exertion is to be called for. Important dietetic hints may be gained from this experience. Whilst we see that the highest condition is not to be desired as a permanency, we may learn the great advantage to be derived from a just admixture of the most nutritious animal and vegetable substances, by those from whom

constant and considerable bodily exercise is required. Animal food should predominate in the diet of those whom I have described as of the leuco-phlegmatic temperament; of those who live in the neighbourhood of marshes, and other situations in which a vegetable diet is undesirable; and in the spare diet of most persons who are troubled with weak digestion.

In endeavouring to arrange a just combination of animal and vegetable diet, it is of great importance to avoid the unhealthful mixture of a great variety of articles. Many mixtures at any one meal are both injurious in themselves, and in the want of moderation to which they are likely to lead. This is perhaps the greatest bane to health, which is met with on the loaded tables of the wealthy. Before quitting the subject of the choice of aliments, I must notice some terms applied to particular classes of diet, and the tendencies of each of the classes which they designate. We hear of low diet and poor diet, of full diet and of generous diet.

Low diet consists in such a reduced quantity of alimentary matter, that the system, so far from being sustained in a state approaching to plethora, is kept below the natural standard, or even made to draw upon its own resources. A strict adherence to this form of diet is of the utmost importance, in the treatment of all diseases of an acute inflammatory character: it favours the return of health, which, by its assistance, finds the system in a state best adapted to appropriate with rapidity and advantage the more abundant nourishment which may then be supplied to it.

Poor diet relates rather to the quality than the quantity of the food taken. Diet is poor when it consists of articles possessed of very little nutrient principle, and that little of the lowest kind. It may more especially

be regarded as poor, when these articles are out of condition, and of inferior or bad quality; as, for example, when watery, ill-prepared potatoes, damaged grain, or a large proportion of succulent autumnal vegetables are to a great degree relied upon as sustenance. Poor diet must be distinguished from simply low diet; although, like the latter, it powerfully tends to reduce and keep down the system: instead of being, like it, conducive to health, it is a fruitful and almost certain source of disease: — land-scurvy, dysentery, sibbens, radyzigie, pellagra, and mesenteric decline, are amongst the evils it either induces or mainly aggravates. (8) Another instance of this kind is seen in the dry gangrene and malignant pustule, in those districts in which the inhabitants are reduced to eat bread made of damaged or spurred rye. The term "poor diet" is sometimes employed, by comparison, in those cases in which an individual, who has been accustomed to nutritious articles of food, is reduced to those which, without being unsound of their kind, are nevertheless possessed of very little nutritive power. It is often important to warn those whose health requires that they should be put upon low diet, against confounding it with the poor diet of which I have last spoken, as well as the danger of their oppressing their stomach in respect to quantity, whilst they scrupulously attend to the reduction in quality.

Full diet is meant, when food of good and thoroughly nutritious properties is supplied in quantity sufficient completely to satisfy the wants of the system. Its quality may be plain and simple, and it may possess no other stimulating property than that which wholesome well-prepared food never fails to afford to the healthy stomach which is ready to receive it.

A diet is GENEROUS when the articles which compose it are not merely rich in nutritious principles, but accompanied with those stimulants which dispose them to provoke the appetite, to call the powers of the stomach into activity, and in some degree hasten the course of the circulation: diet may therefore be generous without reference to its quantity. Full diet and generous diet are consequently no more to be confounded than low diet and poor diet.

A very important point to attend to, with respect to the taking of our food, and more especially the solid part of it, is, the observance of the utmost regularity in the time of taking it. It is even of greater moment to observe uniformity in the time of taking our daily meals, than to be very particular in the time we select; although even this is not to be regarded with indifference. In general, substantial meals should not be made late in the day; and certainly they ought not to be deferred to near the time of going to bed. Yet a late dinner, constantly taken at the same hour, is better than dining sometimes early and sometimes late; which can scarcely fail to have the effect of preventing the meal from being taken when the body in general, and the stomach in particular, are best prepared to receive it.

The term "temperance" is so constantly applied to just moderation with respect to articles of drink, that it is perhaps seldom thought of as being applicable, with equal propriety, to moderation in regard to solid food. I shall however, before I quit the subject of solid food, devote a few moments to the consideration of temperance in eating.

The temperance in eating, which I am about to recommend, is something more than merely refraining

from that degree of excessive eating which, when given way to, to satisfy sensual appetite, is called "gluttony," and is universally despised; or that unhealthy voracity which depends on disease, and is called "bulimia," or wolf's-hunger; an instance of which I have seen in a woman who had reduced herself to absolute indigence in endeavouring to satisfy the cravings of her appetite, although she was willing to confine herself almost entirely to bread of coarse quality.

Many persons—I may almost say the majority—without falling into either of the states which I have mentioned, are in the habit of eating more than is requisite or even good for their health. By going beyond the proper quantity of food, the system becomes oppressed by the quantity of its juices: the blood and other fluids become impure, receiving that which they ought not, and not separating from it that which should be thrown off from the system: the necessary portion of healthy bodily exercise cannot be taken without inconvenience, and the faculties of the mind are for a longer or shorter time torpid and obscured: diseases of various kinds, according to the particular liabilities of the individual, are promoted; and, when brought into activity, are not so easily encountered or cured as when they affect the persons of the temperate. Our own great poet, Milton, was fully aware of the fatal tendency of intemperance; and, after describing the angel Michael pointing out to our first parent various deaths occasioned by accidental causes, he makes him say, that there are,

—— "By intemp'rance, more
In meats and drinks, which on the earth shall bring
Diseases dire: of which a monstrous crew
Before thee shall appear, that thou may'st know
What misery th' inabstinence of Eve
Shall bring on men." ——

In the Bible, there are numerous passages inculcating temperance in eating, and exposing the vice and folly of departing from it. Heathen writers have given precepts to the same tendency. Plutarch has laid down the following short and full instruction, for the preservation of health:—"Keep your head cool, and your feet warm. Instead of employing medicine for every indisposition, rather fast a day; and whilst you attend to the body, never neglect the mind."

Plutarch was an Epicurean, in the true sense of the word. You will not unfrequently hear the term "Epicure" applied to those who are devoted to the pleasures of the table; but "an Epicurean" originally meant one who belonged to that sect of philosophers who placed the chief good in pleasure and the avoidance of pain: but then the pleasure which they sanctioned was generally of a pure and exalted character. Nevertheless, the Epicureans, in consulting the ease and comfort of the body, formed a contrast with two other sects of philosophers, the Stoics and the Cynics, who pushed temperance to abstinence and privation, and, by precept and example, inculcated self-denial and austerity, and considered it a part of virtue to bear with patience and equanimity all the difficulties and misfortunes of life. It is needless for me to enumerate all those who, in ancient and modern times, have enforced temperance in eating; yet there is one remarkable medical authority not to be passed unnoticed. Although the individual to whom I allude is not now living, his name and his character are still fresh in our remembrance. The striking success of John Abernethy's extensive practice essentially depended on the great stress which he laid on temperance in eating. He not only severely enforced this in his consultations, but it forms the sum

of what is contained in that notorious page to which every patient was referred. Not satisfied with recommending moderation in general terms, he sometimes made his patients eat and drink by weight and measure, and thereby successfully limited them to a low, though not to a poor diet.

The example of Cornaro affords a striking instance of the efficacy of that temperance, in favour of which I have already adduced sufficient authority.

"CORNARO was an Italian, who by the simplest and strictest regimen, and an unexampled perseverance in his plan, *happily attained* to a great age; which *richly rewarded him* for his self-denial, and gave an instructive lesson to posterity. One cannot read the history of the life and abstinence of this veteran of eighty-three, and hear how he praises that serenity and contentment for which he was indebted to his mode of living, without participating in his happiness and his cheerful sensations. Till the fortieth year of his age he had led a life of dissipation; had been always subject to colics, pains in his limbs, and a fever; and was so far reduced by the last, that his physicians assured him he could not live above two months; that all medicine would be useless; and that the only thing which could be recommended for him was a spare diet. Having followed this advice, he found, after some days, he was much better: and at the end of a few years, his health was not only perfectly re-established, but he became sounder than he had ever been before. He resolved, therefore, to restrain himself more and more, and to use nothing except what was absolutely necessary for his subsistence. For sixty whole years he took no more than twelve ounces of food, every thing included, and thirteen ounces of drink, daily. He avoided also violent heat and cold,

as well as passion; and, by this uniform regimen, he kept not only his body, but also his mind, in such a state of equality, that nothing was able to derange them. When at a great age, he lost an important law-suit: and though this disappointment hurried two of his brothers to the grave, he remained perfectly sound and resigned. He was once thrown from a carriage, and trodden under the feet of the horses, so that an arm and one of his feet were dislocated; but he caused them to be reduced, and, without the use of any medicine, was soon restored to his former condition. But what is most worthy of remark, and proves how dangerous the smallest deviation from long custom may be, is what follows. When he was eighty years of age, his friends prevailed upon him, as his body now required more nourishment, to make a little addition to his food. Though well aware that with the general decay of strength the power of digestion decreases also, and that in old age one ought rather to lessen than increase the quantity of nourishment, he gave way to their request, and raised his food to fourteen and his drink to sixteen ounces. "Scarcely," says he, "had I continued this mode of living ten days, when I began, instead of being cheerful and lively as before, to become uneasy and dejected, a burthen to myself and to others, On the twelfth day I was seized with a pain in my side, which lasted twenty-four hours; and this was followed by a fever, which continued with so much violence for thirty-five days, that my life was despaired of. But, by the blessing of God, and my former regimen, I recovered; and now, in my eighty-third year, I enjoy a happy state both of body and mind. I can mount my horse without assistance; I climb steep hills; and I have lately written a play, abounding in innocent wit

and humour. When I return home from a private company or the senate, I find eleven grandchildren, whose education, amusement, and songs, are the delight of my old age. I often sing with them; for my voice is now clearer and stronger than it ever was in my youth; and I am a stranger to those peevish and morose humours which fall so often to the lot of old age.'—In this happy disposition he attained to his hundredth year; but his example has never been imitated."

"The most extraordinary instances of longevity," says Heufland, "are to be found, however, only among those classes of mankind who, amidst bodily labour and in the open air, lead a simple life, agreeably to nature; such as farmers, gardeners, hunters, soldiers, and sailors. In these situations, man still attains to the age of one hundred and forty, and even to one hundred and fifty."

"In the year 1670, died Henry Jenkins, of Yorkshire. He remembered the battle of Floddenfield, 1513; and at that time he was twelve years of age. It was proved, from the registers of the Chancery and other courts, that one hundred and forty years before his death he had appeared as an evidence, and had an oath administered to him. The truth of this account cannot be controverted. At the time of his death, therefore, he was one hundred and sixty-nine years old. His last occupation was fishing; and when above the age of one hundred, he was able to swim across rapid rivers."

"The next to him, in point of age, is another Englishman, Thomas Parr, of Shropshire. He was a poor farmer's servant, and obliged to maintain himself by his daily labour. When above one hundred and twenty years of age, he married a widow for his second wife,

who lived with him twelve years, and who asserted that during that time he never betrayed any signs of infirmity or age. Till his hundred and thirtieth year, he performed all his usual work, and was accustomed even to thresh. Some years before his death, his eyes and memory began to fail; but his hearing and senses continued sound to the last. In his hundred and fifty-second year, his fame had reached London: and as the king was desirous of seeing such a great rarity, he was induced to undertake a journey thither. This, in all probability, shortened his existence, which otherwise might have been preserved some years longer; for he was treated at court in so royal a manner, and his mode of living was so totally changed, that he died soon after, at London, in 1635. He was one hundred and fifty-two years nine months old, and had lived under nine kings of England. What was most remarkable in regard to this man, is, that when his body was opened by Dr. Harvey, his bowels were found to be in the most perfect state, nor was the least symptom of decay to be discovered in them. His cartilages, even, were not ossified, as is the case in all old people. The smallest cause of death had not yet settled in his body; and he died merely of a plethora, because he had been too well treated."

"In the year 1757, J. Effingham died, in Cornwall. in the hundred and forty-fourth year of his age. He was born of poor parents, in the reign of James I.; and had been brought up to labour from his infancy. He had served long as a common soldier and a corporal; and had been present at the battle of Hochstedt. He at length returned to the place of his nativity, and worked as a day-labourer till his death. It is to be remarked, that in his youth he never drank strong,

heating liquors; that he always lived remarkably temperately; and seldom ate flesh. Till his hundredth year he scarcely knew what sickness was; and eight days before his end he had walked three miles."

These instances seem to realize another passage of our great poet; in which, again making the angel Michael address Adam, he says:

—— "If thou well observe
The rule, of not too much, by temp'rance taught,
In what thou eat'st and drink'st, seek from thence
Due nourishment, not gluttonous delight,
Till many years over thy head return:
So may'st thou live, till, like ripe fruit, thou drop
Into thy mother's lap, or be with ease
Gather'd, not harshly pluck'd, for death mature."

Notwithstanding the examples of extreme longevity, which I have cited, have occurred amongst the poor in whom temperance is favoured by fewer and less powerful temptations to excess, and sometimes made compulsory by the want of the means of inordinate gratification, still the poor, as a body, are not so innocent of intemperance as to render my recommendation of it misplaced and unnecessary. Although they may sometimes be really pinched by want, the poor are at other times, more especially in cities, exposed to the evils of excess, as well as to those resulting from the erroneous choice of food. The effect is perhaps more marked and striking in consequence of the transition and contrast. A prudent and equalized application of their small but fluctuating income, and a little attention to make the abundance of one season help out the scarcity and counteract the high prices of another, would greatly favour temperance; and this would bring with it a train of other virtues, with their attendant rewards.

Let it not be supposed that the moderation and tem-

perance which I have recommended, may be practised by a few individuals of strong minds, or appetites more easily controlled than those of other men; and that the idea of moderation being generally observed, is altogether visionary and hopeless. The examples which I shall next bring forward will shew you that this is not the case: and I would have you particularly to notice, that some of these examples have been furnished by heathen nations, who had not the advantage of those precepts and promises by which our conduct ought to be actuated. The Lacedæmonians, or Spartans, when Lycurgus undertook to give them his celebrated code of laws, were amongst the most luxurious of the Greeks: nevertheless, they consented to be restrained by his statutes, which enjoined the most rigid moderation, and the use of the plainest and most homely diet. During the long period of years in which they maintained these habits, they continued to be the most incorruptible and invincible of the Greeks.

The Romans, during the best days of their advancing power and prosperity, were almost equally remarkable for their temperance. Their best generals and statesmen were often taken from the plough, to direct the most important affairs of the nation; but even then they continued satisfied with the most simple fare, which foreign ambassadors sometimes found them preparing for themselves. Whilst they adhered to these manners, and observed this moderation, it was no wonder that they were incorruptible by foreign treasures and luxuries, whether offered to them as bribes, or won by conquest. In later times, various orders of monks and friars, such as Carmelites, Capuchins, Camaldules, and Trappists, have, as bodies of men, and for centuries, been in the practice of moderation. Some companies of these

orders may even still adhere to the practice of their predecessors; but it is to be feared that a vast majority of them merely use their profession as a cloak for the grossest sensuality and corruption.

Various sects of Reformed Christians, of whom the Moravian Brethren are examples, have proved the possibility, and illustrated the advantage, of the general adoption of temperance, in the more extended sense of the word.

DRINKS.

I now proceed to speak of FLUID ALIMENTS. And first, of the phænomena which attend their passage through the body.

The use of drink is of a twofold character. In the first place, it is required to replace the loss sustained, both by the vapour continually exhaling from the surface of the body and from the lungs, and by the secretions of the kidneys and bowels. Secondly, drink is required, because some of the solids taken into the stomach demand a certain quantity of fluid to reduce them to a proper consistence, and render the nutritious parts in a fit state to be taken up by the absorbent vessels. The absorption of fluids sometimes takes place so rapidly, that it has been supposed that an immediate communication existed between the stomach and kidneys: this, however, is not really the case.

In speaking of the digestion of solid food, I had occasion to notice the absorption of nutritious matter from the small intestines, by the absorbent vessels or lacteals, which proceed from this part of the alimentary canal towards the lower part of the thoracic duct; which canal empties itself into the veins near the heart.

The fluids taken into the system, in part, follow the same course; although it is probable that they are not

merely taken up as part of the chyle. The absorbent vessels of the stomach probably remove a considerable quantity very soon after it is swallowed, and thereby counteract too great dilution of the food. The veins also, both of the stomach and intestines—although it has been denied by some that they perform the office of absorbents—are now believed, on the authority of the most accurate experimenters, to take up a considerable quantity of the fluid contents of the alimentary canal. The portion of drinks which enters the system through the medium of the veins, is, like that which passes through the thoracic duct, poured into the general mass of venous blood before it reaches the heart: but whereas the portion taken up by the lacteals has to pass through the glandular bodies situated in the mesentery or web, that which goes through the veins has to pass through the liver, the largest gland in the body, which, as you know, performs the important office of producing the bile. You may readily conceive, from this fact, that errors in drink are extremely liable to disturb the liver, and bring on or aggravate those serious disorders which have their seat in that part. I have stated, that fluids find their way into the blood by both channels, before it reaches the heart: hence errors in drink may disturb this organ. But before the blood is sent from the heart over the body at large, it is sent from the right side of the heart to the lungs. Here, as I explained to you in the last Lecture, the blood undergoes important purification, by the act of breathing; but the lungs, in the mean time, may be more or less offended by the articles conveyed to them by the blood: the very odour of some of these articles may, at times, be perceived in the breath; as, for example, when turpentine has been taken. It is not every thing offensive which enters the

blood that can be thrown off from it in the lungs: some of these articles, therefore, return, with the blood, to the left side of the heart; and, as the blood is sent from this side of the heart over the whole body, a portion of them must be sent to the brain; and they can scarcely fail to produce more or less injurious consequence to that most delicate and important organ. This, however, is not the only mode by which the brain is disturbed by what is taken into the stomach: there is a much more direct connexion between these two organs, by means of nervous communication, of which I shall have hereafter to speak. The baneful influence of error in drink, reaching the brain by both of these ways, is strikingly exhibited in the production of intoxication.

A considerable portion of the blood sent from the left side of the heart is conveyed to the kidneys,—two well-known glands, situated in the loins, a little below the midriff or diaphragm. These organs perform a most important office, in separating from the blood various matters from which respiration cannot free it, but which, if retained, would be extremely injurious to the system. The most important of these excrementitious matters are, urea, the acid of urine, and some salts. You will now expect that I should say a few words respecting the kidneys. With the general appearance of these bodies you are doubtless acquainted. Although they are more or less complicated in different animals, there is a striking similarity of texture in most of them: thus you will find the exterior tolerably smooth, and of a darkish colour, somewhat like that of liver. When cut pretty accurately through the middle, so as to separate the back or posterior from the fore part, you will find that the substance, to a consi-

derable depth, resembles what is seen upon the surface; but that nearer the middle, the substance is lighter, and appears to be made up of straightish lines, spreading from one or more points which are directed towards the notch or hollow which is always to be found on one side of the kidney. It is the outer part of the kidney in which the urine is supposed to be separated from the blood; and the lighter middle part, shewing lines spreading like a fan, appears to be composed of very minute tubes, for the purpose of conveying it away. There is a funnel-shaped membranous bag attached to the hollow or notch at the inner side of the kidney, which receives the urine as it comes away from the points at which the tubes before mentioned meet. This funnel-shaped bag contracts, so as to form a tube, which conveys the urine to the bladder; and it enters the side of the bladder in such a slanting or oblique manner, that it is extremely difficult for the urine to find its way back from the bladder towards the kidney. In consequence of errors in diet, and more especially in drinks, the kidneys, and parts connected with them, may be very seriously deranged by the fluids that pass through them. It will be sufficient for me to mention two or three of these diseases, by way of example. Sometimes the kidneys are brought into a state in which they allow very large quantities of urine, sometimes amounting to several gallons, to run off in the course of the day. The urine is not only more copious, but contains principles which either ought not to exist in it, or ought not to be so rapidly separated from the blood. The urine, in these cases, is often quite sweet: it ferments, like beer, and frequently attracts flies. This disease is called diabetes, and is almost invariably fatal.

Another affection of the kidneys consists in the external or secreting part being deranged by a deposit of a whitish colour, which gives the kidney a mottled appearance, and often renders its surface uneven. Kidneys in this state often produce a considerable quantity of urine, which is sometimes pale, and sometimes of a dingy or smoky colour: its healthy properties are considerably altered; and it contains nutritious matter, which ought not to escape by the kidney. This form of disease is quite as fatal as diabetes. Persons affected with it are very liable to various kinds of dropsy, to apoplexy, and disease of the heart. When they meet with accidents, the injured parts have very little disposition to heal; and when they become the subjects of other diseases, they have very little power to resist their fatal tendency. I believe that many hundreds of individuals have fallen victims to this state of the kidneys, without the cause having been even suspected. It often occurs where it cannot be ascribed, at least solely, to intemperance in drinking. The abuse of mercury, or exposure to cold, seems often to have co-operated with intemperance, or may have been the only discoverable exciting cause.

The last affection to which I shall here call your attention, belongs to the urinary passages, and depends upon the urine itself. When, from various causes (of which errors in diet, and more especially in drinking, appear to be by far the most frequent), the urine is charged with a larger quantity of saline and other matters than it is capable of dissolving; a portion of these is necessarily separated in a solid form; and by their cohesion, either in small grains, in grains of a larger size, or in absolute masses, they constitute urinary sand, gravel, or stone, the painful and serious effects

of which are too generally known to require any description.

Of different kinds of drink.—I shall speak of these under three heads. The first of these may be regarded as simple diluents, or nearly such; secondly, of those which consist of fluid, holding a considerable quantity of nutritious matter in solution or suspension; and thirdly, of those which are characterized by their stimulating property.

Of diluents.—Pure distilled water is the simplest diluent with which we are acquainted, or of which we can form any idea: it seems to contain nothing requiring any change to be effected in it by the stomach or other organs, except, in some instances, a change of temperature: it would therefore appear to be peculiarly adapted to be added to the contents of the stomach, in almost any state of that organ, and in any stage of the process of digestion. Nevertheless, it is not by any means an agreeable beverage, and its virtues are of a negative character. By the same process of distillation which frees the water of all impurities and earthy matters, it loses all its dissolved air, both atmospheric and carbonic acid, and consequently loses that briskness which renders the best waters grateful to the palate and stomach. The use of distilled water has, nevertheless, been strongly insisted upon by a distinguished physician, Dr. Lamb; and, in compliance with his recommendation, stills for the production of distilled water have been adapted to fire-places.

Rain-water, and water derived from dissolved snow or hail, closely resemble distilled water: in fact, they may be regarded as distilled water, supplied by Nature herself. They do not, however, quite equal it in purity; since they may be not only contaminated in

their fall through the atmosphere, but in the tanks, and other situations in which they are contained: in fact, when water derived from either of these sources has been long retained, it is extremely apt to become contaminated with vegetable and animal matters, which impair its appearance, smell, and taste. Its faults, in all these respects, may be sufficiently corrected, for all practical purposes, by boiling, and well-managed filtration. A prejudice has been entertained against snow-water; which, as it is without foundation, appears to require contradiction. It has been supposed that the drinking of snow-water occasions an unsightly swelling in the fore-part of the neck, known by the names of bronchocele, goître, and Derbyshire-neck. A careful inquiry into the circumstances in which those are placed in whom this affection exists, has tended clearly to shew that snow-water was not only perfectly innocent of the charge laid against it, but that, even in districts in which the affection prevails, the drinkers of the pure snow-water either escape, or experience relief, if they had begun to be affected with it. Rain- and snow-water may therefore be strongly recommended for all purposes of diet, where the impurities of the spring, or other waters of the place, appear to be favourable to the production of goître or other diseases.

Spring-water.—As this water has filtered, for a greater or less distance, through the pores of the earth, it is generally rendered extremely clear and transparent: it is often charged with fixed air, or carbonic acid, which exists to a greater or less degree in the earth through which it has soaked. We may see this air escaping in bubbles from fresh-drawn spring-water, in consequence of the water being able to hold more

fixed air dissolved in it, when under the pressure which it receives whilst under ground, than when it is only under the pressure of the atmosphere. It is a higher degree of charging with fixed air, produced artificially, which causes the sparkling and effervescence of soda-water. The water in some springs in Germany, which are charged almost to the same extent, is carefully preserved in bottles, and meets with an extensive sale, as a much esteemed and wholesome beverage. The Seltzer and Fackenger waters are of this description. Besides the carbonic acid on which the sparkling appearance and briskness of the water of the most-esteemed springs depend, water, as it passes through the earth, becomes charged with other principles; which, as they are capable of complete solution, may render the water very impure, without altering its transparency. It is on the presence or absence of these admixtures that the hardness or softness of spring-water depends. These principles dissolved in spring-water, on which its hardness depends, are very various, according to the nature of the ground through which it has filtered. Sometimes it is merely carbonate of lime, which is seldom of much consequence to the health of those who drink it. The greater portion of it may be separated by boiling, which drives off the carbonic acid, and causes the earthy particles to collect at the bottom and sides of the vessel, in the form of fur. Sometimes the spring-water is rendered hard by holding in solution sulphate of lime, otherwise called "selenite, or gypsum." This is not so easily separated from the water as carbonate of lime; and it seems at times to produce a disturbing effect on the stomach and bowels of those who drink it, especially when they commence the use of it. This observation is almost invariably made by those who

visit Paris, the water of which city appears to be contaminated with this salt. There are many springs whose waters are charged with earthy and metallic salts, which are much more sensible to the taste, and more disagreeable in their effects, than those which I have just mentioned. For example, some springs contain common salt; others Glauber-salt, Epsom-salt, or saltpetre, carbonate of iron, or green or blue vitriol. The first of these, though useless for drink or washing, are often of great value, in furnishing large quantities of the finest salt. The others are seldom turned to any useful purpose, except where their ingredients exist in such proportions as to render them applicable to medicine; and in this way, some of these impure springs have obtained a well-merited reputation.

The great importance of good springs of water has been felt and acknowledged from the earliest periods. Some of the most ancient settlements of the human race appear to have been determined by them. This has been particularly the case in and near the torrid zone, where the want of water is most severely felt, and where its scarcity is most likely to occur. I need only refer to the early records of sacred history, for the confirmation of this remark. In like manner, the inconvenience of bad water has been so severely felt, that it has been handed down by history, by tradition, and by the names of the places in which it occurs. Its striking influence on the murmuring Israelites at Meribah, and the signal miracle which effected their deliverance, must be familiar to every one.

River-water, like spring-water, must be very much influenced by the nature of the country through which the water passes. As far as the principles which it has received are concerned, what I have stated

with respect to spring-waters will suffice here. There are, however, some particulars with regard to river-water generally which must not be passed over. By the constant exposure of a large surface to the air, and also by motion, it loses most of its carbonic acid: hence, it is not only much flatter to the taste than spring-water, but it also contains less of the earthy carbonates in solution. It contains, however, more dissolved atmospheric air; and is therefore more adapted to preserve the life of fish, and other aquatic animals. Some of these are of almost microscopic size, and become one of the sources of impurity in river-water, which often holds both living and dead animal and vegetable matter in a state of suspension. Besides these matters, finely levigated, earthy particles are often suspended in river-water, and deprive it of its transparency. From any of these it may be easily separated, by rest, boiling, and filtration. River-water is at times contaminated by the reflux of the sea. When the admixture of salt-water is considerable, it is rendered wholly unfit for dietetic purposes; but when only slightly brackish, it has, for some of them, been preferred to fresh; as, for example, for the brewing of beer destined for long keeping:—this supposed superiority is, however, very doubtful

STAGNANT WATER.—This, as it exists in small lakes, pools, ditches and marshes, is, in general, very unfit for purposes of diet, from the large quantity of living and decomposed animal and vegetable matter which it contains. It is also very liable to be contaminated with carburetted and sulphuretted hydrogen gases, which contribute to confer upon it an offensive odour. The pernicious effects of this water are not to be attributed to it solely as an article of diet: it often produces

injurious or even fatal effects on the health of those who live near it, by contaminating the air which they breathe: hence the prime importance of draining, not only large tracts of flooded land, but also small collections of stagnant waters, especially when situated near dwelling-houses. Water, when nearly or quite stagnant, sometimes becomes strongly impregnated with the mineral and vegetable substances with which it may be in contact. It is said that the valuable properties of Peruvian bark, in curing ague, were discovered in consequence of these having been imparted to water in which trees producing this bark had lain: and water in or near copper-mines sometimes becomes so charged with salts of copper, that it is a lucrative process to separate the copper from them. A good supply of water is of such vital importance to the existence of human society, that wherever mankind have settled for any length of time, and this has been wanting, either constantly or at times, they have taken measures to provide it, by tanks, aqueducts, and water-pipes. Some of the former are amongst the most remarkable works of human labour; but in modern times they have given way to the more convenient use of pipes, which improved knowledge in hydrostatics has generally introduced. The water supplied to communities by means of pipes has been supposed to be contaminated by the materials of which these pipes are composed. This idea, although not altogether groundless, has probably been much overrated. The iron pipes which are used for the larger conduits are but little acted upon, when filled with water, and excluded from the air; and the lead which is used for the smaller pipes seldom exhibits any considerable change, even after the lapse of several years.

Nevertheless, I cannot omit this opportunity of recommending a very simple expedient, which completely removes even the very trifling risk which is supposed to attend the use of lead: this consists in having the leaden pipes lined and covered by an extremely thin coating of tin, which is supposed to render them not only more wholesome, but more durable*.

Before I quit the subject of water, I must not omit to notice a very important method of purifying rain-, river- and stagnant-water, by means of filtration through charcoal. It has been employed upon a large scale, and with great advantage, in Paris; and it is coming into use in this country. Some bakers have very laudably employed it, for the purification of water used in making bread.

Next to plain water, I must mention, as little more than mere diluents, those drinks which consist principally of water; to which some other materials are added, for the purpose of communicating flavour, or perhaps rendering it a little more grateful to the stomach. In different countries, different materials, according to the different productions of the soil or taste of the inhabitants, are employed for this purpose.

Toast-and-water.—The simplest addition which is made to water, for the purpose of producing a light and agreeable beverage, is imparting to it the taste and colour of a piece of toasted bread. Its only advantage over simple water, for which it may at any time be substituted, seems to be, that, in consequence of the slight flavour which it receives, the disagreeable flatness which plain water, after standing awhile, always acquires, is not perceived. In some cases,

* Leaden pipes of this description are manufactured by my friend John Warner, of Jewin Crescent. See Note (9).

moreover, slight adventitious tastes, which water sometimes possesses, to a degree sufficient to render it disagreeable as a beverage, may be removed or counteracted by the charred surface of the bread. Sailors act on this principle, when they endeavour by means of burnt biscuit to correct water which has been injured by long keeping.

VINEGAR-AND-WATER.—The addition of a small quantity of vinegar to water, though very seldom adopted in this country, is of very old, as well as of very extensive use. The Roman soldiers were supplied with vinegar for this purpose, as a part of their rations. When I have been on the continent, I have myself frequently seen a very few drops of white-wine vinegar added to a tumbler of water, to be used as a beverage at the dinner-table. To the small extent to which vinegar is thus employed, I believe it may, with many persons, be rather beneficial than otherwise: at any rate, it is not to be compared with the copious and pernicious use which is said to be sometimes made of vinegar as a beverage, for the purpose of repressing a tendency to corpulency.

LEMONADE.—A small quantity of lemon-juice is, in warm climates and warm seasons, very frequently and successfully added to water, to render it more grateful, and more powerful in allaying the sensation of thirst. The juices of other fruits are also occasionally used, to give a flavour to water as beverage; as, for example, of oranges, currants, and raspberries. This, however, is more often the case in other countries than in this; in which light drinks of this kind have too generally given place to more noxious liquors.

WINE-AND-WATER.—In those countries in which light wines are produced, they are, when copiously diluted

with water, very generally employed as a common beverage, at almost every meal. Such mixtures, when we consider the quality of the wine, and the proportion of water added, can only be regarded as mere palatable diluents, bearing no similarity to the heating neguses prepared in this country, under the appellation of wine-and-water.

The weak diluent drinks, of which I have been just speaking, are prepared as they are wanted, for immediate use: those of which I have next to speak, differ from them, not merely as being somewhat stronger, but also from the circumstance, that they are kept ready for use for a longer or shorter period.

Beer, of moderate, or absolutely of little strength, when well prepared from good malt, with an adequate proportion of hops, may justly be regarded as one of the very best of these medium drinks. Whilst within the limits to which it may with propriety be taken, as a diluent to our solid food, it is incapable of disturbing the head: it appears with most persons to be highly grateful to the stomach, to assist in counteracting the effects of fatigue, and therefore to place the system in a favourable state to derive advantage from the more substantial restorative powers of the solid part of the meal. The principal inconvenience of this beverage is its proneness to pass into an unsound state, in which it becomes unpleasant to the palate, and offensive to the stomach. This is particularly the case in warm weather, when this kind of beverage is in the highest request: it may therefore not be amiss to remark, that a very good substitute for small beer may be provided by mixing water with stronger beer, at the time of using it. I must not omit this opportunity of expressing my regret, that the measures of Govern-

ment, laudably designed to promote the general use of this wholesome beverage, to the reduction of the consumption of ardent spirits, should have been so completely and generally defeated, by the perverse and pernicious propensities of my countrymen. The taste for drinking beer, in season and out of season, to an intemperate and profligate extent, has indeed been encouraged by the multiplied opportunities and occasions of temptation almost everywhere presenting themselves, both in town and country. But the taste for ardent spirits seems to have been encouraged, instead of banished, by the ally, rather than rival, which it has received. The case seems to be very much like that of the sailor, who when asked whether he would have some porter or some grog, replied, "If you will give me the porter, I will drink your honour's health whilst you are mixing the grog."

CIDER AND PERRY.—In those districts where apples and pears abound, these grateful and probably wholesome beverages are prepared at a price which places them within the reach of all classes of society. When prepared from the unmixed juice, they are, however, too strong to be partaken of so largely as the wants of the system, induced by active exertion, would seem to require: for this purpose, a weaker beverage, prepared with a mixture of water, or the stronger drink diluted at the time of using, ought to be preferred. Both cider and perry are still more liable than beer to be met with in an unsound state; in which condition it can scarcely fail to be injurious to the constitution. I believe this to be much less strikingly the case in the cider districts of this country than in those of Normandy; but I am induced to mention the fact, with the hope that the more successful managers of

these two grateful beverages may be prompted, out of regard to the health of their neighbours, to communicate the principles on which their success depends.

LIGHT WINES.—In some countries, these are produced of a strength scarcely superior to that of table-beer. As they are obviously not within the reach of most of my countrymen, for the purposes of ordinary beverage, I need not dwell on their respective merits here.

OF NUTRITIOUS DRINKS.—I must now leave, for the present, the consideration of the stronger fermented liquors, characterized by their stimulant rather than by their diluent properties, to speak of those drinks which combine more decidedly nutritious qualities with their fluid parts. It is not necessary that I should notice all the articles that might be ranged in this class: the following, which are the most remarkable, will sufficiently illustrate the principles upon which the others may be judged of.

MILK.—I select this article, not merely because it is a beverage of almost universal consumption, and forms the principal part of our aliment in the first period of our life, but because it will well serve to exemplify the peculiarity of the class of drinks of which I am now speaking, and illustrate the principles which we must bear in mind, in applying them to use. It is very obvious, that milk, notwithstanding its fluidity, consists, besides its strictly watery parts, of principles which are capable of assuming a solid form: it is therefore unfit either to be taken up by absorption, or to be mixed with food already advanced in the process of digestion. When milk has been swallowed by an individual who is capable of digesting it, it quickly undergoes coagulation, by which the solid parts are more or less separated from the fluid: this coagulation is occasioned

by the juices of the stomach. In those persons who habitually feed on milk, the juices of the stomach are particularly adapted to produce this effect: this is especially the case with the stomachs of young animals, for whom this article of diet is expressly and peculiarly provided. The rennet employed in making cheese, extracted from the stomach of the calf, consists of this coagulating principle. When the coagulation of milk has taken place, either within or out of the stomach, the fluid part, or whey, probably requires very little change before it may be taken into the system by absorption: hence whey, artificially made, is often found an excellent beverage. The curd, on the other hand, requires to undergo the process which I have already described, in speaking of solid food: it must be re-dissolved, after it has been coagulated. There are many individuals who find this part of milk, in any considerable quantity, oppressive to their stomachs and intestines. I must here mention, as a preparation of this part of the milk, the well-known article, cheese, although obviously belonging to the class of solid food. Though all cheese essentially consists in the pressed and nearly-dried curd of milk, yet it presents so many and important differences, dependent on the mode of preparation and the length of time it has been kept, that it is impossible to include the whole subject in one sweeping remark. Poor, perfectly mild cheese, which consists of the curd separated from the rich and buttery part of the milk, is almost the only form of cheese likely to be eaten in a sufficiently large quantity to form a considerable part of a meal; the stronger form of cheese being generally used as a seasoning or provocative. Cheese, of middling, or even of inferior quality, probably con-

tains no inconsiderable quantity of nutritious matter. It may be observed, also, that it is one of those animal substances which are not deficient in azote or nitrogen: nevertheless, its peculiarly dense and close consistence must be very unfavourable to its being readily digested. A part of this inconvenience may, it is true, be obviated by the plan of grating it, and mixing it with other articles of diet, as is generally adopted in many parts of the continent.

I must not omit this opportunity of entering my protest against the habit too often adopted by individuals of the labouring class: I mean, that of resorting to cheese with bread for their most substantial meal: it is neither favourable to health, nor to the full development of strength, nor to economy. There is another principle in milk which conduces greatly to its agreeable and nutritious properties, when intermixed with the other principles as nature produces it, but which becomes much less wholesome when in a separate state: I allude to the cream. This is a mild, oily substance, which, though far too rich to be taken into the stomach in a considerable quantity by itself, may be frequently used as an agreeable and not unwholesome addition to other substances, by those whose stomachs are not particularly weak and delicate. With respect to butter, which consists of the oily part of the milk still more completely separated, I must refer you to what I have already stated in my remarks on fatty matter, in the part of my Lecture relating to our solid food: yet I must observe, that those to whom economy, as well as health, is an object of importance in the selection of their food, will do well, either to abstain from butter, or to use it very sparingly.

The articles which I have next to speak of, belonging to this class of fluids, have generally more or less milk in their composition; but this is considerably modified by the mixture into which it enters: I allude to tea, coffee, cocoa, and chocolate. Notwithstanding the essential differences which characterize these articles, they possess some features in common, which it seems best for me to notice, before I speak of the respective merits of each. They are all taken warm, and mostly with the addition of sugar and milk, and employed as beverages at the same meals. It is obvious, that not only the milk, but also the sugar, and other vegetable matter which they contain, must render them unfit for immediate absorption: at the same time, these principles cannot be separated from the watery parts with the same readiness as the curd of milk is separated from the whey, by prompt coagulation: hence you will at once perceive that the nutritious matters which they contain are not in a state favourable for immediate digestion, and that they are not the diluents best calculated to promote the rapid digestion of the solid materials eaten with them. I do not wish it to be inferred, from what I have just said, that these articles are unwholesome, or unsuitable to the purposes for which they are employed: the very properties which I have just attributed to them may, in fact, constitute, under proper management, a real advantage; but it is very expedient that they should be borne in mind, in order duly to apportion the quantity of fluids of this kind, not only to the quantity of solid food taken, but to the state of the individual who uses them. Those whose digestion is slow, those whose weakness of stomach amounts to disease and who do not rapidly expend the fluids of the system in

perspiration and other secretion, ought to be extremely careful to take these drinks in very limited quantities; otherwise, they will not only increasingly suffer from the various evils of indigestion, but irreparably injure the power of the stomach. It is generally supposed that the warm temperature at which these drinks are used greatly contributes to promote this injurious tendency. I believe, however, that this is somewhat overrated, except when they are taken decidedly hot.

Tea.—This beverage, though of a comparatively recent introduction into this country, has become an article of almost universal consumption, and seems to be regarded as one of the necessaries of life. I should therefore have little prospect of success in seeking converts to my doctrine, were I to advocate the opinion of those who maintain that the vast increase of nervous complaints, which is supposed to have taken place in this country within a comparatively short period, is to be ascribed to the introduction of tea-drinking. Whilst, however, it is far from my object to support this opinion, or even to diminish the consumption of tea, I do not hesitate to declare, that I regard it as a very important object to urge a considerable change in the mode in which it is very frequently employed amongst the poorer classes of society. You are well aware that there are several varieties of tea, differing no less in their properties and appearances, than in the name which they bear, or the prices which they cost. All of these may be comprised under the divisions of green and black. Whilst each of these admits of every variety, both of strength and flavour, there are other characteristics, besides colour, which distinguish these two groups. Those whose sensibility has not been blunted by strong teas must be well aware that there

is a striking difference in the effect produced upon the system by green and black tea. They may both be grateful and refreshing at the time of being taken; but the green is found to produce, shortly after, more or less of the following effects:—the stomach feels uneasiness, approaching to nausea, and the bowels are occasionally disturbed; the limbs become tremulous, and the eyelids quiver. If it be taken in the latter part of the day, the usual time for the approach of sleep is passed without any sensation of drowsiness; but instead of it, there is an unwished-for and disagreeable watchfulness, sometimes accompanied with an inexplicable feeling of apprehension, and with palpitation of heart. You will easily believe that an article capable of producing these effects cannot really afford nutrition and support to the system, but must, on the contrary, have a highly pernicious influence; yet it is precisely this kind of tea which great tea-drinkers, or rather abusers of tea, almost always select for the subject of their excess. This mistaken choice is, then, the first error in respect to tea, the correction of which I think it my duty to recommend.

Although I have introduced tea amongst the class of nutritious beverages, yet it is not by virtue of the foreign leaf whose flavour we admire, but of the milk and sugar which accompany it, that the beverage, as we take it, is at all nutritious. Now I have reason to know, from pretty extensive and long-continued observation, that there are many who are in the habit of partaking largely and frequently of tea, but who make very little use of either of these accompaniments. I know that it is the injurious, I may almost say the fatal habit of many of the poor, more especially of the females, to spend their scanty means of subsistence in

the impolitic and extravagant purchase of small quantities of fine and unwholesome green tea, which they exhaust with repeated waters, and drink at every meal, in the unhealthy manner which I have described. The inevitable effect of this, is, to injure the digestive powers, and destroy the appetite for really nutritious food. At the same time, whilst they seem to be pushing temperance almost to fasting, they are really begetting a craving for ardent spirits, the repeated stimulus of which becomes almost necessary to counteract the miserable lassitude which they have brought on themselves.

The use of tea to a person in health should be limited to one-third, or at most half-a-pint, made of moderate and agreeable strength, of black tea; to which a few grains of green may, on particular occasions, be added. (10) Where individual peculiarities do not forbid milk and sugar, they ought to be added: the quantity of the former may be left to taste, but that of the latter ought certainly not to exceed that which is sufficient slightly to cover the roughness of the tea. When used even in this way, tea ought not to be taken more than twice in the day. The occasional use of tea to assist those who are under the necessity of passing the night in watching, must be admitted as an exception, to which these rules will not apply.

Coffee.—Though this imparts to the water in which it is prepared very little more nutritious matter than tea does, yet, as it is generally taken with a larger quantity both of milk and sugar, it may be regarded, in actual consumption, as more nutritious. Again, though strong and good coffee, like the finer kinds of tea, has the effect of keeping off sleep, yet it has not the same debilitating and enervating tendency; and the

watchfulness that it induces is attended with agreeable, rather than distressing sensations. On the other hand, coffee seems to be more heating and stimulating than tea, is more disposed to occasion constipation of the bowels, and, with some persons, seldom fails to produce acidity and flatulence of the stomach. It is less suitable than tea to persons disposed to inflammation; but may often be preferred to it, especially at the morning meal, by those who are engaged in employments requiring bodily exercise. A practice prevails in some foreign countries, much more than in our own, of taking a small cup of strong coffee, without milk, immediately after dinner. I believe it is supposed to produce a favourable effect on the process of digestion: this, however, I am very much disposed to doubt; and rather attribute the agreeable effect which it unquestionably produces, to its slightly exhilarating quality, which counteracts the lethargic tendency of a pretty full meal. In this way it may also have a good effect, in obviating the sympathetic headaches with which some persons are tried during particular states of their stomachs: at all events, the practice deserves commendation and adoption, in preference to the drinking of wine, mixed spirits, or beer, which in this country too often succeed our dinners.

Although there is a considerable variety in the qualities of coffee, yet its agreeableness, as an article of drink, is, at least, as much dependent on the mode of preparation as on the selection or choice of varieties. It is much best when recently roasted: and instead of being long boiled, should be expeditiously prepared, and care should be taken not to suffer the flavour to be lost by evaporation. The error of extreme dilution, to which I adverted with respect to tea, is equally to

be guarded against with respect to coffee; and the health, as well as the gratification and comfort of the consumer, will be promoted by making a sacrifice of quantity for the sake of quality. Before I dismiss the subject of coffee, I must say a few words respecting another article, which has of late years been very frequently used in conjunction with it. This is chicoree, or succory, and is the roasted root of a species of endive. When this admixture is not made for fraudulent purposes, it is rather commendable than otherwise, especially in coffee to be used as an article for breakfast: it heightens the colour, improves the flavour, and probably renders the beverage more nutritious, and at the same time less stimulating.

Cocoa and chocolate.—Both of these beverages are prepared from the same material, and differ but little from each other. In the former, we have whatever hot water is capable of extracting from the ground particles of the nut: in the latter, all the finer parts of the nut are, with certain substances added to improve the flavour, reduced to a paste, which is afterwards mixed with water or milk, when it is prepared for drinking. Cocoa is therefore lighter, but less nutritious, than chocolate, which is somewhat thickened by the particles of the nut; and, though it may be of a finer flavour than simple cocoa, is often too heavy for some stomachs, which do not reject cocoa. Cocoa, and chocolate, do not possess the exhilarating qualities of either tea or coffee, but they are abundantly more nutritious than either: hence, when they do not disagree with the stomach, they are desirable articles, not only for the restoration of invalids, but for the substantial breakfasts of persons in good health, and engaged in active employments. The great reduction in the price

of these articles may, therefore, very properly induce the labouring classes to have habitual recourse to them, instead of tea. ([11])

The next class of nutritious drinks, which remains for me to speak of, comprises those which consist of some farinaceous substance diffused through water; such as, gruel made with oats or barley; also semolina, arrow-root, sago, and the like, so prepared as to possess such a consistence as may just admit of their being taken as a drink. Most of these are rather adapted to the occasional diet of invalids or children, than to form the meals of those who are engaged in the active duties of life: nevertheless, they are employed, not without advantage, either in conjunction with, or as an occasional substitute for solid food, more particularly in summer, when the increased demand for fluid tends to counteract the disadvantage of the great dilution of the materials subjected to the digestive process. The advantage of these slops, for invalids, does not so much depend on the facility of their digestion, as on their freedom from a heating and plethoric tendency, and on their facilitating the operation of medicine, and promoting the various secretions. In the employment of them, the points to be guarded against are, flatulence and acidity, and their ill-timed admixture with other food already partly digested.

Soups.—Some of these, which consist of vegetable matter in conjunction with animal juices, will form the connecting link between the drinks of which I have just spoken, and the pure animal broths. The principal of these, which it is requisite to notice here, are, soups thickened with peas, barley, rice, Indian-corn, or potatoes; or which have turnips, carrots, kale, or other succulent vegetables, chopped up, and diffused

through them. These articles, which are often commendable with respect to economy, require to be used under cautions precisely similar to those which I have offered respecting the class of drinks of which I have last spoken: but they are more nutritious than these in proportion to the quantity of animal matter which they contain: moreover, the spice, with which they are seasoned, promotes their digestibility, and counteracts the flatulency which they tend to produce. These kinds of soups should be strictly refrained from by persons whose stomachs are weak and long retain the fluids taken into them. The pure animal broths, such as beef-tea, gravy-soups, mutton and chicken broth, though less nutritious than some of the compound broths which I have mentioned, are more congenial to the stomachs of invalids, for whom these articles of diet are more particularly designed; since they are less likely to produce flatulence, and supply the system with a grateful form of nutritious matter in too small a quantity to produce heat or plethora.

Although I do not wish to be understood as wholly discouraging the occasional use either of the compound or simple broths at the dinner-table, to which I believe they may at times be advantageously admitted, yet I have no hesitation in saying, that I am fully persuaded that the daily use of a considerable quantity of broth at the commencement of the meal is likely to prove unfriendly to health, and to prevent the system from deriving all the substantial support which it might obtain from the more solid aliments taken after it. (12)

Stimulating drinks.—We now come to the third or last class of drinks, which are characterized by their stimulating property. These comprise the stronger

kinds of beer and wine, and distilled or ardent spirits.

STRONG BEERS.—These are, either pale, such as, strong ales; or of a dark colour, such as porter and stout. Most of these, like the fluids of which I have last been speaking, contain some nutritious matter, of which sugar is the principal: they must, therefore, not be regarded as mere stimulants. Jackson, the celebrated trainer, considered a moderate quantity of sound beer, of good strength, to contribute materially to bring men to the height of their condition. The nutritive and sustaining properties of strong beer are, however, very much overrated; and a fallacious pretext thence deduced for their excessive and injurious consumption, more especially amongst coal-whippers, and others employed in very laborious occupations; who doubtless mistake the temporary exhilarating effect which counteracts their feeling of exhaustion for the acquisition of substantial nourishment.

I am very far from wishing to curtail the salutary, or even the allowable enjoyments of the poorer classes of my countrymen. To do so, would, indeed, be completely opposed to the feelings and spirit which have led me to conceive the idea of giving these Lectures, and of soliciting your attention to them; but I am persuaded that I should ill perform the task which I have undertaken, were I, when pointing out the good qualities and advantages of the truly English drinks of which I am now speaking, to omit pointing out, also, not only the limits within which these advantages are to be gained, but the evil—I may say, the ruinous consequences, which await those who are in the habit of going beyond these limits.

The combined effects of the stimulating and nutri-

tious properties of a moderate quantity of sound beer of good strength are well seen and suitably employed, in restoring a degree of elasticity and vigour to the mind, as well as to the body, of one who is exhausted by the fatigue of the exertions which he has made. He is prepared to enjoy and profit by the period of rest; to take with satisfaction and advantage the substantial meal which is to repair the losses which his system is undergoing; to take pleasure in the society of his family; and to pass, in tranquil sleep, the night which is to fit him for the labours of another day. The exhausted labourer is not the only person to whom these drinks are not only allowable, but useful. The feeble mother, whose delicate frame scarcely enables her to undergo the cares and fatigues of her family, and much less to furnish to her infant the aliment on which its health and vigour depend, derives from sound and genuine beer that availing support, which no drugs of the apothecary, and still less the poisonous cordials and fatal drams of the spirit-merchant, can supply. Without crediting, for a moment, the anti-consumptive virtues which Lord Bacon has attributed to ale, I may assert, from well-proved experience, that the invalid, who has been reduced almost to extremity by severe or lingering illness, finds in well-apportioned draughts of sound beer one of the most important helps for the recovery of his health, his strength, and his spirits.(13)

Is it not then lamentable, that an article possessed of so many virtues should, perhaps in the majority of cases, become the ruin, if not the death, of individuals, the destruction of family prosperity, the source of family broils, and the bane of society—scarcely second to ardent spirits, of which I shall have hereafter to speak?

It is not for me to fix the exact quantity, imperial measure, by which your draughts of beer are to be limited; but I can give you two rules equally favourable to health and economy. *First*—When drinking strong beer, always limit yourselves to the smallest quantity capable of counteracting the feelings of languor and exhaustion under which you may have laboured; and, if a further quantity of drink be required to allay thirst or dilute food, either have recourse to water or much weaker beer, or wait a while and take tea. *Secondly*—Shun, with the most scrupulous care, all those occasions on which you may be tempted to take beer as a means of consuming time, or of producing sensual pleasure or riotous mirth. (14)

WINES.—The stronger may be considered as differing from those which are thin and light, very much in the same manner that strong beer does from weak: they are not, however, (with the exception of those which are sweet and luscious,) so nutritious as beer, but more stimulating. Like strong beers, they are by no means adapted for drinks in an unmixed state. Although the high price of most of these wines necessarily excludes them, in this country, from general consumption, and I might therefore seem to be excused from entering fully into the subject, I cannot refrain from making a few remarks;—first, respecting the moderate and allowable, if not useful employment of these wines; and secondly, respecting the misplaced and intemperate use of them.

Most wines of moderate strength are sufficiently stimulating to produce, first, a slight and grateful glow in the stomach; and, secondly, some increase in the rapidity of the circulation of the blood throughout the body. They also, at the same time, excite the brain,

and other parts of the nervous system. These effects, within moderate limits, and very far short of that culpable excitement which approaches to intoxication, may be turned to a very useful account, in counteracting the depressing effects of fatigue or disease. Whilst most of the stronger wines resemble each other in producing these effects, they differ among themselves, by possessing peculiar properties, which adapt them for different purposes. Thus, the sweet and luscious wines are the most nutritious, and consequently, in themselves, the most restorative and invigorating; and are, therefore, well suited for invalids recovering from an illness by which their strength and flesh have been greatly reduced, provided their stomachs have not materially suffered. On the other hand, they are unsuitable for those who are troubled with indigestion, flatulence, and acidity of stomach.

Those wines which are called "dry wines," which are possessed of considerable strength without sweetness, acidity, or roughness, may be considered as the most simply stimulating. They are the best adapted for those cases in which the circulation requires to be excited; and also for those in which the stomach does not perform its part under the natural stimulus furnished by the presence of food, and therefore seems to demand artificial assistance. Without extreme caution, the stomach may be injured, rather than helped, by affording it the grateful, and consequently the insidious stimulus of wine. Instead of recovering its powers, and becoming in a state to act without assistance, it may refuse to act, without the repetition of the stimulus; and larger and stronger doses will be progressively called for.

Some wines possess, in conjunction with their sti-

mulating quality, a rough or astringent principle, in consequence of which they produce a decidedly bracing and tonic effect on those recovering invalids with whose stomachs they agree. Red-port, and several other good-bodied red wines, are of this description.

This bracing, or tonic effect, is by no means in proportion to the quantity taken: on the contrary, it is completely counteracted and lost, if the quantity of wine taken be such as to bring into operation the stimulating property of the wine to an extent at all approaching to intoxication. Such are the principles which regulate the use of wine for invalids.

Wine may also be allowed, if not recommended, to persons in health, when they are exhausted by inordinate fatigue; or even to counteract the production of this state, in those whose combined mental and bodily exertions are liable to induce that degree of exhaustion in which the stomach fails to do its part to repair the losses of the system: for this purpose, a very moderate quantity of wine is quite sufficient. There is far greater danger of producing a weakening and injurious effect by exceeding this quantity, than of allowing the system to sink by total abstinence, especially with those who have not acquired the habit of trusting to the stimulus of wine. In fact, there are many striking cases on record, which would warrant us in believing that the greatest and most-continued efforts, both of body and mind, may, with proper management, be best sustained by those who never have recourse to drinks of stronger quality than those which I have described as simple diluents. Although I have no hesitation in saying that they do well who thus restrict themselves, yet I am not disposed to censure those who may be in the habit of employing wine as an article of diet, or

even as a permitted gratification, provided the limits of the strictest moderation are observed. Of the transgression of these limits I shall speak presently; but before doing so, I must notice a much less criminal abuse of wine.

I have frequently observed, whilst attending patients of the poorer class, that the medicinal virtues of wine are altogether misunderstood. An idea seems to prevail, that wine, like Morrison's pills, is indiscriminately good for every disease. I have known children in the most alarming condition from severe inflammation—as, for example, of the head and the chest—in whose management I have enjoined the strictest abstinence from any thing stimulating; whose parents, nevertheless, drenched them with tent-wine, under the delusion of which I have been speaking. Whilst they encourage this fatal error, it is in vain to represent to them, that they are defeating whatever care and skill their medical adviser may exert; and that they are worse than wasting their own resources, by adding fuel to the fire which they wish to put out.

Although the criminal and intemperate abuse of wine is not likely to be fallen into by those persons for whom these Lectures are expressly designed; yet, as I would not, by silence respecting it, be supposed to regard it as in the least degree less odious or criminal than intemperance in beer and spirits—the general and fatal prevalence of which has become so great a national evil, that I must make them the subject of special attention—I cannot refrain from making a few observations respecting it. I will not attempt to mark minutely, by their respective effects, the different degrees of intemperance in wine, as the limits—first of moderation, next of health, and lastly of sobriety—are

transgressed. It is enough to point out the aching head, the disgraceful sickness, and the offensive breath, which attend the wine-bibber on the morrow of his revel, to prove that his course is fatal to health, without more than alluding to those more lingering diseases which perseverance in intemperance can scarcely fail to produce. The iniquity of intemperance in wine, to which the wealthy give way, does not rest solely in the crimes which they directly commit, when, under its influence, they wantonly injure, or basely corrupt and debauch their poorer neighbours. They must also, in some degree, be answerable for the catalogue of crimes and offences which their example encourages or sanctions amongst the poor, whose opportunities for enjoyment are less numerous and varied, and less refined than theirs. Not only has Solomon, in his wisdom, pointed out the evils which attend those who tarry long at the wine, but all the precepts and denunciations against drunkenness, all the details of the flagitious acts perpetrated under its influence, which are recorded in the Bible, from Genesis to the Revelation, are directed against the inordinate drinkers of wine. It is needless that I should say more respecting them; but refer them to that sacred volume, with the hope that it may guide them to salutary contrition and penitential sorrow.

It now remains for me to speak of the last division of the class of stimulating liquors, which, unquestionably, ought never to be employed as a beverage:—I mean, ARDENT OR DISTILLED SPIRITS. Though some of the stronger articles of drink, which I have already mentioned, may easily be abused by being made the cause of intoxication, I have reserved my remarks on the deadly effects of this form of intemperance, to this time; since it is on the alcohol, or spirit of wine,

which distilled fermented liquors contain in the highest degree of separation and purity, that the intoxicating quality of those liquors depends. From time immemorial, and in almost every part of the globe, man has exhibited a strong and pernicious appetite for substances which, in moderate quantities, produce a pleasurable degree of excitement of the spirits. This state being the effect of a foreign or adventitious cause, and not the natural result of the well-being of the system, is only transient, and is very often followed by the opposite state of depression or dulness. To remove this unpleasant secondary state, or to heighten the fascinating and seductive gratification of the first or excited state, there is, too often, temptation to repeat the exciting cause. In proportion to the extent to which this is carried, the spirits and intelligence become more or less disturbed, the senses are perverted, and reason for a time ceases to have the controul of the thoughts and actions. This dangerous state, you know, is called intoxication. To give way to the temptation to produce it, has ever been regarded as one of the most loathsome and degrading of vices, the associate and promoter of almost every other. In the Old Testament, those addicted to it are sometimes called "sons of Belial," and represented as the perpetrators of the blackest and basest crimes. Even amongst the heathen nations of antiquity, the vice of intoxication was strongly reprobated. Wine, or the fermented juice of the grape, appears to have been the first, as well as the most general means employed in producing intoxication. Hence the word "wine" is sometimes used to denote the state of intoxication.

It does not appear that the ancients were acquainted with any stronger liquor than wine; which, when

perfectly made from the unmixed juice of the richest grapes, is certainly of great intoxicating power.

It was not until the study of alchemy, that we became acquainted with the fluid called alcohol; for in those days there were no chemists. The alchemists devoted their studies to the accomplishment of two objects;—one, to make gold, or convert baser metals into it; and the other, to discover what was called the elixir of life; which was, to destroy the influence of age and of death, and to preserve those who should take it in perpetual youth and vigour. The desire to achieve these two objects led to the making of experiments; in the course of which, it is said that Paracelsus, one of the most distinguished alchemists, discovered alcohol, or spirits of wine, and observed its exciting properties, which were considered as an actual acquisition of permanent strength and vigour. He eagerly used it himself, and led others to follow his pernicious example. After having boasted that he should enjoy extraordinary length of life, a premature death terminated a course of violence and intoxication. Alcohol is not formed by distillation: it exists in simple fermented liquors, from which it is only separated by the still.

The fermented liquors in which it is contained in a latent state, such as beer, wine, cider, &c., do not, however, produce precisely the same deleterious effects as those occasioned by ardent spirits, even when these are diluted. There are, as you know, various kinds of distilled spirits.

Brandy is, or should be, distilled from wine, or the fermented juice of the grape.

Whiskey is obtained from fermented wort, brewed from barley, or other grain, after it has been malted.

HOLLANDS and GIN consist of alcohol, or spirits in a diluted state, flavoured with the berry of the juniper, which possesses certain medicinal properties, which may sometimes render these spirits useful. Yet this is more often urged as a merely frivolous pretext, than as a valid plea for their employment. It is vulgarly believed that ingredients of an injurious tendency are substituted for the juniper-berry in the manufacture of gin; and the impaired health produced by it is ascribed to them, rather than to the true cause; namely, the essential properties of the spirit.

RUM is distilled from the residue of the juice of the sugar-cane, which is suffered to ferment after the separation of the crystallizable portion of sugar.

ARRACK is obtained from fermented rice. It is an exceedingly strong and ardent spirit, which is manufactured in the East; where it is no less destructive to our intemperate sailors and soldiers, than rum is to those who are employed in the West Indies, or on the coast of Africa.

There is another form of spirituous liquor, called KOUMIS; which is made by the Tartars from the milk of mares, and is said to be highly intoxicating. The power of yielding this spirit depends on the sugar of milk, which mares' milk contains in considerable quantity.

Besides these spirits, various modifications of alcohol are found in the liquor-shops, under the names of COMPOUNDS and CORDIALS. However they may be modified, as to taste, by the sugar, spices, and essential oils which they contain, they all agree in possessing the deadly properties of the spirit which forms their basis. Some of these compounds contain another poisonous principle; namely, prussic acid, derived from bitter-almonds, and other kernels with which they are

flavoured. Though instances have occurred of serious consequences having been produced by such cordials, the quantity of prussic acid employed is very seldom sufficiently great for its pernicious tendency to deserve comparison with that of the spirit.

It is worthy of remark, how the pernicious properties of ardent spirits have been attempted to be disguised under the names which have been given to them. Thus brandy, over a large portion of Europe, is designated by a name signifying "water of life"; probably in consequence of some traditional connexion with the alchemistic notions of its first preparer, Paracelsus. Gin is called "cream of the valley"—a name which would answer very well, if the words "of the shadow of death" were added to it. Whiskey is dignified with the name of "mountain dew," when it is brought, in violation of the law, from barren mountains, where there is neither "dew nor verdure:" and rum, which has been the principal means of all but exterminating the noblest of the uncivilized races of mankind, is introduced to the ill-fated American Indian as "the milk of his father the President."

It is needless that I should dwell on these liquors individually, as they offer only a choice of evils. They are, nevertheless, sometimes useful as medicines; as when life appears sinking, or when the circulation becomes too languid: but, because in some cases of sickness it may be expedient to administer spirits, it is very erroneous to think that they may be taken with impunity in a state of health.

The effects produced by the immoderate use of ardent spirits are of two kinds:—First, the transient, produced by large and overpowering quantities at one time. Secondly, the more permanent, produced by

the continued and habitual use of spirits. This last is the more decidedly likely to prove fatal. The first may cause sudden death; but they generally soon pass away, and leave no visible ill effect: whilst the second almost inevitably lead to death, by the painful path of sickness.

A large quantity of spirits taken at one time produces sickness with some persons; and in this case the evil is soonest got rid of. Some persons become noisy, as we find by the tumultuous uproar so often heard issuing from those haunts in which the vice of drunkenness is usually practised:—others become furious; and in that state commit the most odious crimes:—others become torpid; or, as it is termed, dead drunk: these, if they escape apoplexy, probably lay the foundation of disease, which ends only with their lives. It is true, that some are so constituted as to appear to be able to take large quantities of ardent spirits without producing manifest intoxication or inconvenience; yet even these must ultimately suffer.

The effects on the body are various; and there are some parts which, to superficial observers, appear to escape with impunity: such is the œsophagus, over which the fluid passes rapidly; but it is detained longer in the stomach; and its evils are first felt there;—in the beginning, by exciting irritation, and then inflammation. The stomach ceases properly to perform its functions. A depraved appetite sometimes ensues, with fetid breath, and frequent eructations, or belchings, as they are called. The inflammation of the stomach becomes chronic or constant; and I have often, after death, found its lining membrane thickened far beyond what is natural or healthy, probably from this cause. In this state, the stomach, after a meal, is

oppressed with a load, and the food remains in an unaltered state. The drunkard, feeling low and dispirited, has recourse to another supply of spirits, which will sometimes produce a degree of relief; and thus the incumbrance is forced upon the system in an unwholesome state. The intestines do not appear to suffer so much mischief from the drinking of spirits as the stomach, a large portion of the fluid being removed from the stomach by absorption. They do not, however, escape with impunity: the lower bowels, in particular, are apt to become diseased in a secondary way; as, for want of a supply of mucus, the fæcal matter is too long retained, and the worst consequences often ensue. The general disturbance of the system, and particularly of the stomach, liver, and spleen, prevents a due supply of healthy blood being returned to the heart; and thus the whole machine falls into disorder and disease. I will recall to your memory what I noticed on a former occasion; viz. that when the blood is vitiated, the healthy action of the liver is impeded. Instead of being of a dull brownish purple, the liver, in such cases, sometimes appears like the cut surface of a nutmeg, or granular. I have seen it in a state resembling wet saw-dust, and composed of a fat and pale substance. The poor, who are accustomed to drink spirits, appear to be aware of this consequence, and taunt each other with having "white livers." When the liver arrives at this state, it yields no bile. When this is not the case, the ducts, which should conduct the bile to those organs where its presence is necessary, become obstructed; and the liver returns blood mixed with bile to the heart, which distributes it through the system; and, as the bilious portion of this mixture finds admission where the colouring matter

of blood cannot, the whites of the eyes are tinged with it; and gradually the whole body becomes coloured, or, as is sometimes said, "as yellow as a guinea." This is what is called jaundice. Jaundice is in some cases transient; and persons get rid of it in a short time, without permanent inconvenience: it is however, at all times, a distressing, and often a very obstinate complaint; and may continue for months, or even during life. Jaundice is not the only disease of the spirit-drinker, resulting from deranged liver;—dropsy is a frequent consequence. This, however, is not to be solely attributed to disease of the liver; it may also be produced by the state of the kidneys, of the heart, and of the lungs, all of which may be injured, as I have endeavoured to explain, by the injurious effects of improper drink.

The fatal influence of intemperance in drink is occasionally seen a little beyond the middle period of life, at which time persons are not very unfrequently subject to what is called climacteric decline. Some are favoured to recover from its attack; but to the spirit-drinker it almost always proves fatal. Premature old age is another result of spirit-drinking. I have often noticed with surprise, in the course of my practice, when I have had suspicion of the habits of a patient, and have inquired his age, that, with all the marks of age and decrepitude upon him, he was some years my junior. The habit of spirit-drinking unfits its victims to bear the wounds, fractures, and accidents of various kinds to which all are liable: and the skill of the surgeon is often baffled, or foiled, by the ill condition of his patient, who, by a long course of spirit-drinking, has destroyed the powers of his constitution. It is also worthy of remark, that the spirit-

drinker is peculiarly susceptible of disease of all kinds; and consequently is likely to fall the first victim to fevers, or other epidemic distempers. The ravages of the cholera have confirmed this, by unnumbered proofs.

The heart and blood-vessels do not escape the injurious effects of ardent spirits. The former is subjected to great varieties of excitement; and the palpitations so produced may lead the way to permanent disease. Ossification of the valves, and thickening of the lining membrane, are the probable results. The arteries, both large and small, are very liable to become ossified: and when this effect is produced, the individual is very liable to apoplexy and gangrene. In a former part of this Lecture, I have hinted at the injurious effects which improper drinks may produce on the lungs. There is, perhaps, no error of this kind by which this effect is so strikingly produced as when ardent spirits are taken. Besides the obvious effect which they must have in promoting and aggravating inflammation of the lungs, whenever these parts suffer from irritation, at a time when the system is under the influence of spirits, there are two other modes in which mischief is produced, affecting these organs, which are less obvious. First, it has been ascertained, by experiment, that a greater exercise of respiration is required when the system is excited by spirit: hence, DIVERS cannot remain so long under water after they have been taking spirits, as they can at other times. RUNNERS, also, find their wind shortened after drinking spirits. Now, those who take spirits in sufficient quantity to affect the system, and then, under the excitement which they have produced, apply themselves to some laborious or active exertion, must expose the lungs, or organs of respiration, to the chance of very serious injury. The

other effect to which I allude, may seem at first to be at variance with what I have just related, as well as opposed to the vulgar, or common opinion, respecting the effect of spirits. It is generally supposed that they promote the warmth of the body; on which account they are frequently taken by persons who have no inclination to intemperance, when they are peculiarly exposed to cold. (15) This is a very fallacious practice. A transient glow may indeed be produced by the quickened circulation which for a short time succeeds the swallowing of the dram; but this, afterwards, becomes proportionably more languid, in consequence of which the surface, and more especially the extremities, become pale and cold, whilst the internal parts are both stimulated by the spirit, and loaded with the blood which has left the surface of the body. The object of maintaining and equalizing the warmth of the body is completely lost; whilst the internal organs are exposed to the danger of inflammation. This effect of ardent spirits is seen carried to its greatest and most dangerous extent in Russia, and other countries where extreme cold prevails. The inhabitants of these countries are apt to give way to the temptation to take spirits to an amount which produces overpowering intoxication. If, in this state, they expose themselves to the cold air, or are driven out of dram-shops and turned into it, the combined influence of the benumbing cold and the liquor they have taken produces a profound degree of torpor: breathing, which is closely and necessarily connected with the production of animal heat, is almost suspended; and the individual, unless rescued from his dangerous situation, is soon frozen to death.

The deleterious effect of spirit on the skin is seen

in the production of what are usually called grog-blossoms. Spirits, likewise, promote attacks of erysipelas; which are often severe, and even fatal, in persons whose constitutions are shattered by the use of spirits.

The worst effects of spirits, as connected with bodily health, are those which it produces upon the nervous system; by which, I mean the brain and nerves. The first effect of a large dose of spirits on this system is almost immediate, and quite notorious, causing swimming of the head, confusion of ideas, and a staggering gait. The late Dr. Spurzheim, who is almost universally known in consequence of the long-continued and close attention which he paid to the brain, declared that he found brains peculiarly hard in this country, which he attributed to the general abuse of spirits. A striking, and often immediate effect of intoxication, upon the brain, is the production of APOPLEXY. When this is not immediately fatal, palsy is almost sure to remain. EPILEPSY is another very serious disease of the brain; which, when not produced, may be greatly aggravated by the influence of spirits. In females, they greatly promote a tendency to hysterics.

One of the most serious diseases of the brain, brought on by the use of spirits, is called DELIRIUM TREMENS. Persons, whose age might induce one to suppose that they were in the prime of life, are sometimes carried off in a few hours by this dreadful malady. Those are the most liable to die from this affection who have kept up an almost incessant state of excitement by means of ardent spirits. It is not necessary that the quantity taken should have been such as to produce an extreme degree of intoxication. The individual may even have been able, in some degree, to attend to the various concerns in which he

might happen to be placed; when, after the sudden removal of the stimulus, or the abstraction of blood, or some powerful influence on the mind, or sometimes without any assignable cause, a state approaching to madness, and often marked with tremors, muttering, and prostration of strength, suddenly comes on, and, if not pretty promptly relieved by well-directed medical aid, is very apt to prove speedily fatal.

The SENSES are so closely connected with the brain, that I shall next notice them. It is well known that the general sense of touch is very much blunted by intoxication; since the drunkard often receives violent injuries from blows or falls, without appearing to be conscious of the fact; and is even known wantonly to injure himself. Solomon alludes to this effect of intoxication, when he makes the victim of intoxication to say, "They have stricken me, and I was not sick: they have beaten me, and I felt it not."

The immediate effect of a large quantity of spirits upon the eye-sight, in producing disturbed vision, is well known. I need adduce no other examples than those of two distinguished statesmen, almost of our own day, who, on one occasion, when going in to the senate to perform their duty to their constituents and their country, were so far under the influence of intoxicating drink, that the one could not see the Speaker, whilst the other saw two Speakers. The continued use of spirits tends to produce inflammation of the eyes, cataract, and a dim and distant sight, characteristic of decrepitude. The delicacy of TASTE is very materially altered: but SMELL and HEARING are much less strikingly so, although they can hardly be supposed wholly to escape. The NERVES, throughout the body generally, are very much weakened: they

suffer more easily and more severely from any causes likely to shake them, and convey imperfectly and irregularly to the various muscles the impulse of the will: hence the shaking hand, and tremulous step. Sometimes one leg is much more affected than the other, in consequence of a paralytic affection having been produced. This symptom has sometimes been called the *brandy-leg*. The shaking of the hand is often such as to interfere with the use of the pen, the brush, the graver, or any instrument requiring delicacy of touch. As a fresh dose of spirits tends for a time to remove this unpleasant effect, an increasingly pernicious habit is easily induced, and has proved the cause of ruin to many excellent artists. When the injurious influence of spirits has been long continued, not only some, or all of the local effects which I have described, are produced, but the entire system becomes enfeebled and diseased. In different parts of the body, portions of cellular membrane, or that loose flesh which unites the different parts together, lose their vitality, producing sloughs of various sizes; which, before they can be thrown off and separated, excite great heat, pain, and inflammation, in the adjoining living parts. These are called carbuncles, and occasionally prove fatal.

I must not wholly omit to notice a very remarkable and general state of the system stated, on very numerous and varied testimony, to be produced by the drinking of ardent spirits; yet so rare, as still to be a matter of doubt in the minds of many who all but deny its existence:—I allude to what is called SPONTANEOUS COMBUSTION. Most of the persons in whom this is said to have taken place, are described as having been addicted to the inordinate use of spirits, and to have had their feeble frames reduced and broken

down by intemperance. The state which is described as spontaneous combustion, is related, in nearly all the recorded cases, to have taken place, or at least to have commenced, in the absence of all spectators. The body has been found in a sort of decomposition, compared to smothered ashes, with a slight degree of humidity. An offensive odour filled the apartment; but the clothes of the dead in general shewed no signs of combustion. In some instances, the bodies have been found emitting some degree of light: in other cases, the deceased were in situations in which they may have been injured by ordinary fire. Without carrying scepticism so far as to say that spontaneous combustion, or combustion at all, of the kind I have described, has never taken place, although maintained by such numerous evidence; I am disposed to think that most of the cases related may be accounted for by supposing sudden death to have taken place, and to have been followed by rapid and extraordinary decomposition, the effects of which have been rather exaggerated than wholly misrepresented; whilst other cases may have been nothing more than death occasioned by fire, from which the miserable victim of intoxication has been unable to escape. Whether you prefer the stories involved in the mystery in which they have been dressed, or will rather admit my more probable though uncertain explanation, you may allow them to remain with sufficient of combustion about them to serve as warning beacons. (16)

The effects which I have as yet described, belong more particularly to the bodily health, or animal functions. The pernicious influence of ardent spirits, and, in fact, of all intoxicating liquors in common with them, is no less strikingly exerted on the intellectual

faculties. It has long been known, that under the influence of intoxication, secrets are betrayed: yet, although the impolitic or ill-timed divulging of a truth may have its inconveniences, this is perhaps the very least of the evils which attend this perversion of intelligence. The veracity of drunkenness is as untrustworthy as impolitic; and instances are by no means rare of persons in a state of intoxication accusing themselves, as well as others, of crimes of which they are altogether innocent.

Although the imagination may sometimes seem to be stimulated to extraordinary power and activity under the temporary excitement of intoxicating liquors, imagination as well as judgment, and every other faculty of the mind, in time becomes irreparably injured or destroyed under their influence. Many individuals in the learned professions, whose cultivated talents had gained them well-deserved reputation, and might have insured them an ample income, have irretrievably ruined their abilities, lost their acquirements, and sunk into beggary—the blots, instead of the ornaments, of society. It is by no means uncommon for the injury of the intellectual faculties, induced by frequent intoxication or habitual tippling, to amount to absolute insanity; sometimes in the form of mania, or raving madness; sometimes in that of the most wretched and desponding melancholy, in which self-destruction is sought for with persevering obstinacy; sometimes resembling the vacant stupidity of a born idiot. I might notice examples which have fallen under my own observation; but the testimony of a physician attached to a large lunatic asylum will be more striking and conclusive. Dr. Crawford, in a Report on Inquiries lately made at the Richmond

Lunatic Asylum in the City of Dublin, says: "I feel confident that I am keeping within the strict bounds of truth, in stating, that at least one out of two of the patients now in the asylum have become insane in consequence of the abuse of ardent spirits; and I know that the same has been observed in the other public lunatic asylums of Ireland."

The moral feelings are not less impaired than the intellectual faculties. A reckless disregard of right and wrong is progressively induced, by which a path is opened to the commission of every species of crime. Veracity or honesty of speech is violated, for the purpose of either concealing the intemperance itself, or the faults committed under its influence. Honesty, with respect to the property of others, is disregarded, for the purpose of gratifying the appetite for liquor; or to meet the expenses which the extravagance of drunken folly may have occasioned; or to repair the mischief which wanton destruction may have committed; or to provide for pinching wants, which become progressively more urgent, as the loss of property and employment cuts off the honest and lawful means of satisfying them. I once knew a medical man whose talents and acquirements at one time justly obtained for him the esteem and confidence of the public, but whom intemperate habits had reduced almost to a state of beggary. He had not only committed frauds, by contracting debts which he had not the means of paying; but his passion for spirituous liquors was such, that if left for a few minutes with a medicated tincture within his reach, he would seize and swallow it, for the sake of the spirit which it contained. The determined sot is led by his depraved appetites to the commission of acts the most disgusting

and revolting. A wretch of this description once made his way into an anatomical museum; where he drank the spirit in which the preparations were preserved, until he became completely intoxicated; in which state he fell upon the fire, and was burnt to death. It is not merely a tincture of human flesh which the drunkard has been known to swallow: his vitiated appetite has not revolted at the flesh itself: and in this way, cannibalism, the mention of which, as committed by ignorant and barbarous heathens, excites our horror, has been perpetrated in England and France, the most polished nations of the civilized world. The temper, which may have originally been mild and placid, becomes fretful, irritable, and disturbed by uncontrollable passion. Parents have been known to cause the death of their children; children have slain their parents; and the nearest friends have been sacrificed. Thus Alexander, who in one fit of intoxication destroyed a splendid palace at the instigation of an abandoned woman, in another killed his best friend, Clitus: and his criminality was rather aggravated than expiated, when, some time after, he caused his own death by his intemperance.

Even when the impulses of passion do not urge the drunkard to acts of extreme violence, the ties of relationship, and the general claims of humanity, are dissolved. Parents witness with seeming indifference the distress and misery in which they have involved their offspring; and, for the purchase of a little gin, have been known to devote them in helpless infancy to the loathsome slavery of a chimney-sweeper. The most atrocious and revolting murders committed within a few years, for the purpose of selling the bodies of the unfortunate victims for dissection, were committed

by persons who had not only stifled their consciences, but destroyed the common feelings of humanity by the continued influence of ardent spirit. Volumes might be filled with the details of murders, incendiaries, and riots, perpetrated by those who have given themselves up to the demoralizing influence of intoxicating liquors. (17)

It is needless that I should detail the catalogue of crimes of which drunkenness has been the parent or the promoter. It is enough that I should allude to the many evils which attend the various forms of gambling, and the numerous snares by which hitherto untainted and unsuspecting youth is beguiled into irretrievable ruin, under the spell of inebriating liquors.

You will perhaps be inclined to think that I am laying undue stress upon extreme cases; that I am making the most of the evils and dangers which may proceed from giving way to a taste for strong drink; and that you see many indulge in it who have not brought themselves to the brink of ruin, and blasted their characters in the way which I have described. But, whilst I admit that I have endeavoured to point to the limits to which a course of intemperance is likely to lead, let me ask you, whether any one who enters into such a course can insure himself against the dreadful chance of reaching those limits? and what there was to distinguish the most profligate and abandoned, to whom I have alluded, when they began to gratify themselves with the fascinating pleasures of intoxicating liquors, from any of those whom you may see around you, and fancy to be innocently indulging themselves in the same fatal pleasure? Let me also urge you to reflect, that the majority who may escape the worst extremes have, nevertheless, to rue many evils and

sufferings which cannot fail to befal them in their deviation from virtue and temperance. Long before they become notorious, as decided drunkards, regular and industrious habits are broken in upon and lost, if they had ever been formed. Earnings are diminished; whilst the money expended is more considerable, as well as injuriously, or less usefully applied. ([18]) The publican and the pawnbroker swallow up the wages of the workman; whilst filthiness and idleness, introduced into his family, cannot fail to draw down upon them the contempt or the reproach of all around them. It is in vain that their relations or friends take compassion on their miserable fate: every effort to relieve them is sure to be abortive; and every thing which is bestowed upon them seems to share in the curse which they have incurred. The melancholy picture which they present cannot be duly appreciated, unless it be contrasted with the happy results which a steady course of industry and prudent economy, the offspring and associates of temperance, cannot fail to procure. It is needless that I should stop to draw this contrast: your own observation and reflection will enable you to do it: and I am persuaded, that when you have conscientiously done so, you will not only be struck with the beauty of the one picture, and the deformity, of the other, but you will make the discovery, that a large portion of the misery and distress at present dependent on poverty, and the insufficiency and want of success of nearly all the measures, public and private, employed to relieve them, are in a great degree to be attributed, either directly or indirectly, to intemperance.

I have probably said enough respecting the evil tendency of ardent spirits, and the vicious courses to which the use of them is so apt to lead: yet, as I con-

sider the subject one of the most important respecting which I have to address you, I cannot dismiss it without offering to your consideration a few further facts, by way of illustration. The offspring of the intemperate are not only injured by the bad example and carelessness of their parents, and the miserable condition in society to which they are reduced;—they too often inherit from them a weakly and sickly constitution, which either makes them the victims of premature death, or of diseases which render their bodies feeble and deformed, their intellects weak, and their tempers bad.

In illustration of the striking effects of strong drink on the bodily strength, I may mention the case of John Buller. This man possessed a degree of muscular power which enabled him to perform feats which seemed to vie with the deeds of Sampson, and almost realize the fables of antiquity. He frequently put his strength in competition with the weight and strength of horses; but their resistance was puny and ineffectual. He readily bent bars of iron of considerable thickness. A grasp of his hand squeezed the blood from the fingers' ends of a powerful fellow who challenged him to a contest: it spurted out, like milk from the teats of a cow: and a further trial of his strength upon the person of his antagonist was prudently declined. J. Buller unhappily gave way to a taste for strong drink: his strength failed, and he was cut off in early life.

A physician, who has written on the effects of drunkenness, relates, that he was consulted by a patient whom he believed to be labouring under the effect of intemperance. He learned that the patient rarely took less than a bottle of gin daily. Though

warned of his danger, he went on from bad to worse, and had a violent attack of the DRUNKARD'S DELIRIUM; and in this state swore that he would murder the first man that came into the house. "He stood with a poker in his hand—an immense fellow, six feet high, and amazingly lusty. He was cleverly secured; and, under the treatment employed, recovered from this serious disorder. He still continued his old course. His liver became diseased; a large abscess formed at the side of his neck and face, and he lay in bed a huge mass of disease. Finding that he was near his end, he called his wife to his side, and said, 'I shall not be able to speak much longer:—and now mind and ply me well with gin, with a tea-spoon, when I am past speaking.' "

In Dr. Trotter's work, there is an instance of the effect of drunkenness; which I am induced to relate, in order to shew that I am not dealing in hyperbole, when I denounce that vice as first demoralizing and then degrading those whom it ultimately destroys. It is the case of a once happy and popular youth, who was converted into a sot; shunning his former friends, and shunned by them, and losing all principle, in proportion as he lost his respectability. "A few years ago," says Dr. Trotter, "I met an old and once-valued friend, in a public walk: being short-sighted, I did not perceive him for some time, and he made no advance to speak to me. I observed him more slovenly in his dress than usual, and his face rather bloated. I requested his company to dinner; which invitation he accepted, in rather an embarrassed manner, and came. At dinner, his conversation was all in broken sentences; his literary taste was gone; and in our entertainment, there was nothing of 'the feast

of reason or the flow of soul.' He drank incessantly of sherry, as if insensible why he did so, and filled bumpers every time. I was called out of the room on duty; and before I returned, he had finished another bottle of wine. It is painful to add, that in a few weeks he was confined in a mad-house."

"Mr. Poynder, a gentleman who held the office of under-sheriff of London and Middlesex for three years, (and whose opportunity for observation was consequently very peculiar,) in his examination before a Committee of the House of Commons, says: "I would make some observations on an evil which, I am decidedly of opinion, lies at the root of all other evils, in this city and elsewhere: I mean, the evil of drinking, but especially of drinking spirits. I have long been in the habit of hearing criminals refer all their misery to this source, so that I now almost cease to ask them the cause of their ruin. Nearly all the convicts for MURDER, with whom I have conversed, have admitted themselves to have been under the influence of spirits at the time of the act. Many of those who are tried, throughout the country, are proved, on their trials, to have acted under the same influence."

The preceding examples exhibit the deleterious effects of intemperance in drinking, upon individuals. I might urge the state of large bodies of the manufacturing population, as a proof of its pernicious effects upon societies; but as these examples may be regarded as exhibiting a combination of other causes, foreign to my present purpose, I shall pass them; with a remark, that it is in the power of every one of you to form the comparison between the temperate and the intemperate, and to draw your own conclusions respecting the tendencies of each, without any assis-

tance from me. ([19]) I proceed, therefore, to notice the miserable fate of a noble, but uncivilized race, now degraded, and almost exterminated, whose ruin has been mainly effected through the influence of ardent spirits. The North-American Indians, of whom I have already spoken, were once the sole possessors of those vast tracts of valuable land, on which European colonies are now thriving, and rapidly extending. Before the Indians were contaminated by European intemperance, they were numerous and powerful: their fine manly forms were graceful and dignified. Although they necessarily laboured under the want of the various branches of knowledge and art, deficiencies inseparable from a state of barbarism—and, above all, wanted the knowledge of the precepts and promises of Christianity—they practised many excellent virtues, to a degree which ought to excite the shame, as well as admiration, of civilized nations professing Christianity. They were chaste, honest, and patient under suffering, to a degree which seemed to reach the very limits of human endurance. They were courteous to strangers; and, when won by kindness, immovable in their friendship and gratitude. Though so far from being talkative and obtrusive as to appear remarkably silent and reserved; when occasion required it, in council among themselves, or in conference with their neighbours, they frequently exhibited proofs of excellent observation and judgment, combined with remarkable shrewdness; and clothed their sentiments in concise and energetic language, yet accompanied with so much imagery and illustration as to make their speeches admirable specimens of native eloquence. Although it would have been impossible for such a race, subsisting on the

precarious produce of hunting, and therefore requiring large tracts of territory, in proportion to their numbers, to maintain their existence in competition with civilized settlers permanently occupying the soil from which by cultivation they derived a certain and abundant supply of food; yet the Indian race would not have been reduced in numbers, deprived of territory, and degraded in the few who remain to represent it, either to the extent or with the rapidity which have taken place, had it not been for the ardent spirits which Europeans, and their descendants, introduced amongst them. Spirits, for which the Indians quickly acquired an almost insatiable appetite, act like poison upon them, and produce a temporary but violent and raving madness, in which their countrymen, nay, even their friends and nearest relations, fall the victims of their fury. To prevent this, their women endeavour secretly to withdraw their weapons, until their fit of phrensy is passed. By spirits, they are induced to part with their furs, essential to them as clothing, for an inadequate and useless, if not pernicious exchange. By spirits, they have been induced to kill more game than they required, and consequently to reduce their means of subsistence. By spirits, they have been excited to unnatural and exterminating wars amongst themselves; and when they had killed each other off, whites have taken possession of their territory. Who will say that white is not Satan's colour!—By spirits, they have been induced to part with the remnants of land which they yet retained; and in effecting the sales, to which they have consented in opposition to their sober judgments, they have again, through the influence of spirits, been cheated in the price. Amongst the many and grievous

evils which they have so much reason to reproach the whites with having brought upon them, they justly regard the introduction of the "fire-waters," the name by which they designate spirits, as the greatest.

Although the use of ardent spirits in civilized countries has not at present threatened ruin and extermination, as in the case of the North-American Indians, yet a very large amount of public as well as private evil is unquestionably derived from them. The quantity of spirits consumed in the United Kingdom is doubtless subject to some variation from year to year; and there must unavoidably be more or less inaccuracy in estimating the amount, in consequence of a considerable quantity being illicitly prepared, or clandestinely introduced. It has been estimated that upwards of three million pounds sterling are spent on spirits, in the course of one year, in Ireland.

Now, without taking into account the personal violence, the destruction of property, and abject misery, which the consumption of so much spirit cannot fail to produce, it is obvious that the money so spent would go far towards clothing and feeding a million or more of the ragged and hungry population of that fine but unhappy country.

"The cost of ardent spirits in the United Kingdom, which exceeds eighteen millions nine hundred and eleven thousand pounds sterling yearly, would, on the calculations given, afford employment to four hundred and twenty-eight thousand seven hundred and fifty men; circulating among them nearly six million pounds sterling, in wages only.

"Our magistrates have already publicly declared, that this enormous expenditure of £18,911,058. 10*s.* is not

to be regarded as merely useless, but horribly injurious: and their testimony is amply supported by the voice of ninety-five thousand offenders, committed within the past year,* to the prisons of England and Wales only. On high authority it is asserted, that four-fifths of the crimes, three fourths of the beggary, and one-half of all the madness of our countrymen, arise from drinking."

In addition to the preceding statement, which I make on the authority of one of the Temperance Society's publications, I may observe, that the impolicy of producing spirits is far greater than may at first be imagined. A large quantity of valuable grain is diverted from the usual purpose of affording sustenance, and the price of bread must be proportionably raised to the labourer and manufacturer. The distillation of spirits gives productive occupation to but a small number of hands, compared with the amount of capital employed: and though its consumption may seem to feed a hungry exchequer, it must in reality be injurious to the revenue; since, as the chief source of idleness, it must be the greatest impediment to the production of capital, and most materially reduce the total amount of what is paid in wages, and consequently of what is spent on more useful and necessary, yet excisable articles.

There may be some who are ready to admit, that all the evils, direct and indirect, resulting from ardent spirits and other intoxicating liquors, which I have endeavoured to point out, are undeniable, and that the advantages which might accrue from a general disuse of them are self-evident; but who may yet reply, that the attempt to reduce their consumption to any conside-

* 1830.

rable amount, amongst society in general, is altogether hopeless, and that the remedy of the evil is absolutely out of reach, and visionary. ([20]) This may even be urged by the temperate; and those who are addicted to indulgence in these liquors will not only embrace the agreeable doctrine, but declare in addition, that to change their habits, and abandon the use of these stimulants, cannot be done without serious injury to their health. Such an assertion is, in almost every instance, perfectly groundless. The following extracts will confirm what I have said. ([21])

"In the prison of the State of Maine, North America, an important experiment has been made, of cutting off habitual drunkards at once from the use of ardent spirits in every form, and confining them to water: and it has been found invariably beneficial. Mr. Powers, the intelligent keeper of the prison at Auburn, New York, affirms, that the most besotted drunkards in that prison have never suffered in their health by breaking off at once from the use of ardent spirits, but that, almost as uniformly, their health has been improved. They seem to be very uneasy, and somewhat lost for a few days, and with rather a poor appetite; after which, they eat heartily, and improve in health and appearance. It is worthy of remark, that in all the prisons where entire abstinence from ardent spirits is practised, the convicts enjoy a better average of health than is seen in the country at large."

"I shall conclude by observing, that I have never seen, in the young and healthy, any bad effects from suddenly leaving off the use of spirits, as they necessarily do, the moment they are received into the asylum: their general health, on the contrary, always improves, and they go out with restored constitutions.

It is only in the aged, who are labouring under various complaints, the result of long-continued intemperance, that it is at all necessary to have recourse to any kind of stimulants."—*Extract from a Letter from Dr. Crawford.*

As a proof that it is not a hopeless idea that temperance in drink may become universal, or generally prevalent amongst nations or large bodies of men, I may again mention the Spartans, to whom I have already alluded. Amongst them, intoxication was not only proscribed by law, but by public opinion: and to render this vice effectually odious and contemptible, they used at times to cause one of the Helots, their oppressed and despised slaves, to become intoxicated, and in this state to expose him to the scorn and derision of their young people; hoping that they would thereby acquire such an aversion and detestation of the vice, as would make them proof against any temptation to fall into it.

It would be well if the disgusting and degrading exhibitions of drunkenness, so often voluntarily exposed in our streets, had the same warning effect upon our youth: but unfortunately, if they regard drunkenness as disgraceful and degrading, they are foolish and inconsistent enough to consider the path which leads to it as manly and honourable.

The next example of strict abstinence from the use of intoxicating liquors, I offer as remarkable for its antiquity and duration, and for the wonderful accomplishment of prophecy in the fulfilment of the promise respecting it. You have probably heard of the Rechabites, who lived in the time of Jehoiakim, king of Judah, and who to a man strictly obeyed the injunction of one of their ancestors, wholly to abstain from

strong drink; and to whom the Prophet Jeremiah predicted, that their race should never become extinct. It appears, from the researches of a recent traveller, that, notwithstanding the many and remarkable changes which have taken place in that region, by which all traces of some very powerful nations are nearly or quite obliterated, the Rechabites still exist.

The disciples of Mahomet, who are spread over a large portion of the globe, and consist of persons of many different races, possessing, in consequence, almost every variety of physical character, and differing widely in their mental condition—whose mode of life presents every variety, from the most refined luxury to the privations of a low degree of barbarism, and whose numbers equal, if not exceed, the amount of the population of Christendom—have strictly obeyed the injunction of their False Prophet, to abstain from fermented liquor. The comparatively very rare instances of disobedience which occur, may almost, without exception, be ascribed to the example and influence of those under the Christian name.

When we see the command of a False Prophet obtaining such obedience over so vast a variety of dispositions, over so great an extent of country, and maintained for so many centuries, ought it to be thought a thing visionary and impossible, that the inhabitants of this country, professing a purer religion, and having before them more glorious prospects than the sensual heavens of Mahomet could realize, were they other than fabulous—whose intelligence is of the highest order, and whose character, in many instances, has been by no means deficient in determination—should make an effectual stand against the vice of intemperance, erase it from the list of our national

crimes, wipe away the blot with which it has stained our character, and enjoy the blessings which such a reformation must inevitably procure?

Perhaps it will be said, that the instances which have been adduced only shew that intemperate drinking may be avoided; and it may be maintained, that the vice, when it has once taken hold of society, cannot be expelled. This I deny. If it were impossible to reclaim the drunkard, measures might be taken to prevent the rising generation from assuming his character, when they fill the place which he must soon cease to occupy. But though the vice of intoxication be fascinating, and difficult to abandon, I am persuaded that even drunkards may be effectually reclaimed. I knew an individual, of a respectable and temperate class of society, who gave way to this vice, to a degree which brought distress and anguish on his family, and sunk himself into the lowest and most abject condition. He seemed lost to the influence of persuasion and kindness. His reformation might have been regarded as hopeless; nevertheless, his good resolutions at length prevailed, and, being strengthened to keep them, he lived for many years a temperate, respectable, and useful life, to the comfort and happiness of himself and his friends.

Reformation is not more hopeless amongst communities than amongst individuals. You are aware, that amongst uncivilized nations the desire for strong drink becomes an overruling and fatal passion. Such has been the case amongst the Hottentots, one of the feeblest and most despised branches of the human family: yet an entire Hottentot town has so completely abandoned the vice of intemperance, that the dealer in spirits, when he attempted to seduce them,

could not find a purchaser for his poison. Ought not Britons to be ashamed of defeat, where the despised Hottentot triumphs?

The next example that I shall give, is of a highly-polished people,—by blood, by religion, and manners, closely connected with ourselves. In the United States of America, ardent spirits have been much more extensively used, as a common article of beverage, than in this country. In fact, in various degrees of dilution, they have been made the substitute for beer, ale, and wine; whilst the cheapness of their production afforded facility to their consumption. Intemperance became, in proportion, the prevailing vice; and the prisons and hospitals gave abundant proof of its baneful influence on society. It is only within a few years that the attention of our trans-atlantic brethren has been generally directed to this evil; nevertheless, they have given it a very important check. Two years ago, fifteen hundred distilleries had been stopped in that country: more than four thousand merchants had ceased to traffic in spirits: and the President of the States declared, that, through an extensive region, he believed the consumption of spirits had been diminished by more than one half. In Plymouth County, Massachusetts, containing a population of forty thousand, there is not an individual licence to sell spirits. The war department has issued orders, that spirits shall hereafter form no part of the rations supplied to the troops; and their introduction into any fort, camp, or garrison, in the United States, is forbidden.

Seven hundred American vessels are reported to be at sea without ardent spirits, except in their medicine-chests: "and though they visit every clime and at

all seasons of the year, make the longest and most difficult voyages, and not unfrequently circumnavigate the globe, the men are uniformly better, in all respects, than when they used them. Seventy-five out of ninety-seven vessels from New Bedford sail without ardent spirits. It has become common, and so great is the increase of safety to property, that Insurance Companies find it to their interest to insure vessels that carry no spirituous liquors at a less premium than others."

"Messrs. Baring, Brothers, and Co., wrote to their agent in Amsterdam, to know why he had not obtained freights. His reply was, that there were American vessels, commanded by Temperance-captains, taking freight; and while they remained, none would offer to other ships." (22)

The means by which the Americans have been able to effect this important change are well worthy attention. It is to their Temperance Societies that this admirable result is to be ascribed. These societies, the oldest of which have scarcely been in existence seven years, are composed of persons who subscribe to resolutions by which they bind themselves to total abstinence from spirits, except when expressly ordered for medicinal purposes. They also endeavour to increase their number, by making converts to the principle of total abstinence; and for this purpose they employ various means to diffuse information respecting the many evils resulting from the use of spirits, as well as the numerous moral and political advantages to be derived from the disuse of them. I must confess, that whilst I cordially approved of the objects of these societies, and of the motives which actuated their founders and promoters, I could

not help regarding their design as visionary, and their success improbable. The results of their exertions have convinced me that I was mistaken; and whilst I admit that my opinion is changed, I feel that it would be a culpable omission, were I not here to recommend their promotion, and urge those who are in any way exposed to the temptation to take spirits, to join one of these societies, and subscribe to its Resolutions, with the best and strongest determination to abide by them. To make this recommendation effectual, it seems desirable that I should point out the advantages which taking this step possesses over making a mere private resolution, however sincerely and zealously it may be formed, First, the consciousness that a pledge to abstinence has been publicly given, must tend to strengthen that resolution, and check the inclination to break it, should the temptation be presented in a moment of weakness. Secondly, there are many who seem to be more influ enced by the practice of others than by their own wills and inclinations; and who in unison with others will do acts, whether good or evil, which they would not attempt by themselves. I know that this principle is strongly at work, to create and keep up the habit of taking spirits and other strong liquors. I know that some who have a dislike rather than a passion for these liquors, and who would not take them when alone, will join in taking them, to a pernicious extent, when they meet with their companions in the workshop; where they are not only seduced by example, but urged by the cowardly jeers of their profligate companions. It seems, therefore, to be meeting the enemy with his own weapons, to bring the strength and influence of union, which is so often

employed to promote intemperance, to counteract it, by supporting and encouraging temperance and virtue. Thus the printer, who may find himself continually assailed by the temptation to intemperance whilst surrounded by his drinking associates, will, if he have joined the Temperance Society, feel a counteracting force, binding him to his good resolutions, when he knows that he has other companions who will despise him for his foolish weakness if he give way; and that to be degraded amongst them, will give a much more painful and lasting sting, than any taunts and jeers which his tippling companions may cast at him for his resolute temperance. Against these, the tables will very soon turn; and, with many more solid advantages in his possession, he will find that "those may laugh who win." (23) I do not, however, wish you to imagine that signing your names, as members of a Temperance Society, is to act like a charm. To make the step an effectual one, you must adopt the principles which it teaches, and make yourselves acquainted with the facts and arguments which it addresses to reason and conscience. This you may easily do, through the papers and pamphlets which the Society has printed in great numbers, for gratuitous distribution, as well as for sale at a trifling expense.

I now come to the last division of my present subject; and shall offer you a few remarks on that class of substances which are employed as PROVOCATIVES or CONDIMENTS, and the like, which we must distinguish from those substances which are in themselves nutritious: they are rather to be regarded as accessaries to digestion, or, at least, as stimulants to different parts of the digestive apparatus. Many of these articles are not to be considered as useless, and merely

subservient to the luxurious gratification of our senses: some of them appear to be highly useful.

Provocatives, of some form or other, are, I believe, employed by the inhabitants of every quarter of the globe; whether they are brought to a high state of civilization, or constitute the wandering tribes of the desert and forest, ignorant of almost every art, except such as are absolutely essential to the preservation of their existence. Even the inferior animals are not without their provocatives, with which nature supplies them in ready combination with their food. Most of the quadrupeds that feed on the vegetable kingdom are known, at times, to eat plants which contain highly stimulant, acrid, or even poisonous principles. Different kinds of plants are taken in this manner by different species of animals. Thus many birds which feed on grain are known to take with avidity the most acrid seeds: and those which feed on insects must find, in many of these, very potent stimulants. I will just beg you to observe, in respect to the provocatives employed by the inferior animals, a fact, which you may turn to some account, when considering the necessities of man, as regards these agents. It would seem that vegetable feeders are by far the most frequent and copious consumers of stimulants. The quadrupeds, and birds which feed on insects, may often meet with stimulants in conjunction with their food; yet the proportion is commonly small; and those quadrupeds and birds which are of the strongest carnivorous propensities, and feed on prey which they catch for themselves and devour almost before life is extinct, seem to have no other provocatives than the blood and other juices, which they find in the warm and reeking flesh.

For the sake of convenience, I shall treat of provocatives, or condiments, in the order of the parts of the alimentary canal on which they act; and shall not confine myself to those taken for the sake of present gratification, nor to those which are actually taken at our meals and in immediate conjunction with our food.

Of the articles which act on the salivary secretion, salt is of the greatest importance. Of this I have already spoken to you at some length. Although it must, in degree, be accounted essentially nutritious, it is more to be regarded as a condiment than as an aliment. It probably acts on every part of the alimentary canal; but it is on the mouth that its most grateful and sensible influence is exerted. When taken too largely, it is well known to occasion intense and distressing thirst: but this is only a secondary effect; the immediate effect of moderate quantities being rather to excite a salutary increase in the quantity of the saliva, at the time when it is most wanted. Salt, as I have before stated to you, is sought with the greatest avidity by herbivorous quadrupeds. Some birds, of which pigeons must be an example familiar to yourselves, have a very remarkable appetite for it. I have already recommended it as a salutary addition to several kinds of farinaceous food. In most instances in which either salt or sugar may, as respects the palate, be equally admissible, it will, except in particular cases, be expedient to prefer the moderate use of the former.

Sugar.—Notwithstanding I have spoken of this article as a highly nutrient vegetable principle, I must not omit to notice it in its character as a provocative; under which, in its concentrated form, it is by far the

most generally employed. In moderate quantities, it forms a most agreeable and, I have no doubt, a very wholesome addition to many fruits; and to many of our farinaceous and succulent vegetables, to which it may, for the sake of variety, be very properly added, in the place of salt. It enters almost universally into our various forms of drink, which it contributes, more generally than perhaps any other principle, to render grateful to the palate. To many of our drinks it is purposely added with a view to the flavour; of which tea, coffee, cocoa, lemonade, &c. are familiar examples. Its presence is, however, no less necessary in those drinks into which it enters in conjunction with other principles, and in modes which render it less evident; such as, beer, wine, cider, and milk.

Although the most conspicuous quality in sugar is the grateful effect which it produces on the palate and other sentient parts of the mouth, it has probably a slight influence in increasing the secretion of saliva, and in rendering other sapid or flavouring substances soluble in it. In the employment of sugar in the form of lozenges, sugar-plums, and sweetmeats, these qualities give it its chief attraction. There are few instances in which this application of sugar, either in the mouths of children or grown persons, can be regarded in any other light than as a mischievous and unhealthful indulgence. Its effect on the teeth is notorious: and I have been informed, that within a district in Yorkshire in which a preparation of sugar of this class, known by the name of 'Everton toffe,' is the constant attendant at the breakfast-table, the dentists find an unusual proportion of practice. I have almost daily proof of the injurious effects of these sweets, in the general distur-

bance of digestion which they produce amongst a numerous class of sickly children. There are, however, cases in which sugar, in the form of lozenge, may afford a convenient and useful means of applying some medicinal substances.

Tobacco.—As a means of exciting the secretion of saliva, and the other juices poured into the mouth, there is no substance so remarkable, or so generally employed, as tobacco. Its influence is by no means confined to this simple effect. It is one of the most powerful narcotic poisons with which we are acquainted. Hence, though use renders it all but essential to the comfort of those who have become accustomed to it, it is almost always excessively offensive to those who commence the employment of it. From the same cause, even those who are the most devoted to it rarely allow the saliva impregnated with it to pass from the mouth into the stomach. From its narcotic power, it tends rather to allay than excite appetite: it can, therefore, hardly be regarded as a provocative, except inasmuch as the secretion of saliva is promoted by it. It is after their repasts that the consumers of tobacco bring it into connexion with their food; when they seem more particularly disposed than at any other time to seek for the gratification which they derive from some of the modes in which it is employed. Although there is, in some respects, a similarity of effect produced by all the modes in which tobacco is employed, each possesses a sufficient peculiarity to merit particular attention. When chewed, in the form of a 'quid,' it probably produces the most direct effect on the secretion of saliva: it appears to have a soothing effect upon the system, and is a powerful instrument in silencing the cravings

of hunger. It does not appear that tobacco in this form causes the same degree of exhilaration that attends smoking it, or taking it as snuff; yet it probably has, when used immoderately, a more decidedly pernicious effect on the stomach; and I have frequently met with persons addicted to this practice who suffered greatly from weakness of stomach and permanent loss of appetite, mainly referrible to this cause. When tobacco is taken in the form of 'SNUFF,' it acts more immediately on the delicate mucous membrane lining the cavities connected with the nose, which it excites to an increased secretion: and when the membrane has been long accustomed to this unnatural stimulus, it almost refuses to secrete without its assistance; and a difficulty is experienced in breathing through the nose, which is one of the greatest inconveniences which a snuff-taker can experience from the artificial want which he has created. From the great sensibility of the parts to which snuff is directly applied, a more stimulant and pungent effect is produced by tobacco in this than in any other form: hence, the first pinch of snuff that a person takes rarely fails to produce a fit of sneezing. Habit blunts this exquisite sensibility; and succeeding pinches, without producing this extreme effect, cause a moderate degree of excitement, which is often had recourse to as a means of resisting the unwished-for approaches of drowsiness. It is seldom, however, that its employment stops here. Snuff produces a more decided effect as a stimulant, especially to the mental faculties, than any other form of tobacco. Yet I am not aware that it is often had recourse to, to aid the close application and intense thought of the mathematician. It is more especially used for this purpose

by those who require a high degree of ready and versatile imagination, on occasions of great excitement. In this way it was employed by Buonaparte, whilst directing the precarious operations of a decisive engagement. Those engaged in rapid composition have frequently had recourse to the stimulus of snuff: and the wit, who shines in conversation, if he has unfortunately become a snuff-taker, makes the disgusting habit a serious drawback to the charms of his society. Gamesters, like military commanders, often become immoderate snuff-takers, under the influence of the restless excitement which attends their conflicting hopes and fears. From these specimens which I have given of the employment of snuff, you will readily conceive that the excitement which it produces, whilst it is so fascinating as to be often sought with the utmost immoderation, is one of an unnatural and pernicious tendency. This, however, is not the only evil of snuff. Its employment, in the most moderate degree, is an exception to cleanliness; which we may trace through various gradations, till, in the extreme snuff-taker, it becomes a loathsome and filthy nuisance. Snuff has a very decided effect in spoiling the features and complexion: and, as it is impossible to prevent a considerable portion from passing from the nose to the mouth—and from thence, though in less quantity, to the stomach—it cannot fail to produce the same evils there which attend the chewing of tobacco. To the poor, who have acquired the habit of taking snuff, it becomes a source of useless, often inconvenient and oppressive expenditure, although they are obliged to content themselves with the coarsest qualities: whilst to the rich, who gratify themselves with the choicest varieties, it is a cause of foolish

extravagance. Another evil which attends it, whether consumed by rich or poor, is the loss of time which it occasions; but in this respect it by no means equals the practice of smoking. Before I proceed to speak of this, I would just remark, that the practice of taking snuff is extremely insidious and fascinating—that those who, after having fallen into it as a habit, have become convinced of its inconveniences, and most anxious to lay it aside, continually find their strongest resolutions defeated. Let this be ever kept in mind, as a serious caution and warning to those who have not yet given way to the temptation.

I have reserved for my concluding remarks on the subject of tobacco, the most prevalent and fashionable, but at the same time the most odious and condemnable form of its consumption—that of SMOKE.

It might be supposed, that as tobacco is necessarily burnt when employed in SMOKING, its injurious properties are destroyed. This is by no means the case. The active principle of tobacco consists in an oil, called an essential or volatile oil, because it can be raised in the form of vapour, like water or spirit. This oil, when separately collected, is one of the most active poisons known. In smoking, a small quantity of it is drawn into the mouth, where it mixes with the saliva. Its poisonous effects are more conspicuous in inexperienced and young smokers, not only because their nerves are unaccustomed to it, and therefore more sensible to the effects of a small dose, but because they are more apt to swallow the spittle contaminated with the smoke; and also, by quickly drawing the air through the burning tobacco, they cause a larger quantity of oil to reach the mouth. The poisonous effect of tobacco, as exhibited on raw

smokers, are, giddiness, intoxication, and distressing sickness, which continue for a considerable time.—Notwithstanding these effects, a silly and childish notion, that smoking is a very fine thing, and makes those seem manly who have little or nothing of manliness to recommend them, induces the young smoker to go on, until his sensibility is blunted to the unpleasant effects, and he is only conscious of the seducing excitement or stupidity which he finds so delightful, that the temptation can hardly be overcome. It is now that the real evils of smoking begin; for I cannot regard the first effects but as a salutary, though too often disregarded punishment. The practice of smoking, carried to the extent of several pipes a-day, has a remarkable effect in destroying the appetite. The North-American Indians are said to take advantage of this effect of tobacco to blunt the cravings of hunger, when, in taking long journeys through the woods, they are not fortunate enough to find game and other means of subsistence.

The weightiest and most serious objections to smoking do not depend on the inconvenience or injury which it may occasion to the smoker's own bodily health, but rather on the influence which it exerts on his mind and his occupations; and on the extent to which, without care, it becomes an encroachment on the freedom and comfort of others. The determined smoker almost inevitably sinks into an indolent state, most unfavourable to the healthy condition of his mind. I speak of those who have so far given themselves up to the practice, as to take their pipe in hand almost the first thing in the morning, and scarcely lay it aside during the whole day. By them, the occasional vacant minutes which good economists of

time consider it most important not to waste, are almost sure to be spent in refilling or lighting the pipe. This is happily not, as yet, a common case in this country; though it is to be feared the growing evil may soon bring us to it. I am therefore the more ready to draw the warning picture of this vice, as I have seen it practised on the continent. I have been quite surprised to see how every opportunity, seasonable or unseasonable, is embraced, to give indulgence to this propensity. I have seen some persons, who seemed as if they could not be seated for five minutes, whether in-doors or in public conveyances, without producing their smoking apparatus. Even the errand-boys must hold a pipe to their mouths, when engaged in executing a commission. It is evident that the smoker's occupations must be seriously interfered with, when the practice is carried to the extent which I have described. Some, in fact, must be altogether suspended whilst the pipe is in the mouth: but where this is not the case, I can form but a poor opinion of the dexterity and despatch of the mechanic who combines smoking with his work. Whatever the trade may think of it, a joiner who works with a pipe in his mouth, in my opinion, cuts an uncouth figure.

I have said that smoking tends to encroach on the freedom and comfort of others. Smokers, in general, fall into this evil from culpable indifference, rather than maliciously; and would perhaps be disposed to deny the fact, that theirs is essentially a tyrannical practice. If the smoker kept the smoke to himself, this objection would be done away with; but the fact is, that for his own useless, if not culpable gratification, he inflicts the smoke of his tobacco and his smelling

breath on all indiscriminately, whether they think, with him, that tobacco-smoke is delightful, or with an old and quaint author, "that none but the de'il would live on smoke." Whether the fumes of tobacco be regarded as offensive or not, the principle remains the same. It is a grievance to be compelled to endure it; and the party who inflicts it, in forcing others to submit to his will, violates the principles of real politeness, however prevalent the fashion may be which sanctions his conduct. It is certainly our duty at times to submit to an inconvenience, which is either unavoidable, or is the price at which some real advantage is obtained for our fellow-creatures; but the smoker's nuisance is a useless and wanton encroachment on those about him. The poor man whose useful art may happen to be a nuisance is severely punished, and perhaps prevented from obtaining a livelihood for his family. His case, though hard, is certainly justified on principle; but whilst this is acted on, it is an unjust and partial toleration, which gives impunity to the smoking dandy. I cannot dismiss the subject of smoking without noticing the danger which, in some situations, attends the use of the common tobacco-pipe. Within the space of a few months, it twice occurred to myself to inspect the bodies of persons whose death had been caused by wounds inflicted by the tobacco-pipe. In one instance, the small end of the tobacco-pipe was driven, for several inches, through the root of the tongue, into the neck, where it broke off and remained. It wounded an important artery, and caused the young man's death, by frequent bleedings, which nothing could permanently stop. In the other case, the small end of the pipe was driven into the socket of the eye,

beneath the eyeball; and proceeded so far, as to be lodged in the scull, under the brain.*

The secretion of saliva is promoted by the act of chewing; and other articles, besides tobacco, are employed for the purpose. Gum-mastic is used in Turkey; and the betel-nut in the East-India Islands. It is not necessary that the substance which is kept in motion in the mouth should give any taste to the saliva, or be at all soluble: small bodies, such as pebbles or cherry-stones, will answer the purpose.

I knew a man who contrived to save a little, out of a very small salary, by carefully avoiding unnecessary expense. Knowing that the gratification of the appetite for drink is attended not only with expense, but often with many other evils, he contrived to beguile or satisfy his thirst by keeping a pebble in his mouth, or chewing a straw. By carefully avoiding unnecessary expense, in this and similar modes, he realized an ample fortune.

Bitters, which consist of columba-root, gentian, orange-peel, and the like, infused in spirit, are sometimes made use of to procure appetite. The ingredients possess properties which are valuable, when judiciously applied medicinally; but if they are taken in this combination, the stomach is soon familiarized with the stimulus, and will not perform its office without it.

Acids are likewise used with the same view; such as, the sulphuric and nitric acids, in a diluted state. The same remark applies to them as to bitters.

Spices, such as mustard, pepper, and all the other

* The danger from fire must not be lost sight of. See Note (24).

kinds of spices sold by grocers and chemists, are good in themselves, and frequently necessary to be used to give flavour to insipid food, or to stimulate the stomach to a certain degree; but the excessive use or abuse of them impairs the powers of the stomach.

CURRY, which is a condiment in general use throughout almost all parts of India, seems in that climate to be an article of actual necessity; and the appetite for it is instinctive. This may, perhaps, be accounted for by the effect of the heat on the skin; which causing a continual and abundant waste from perspiration, the stomach requires to be stimulated also, in order that during digestion there may be a sufficient determination of blood to it.

I must recur again to the sujbect of spirits, in order to speak of the practice of DRAM-DRINKING; which is taking spirits in small quantities, either to excite appetite, or stimulate the stomach to retain food that disagrees with it, and which it feels an impulse to reject. This is so obviously bad, that it seems hardly necessary to point it out If the food be of the proper quality, and the stomach in a proper state to receive it, there will be no inclination to reject it; but if the contrary, and you compel the stomach to digest improper food by the application of an unnatural stimulus, the general health must suffer in proportion as the dictates of nature are violated. It must be evident that the offensive load had better be thrown off, than thus forced upon the system.

I must speak of OPIUM in this place, rather from the mode in which it is used, than as regarding it as a condiment. The taking of this drug in small quantities produces great excitement, and sometimes the

utmost furiousness. In large quantities, death is, you know, the result. Unlike tobacco, opium is taken into the stomach. People begin with taking it in very small quantities, perhaps with a grain, at first; but after a time they require a larger quantity to produce the same degree of excitement, until they have been known to consume an ounce in a day. The practice has a most pernicious effect on the nervous system, and invariably tends to shorten life. I have known several opium-eaters in whom the most lamentable results were produced.

DINNER-PILLS.—These are often used, either as provocatives to promote a hearty meal, or to assist digestion. They are usually compounded of cathartic drugs, with some stimulating admixture. Where the habit of using them is formed, it is not easily abandoned.

MAGNESIA is often had recourse to for the same purpose as dinner-pills, and also to counteract the effects of gluttony. These articles may, in the first instance, be productive of a certain degree of good; but the use of them, if long persevered in, cannot fail to prove injurious, as the stomach soon accommodates itself to the use of such stimuli, and ceases to perform its duties without them.

Some persons, who are not in the daily practice of employing dinner-pills, magnesia, and other medicinal correctives to counteract errors in diet, which may arise from mismanagement as well as from pernicious indulgence, fall into a different course, and, to counteract the loaded state of the system which is induced, take periodically a strong dose of cathartic medicine. Others, imagining themselves to be bilious, have recourse to the various QUACK-MEDICINES which are

sold as certain cures for this affection. The very great number, as well as variety of such articles which are consumed in this country, prove that this pernicious practice must prevail to a very great extent, which can scarcely fail to impair the digestive organs, ruin the health, and shorten the lives of those who give way to it. Others, who have no remarkable fondness for taking medicine, have recourse to periodical bleeding, or cupping, to get rid of the excess of blood, with which, through over-feeding, they are or fancy themselves to be encumbered. It might be supposed that these various medical measures would be sufficiently disagreeable to deter persons from unnecessarily having recourse to them; but this is not the case: habit, by degrees, produces a strong propensity to fly to them; and I am sorry to say, that the evil is not wholly removed when such persons, for the sake of safety, resolve never to take medicine without professional advice. It is undoubtedly a safe and wise plan not to neglect disease in its early stage, but rather attack it at its commencement; and it is not my object to dissuade any from doing so, under the direction of a medical man. I wish it to be distinctly understood, that my remark applies only to those cases in which a constant or frequent inconvenience is either kept up or renewed by erroneous habits, more especially in eating and drinking; and for which constant recourse is had to a variety of medicines, and often to a variety of medical men, each ignorant of what his predecessor has been doing; instead of rigidly adhering to a system of eating and drinking, by which the evil complained of might be radically removed, or reduced to the smallest degree which the injured constitution will allow.

I must now bring this Lecture to a close. But before I take my leave of you on this occasion, let me assure you, that, amongst all the measures which I have pointed out for your adoption, I believe that there are none which experience has not proved to be practicable. The temperance which I have recommended must not be confounded with the severe restrictions which the hermit may have imposed upon himself expressly for the purpose of mortification. If my recommendations are not easily carried into practice, the difficulty will, in most cases, be found to depend on the want of sufficient resolution and perseverance, rather than on the real difficulty of the task which I have set before you. It is my firm persuasion, that if mankind in the present day were strictly to adhere to those practices which promote the health and well-being of their minds and bodies, and as strictly to abstain from those which tend to injure them, there would be little or no cause to complain that our race is degenerating, and that the men of modern days scarcely possess the sixth part of the strength of their forefathers.

ADDITIONS AND NOTES
TO
THE SECOND LECTURE.

NOTE (1.) PAGE 63.

ALTHOUGH the gluten existing in wheat, from its chemical composition, is calculated to be a highly nutritious principle, it is absolutely necessary that it should exist in combination with other principles, that it may be acted upon by the digestive process. In its separate form, it is an excessively viscid, tenacious, and insoluble substance, best known in the form of bird-lime. If taken in this state, it would probably be injurious to health, if not fatal to life. In combination, as existing in those articles of food of which flour is the basis, its injurious properties are entirely masked. In bread, which has undergone the panary fermentation—and in biscuit, which is thoroughly baked—the gluten itself is probably changed, by the different combination of its elements in conjunction with those of the other principles of which flour is composed.

NOTE (2.) PAGE 67.

A very ingenious process has been devised for making bread, which gets rid of all the unpleasant and unwholesome closeness of unfermented preparations of flour; whilst it is as completely free from the changes which fermentation produces as any biscuit or passover-cake can be: on which account it is admirably adapted to those who, from motives of health or conscience, feel themselves restricted from bread made light by leaven or yeast. The process is quite consistent with economy; since the materials employed may be obtained at a trifling expense, and there is no loss from that portion of the flour which is decomposed for the production of carbonic acid. It has, moreover, the great advantage of rendering the bread capable of being kept in a fresh and palatable condition longer than is the case with bread made in the usual way. The peculiarity of the new process consists in syntheti-

cally producing common salt during the baking of the bread, by mixing the flour with carbonate of soda, and wetting it with weak muriatic acid. The carbonic acid which is disengaged produces the same effect in lightening the bread as that which, in ordinary cases, is produced by the fermentation of the flour. A full account of this bread, and the mode of preparing it, may be found in the "Economic Magazine;" but those who have not the means of referring to that work, may be assisted by the following data, which I have received from a friend who has long been in the constant habit of using bread made in this mode. Sixty grains of sesqui-carbonate of soda are sufficient for every pound of flour. Seventy-two minims of muriatic acid will about suffice for the decomposition; but as muriatic acid is of variable strength, it will be best to ascertain its power of saturation, before using it. The soda, in fine powder, should be thoroughly sifted into the flour, in order to be intimately mixed with every part of it; and the acid should be added to half-a-pint of water, the quantity required for wetting the flour. The quantity of salt produced is not sufficient to flavour the bread, and it is recommended to use an additional tea-spoonful. It is essential that the bread should be mixed immediately before it is committed to the oven; as it must inevitably be heavy, if the decomposition is completed previously. It is convenient to keep diluted acid, of known strength, ready for use.*

NOTE (3.) PAGE 69.

Though potatoes are of great value as a nutritious and wholesome article of food, it is very important, to their deserving this character, that they should be mealy, and in good condition; and that they be thoroughly dressed, yet not overdone and watery. Frequent opportunities of examination after death have convinced me that waxy and underdone potatoes are amongst the most indigestible articles taken into the stomach as food. It must also be observed, that, with invalids of very weak digestion, it is sometimes necessary to

* Bread made in this mode may be had of H. Dodson, 98, Blackman Street, Borough; who is in possession of a patent for the process.

enjoin not only care as to quality, but greatly to limit the quantity, or wholly to suspend the use of potatoes as well as of other vegetables. For some suggestions relating to the preservation of potatoes in a wholesome state, the reader is referred to Note (7).

NOTE (4.) PAGE 73.

Those who treat of alimentary substances notice two kinds of sugar as occurring amongst vegetable principles. The one is highly crystallizable, and is that most commonly known as obtained from the sugar-cane and the beet-root, and which might probably be obtained from many other sources. The other is much less susceptible of crystallization, and is seldom or ever seen in that state. It is best known as obtained from a species of ash, and sold under the name of *manna*. Maple-sugar bears considerable resemblance to this substance. This form of sugar is abundant in many dried fruits; as, for example, raisins, figs, dates. Sugar likewise exists in milk, but with some slight chemical peculiarities. Under disease, it likewise occurs in other secretions. When a tendency to this state exists, it is very important to abstain from sugar, as well as from those substances which favour its production.

NOTE (5.) PAGE 74.

The observations which have been offered respecting articles of food which are in season, both as to perfect condition and abundant supply, for a limited period only, are quite applicable to the class of pulpy, succulent vegetables. Although in this country they are, with very few exceptions, only eaten when recently gathered; in other countries, and more especially in Germany, various kinds of greens, French beans, and young peas, are preserved for many months in excellent condition, by boiling them for a short time in a small quantity of salt and water, and carefully excluding the air. The adoption of the same practice in this country would furnish agreeable and wholesome additions to the dinner-table, amongst all ranks; and it would indirectly, as well as directly, very much promote the comfort and economy of the operative class.

NOTE (6.) PAGE 75.

The alimentary properties of gelatine have been carefully investigated by Dr. Edwards; who has clearly shewn, that, like sugar, fat, and starch, it is incapable of permanently sustaining life, if given separately, to the entire exclusion of other principles; but that in conjunction with some of them, it is sustaining, wholesome, and economical. Gelatine enters largely into the composition of bone; but it is so intimately associated with the phosphate of lime, that, in the ordinary modes of cooking, a large proportion is always lost as an article of food for man. Amongst the most remarkable means which have been employed to overcome this difficulty, may be mentioned that of long immersion in dilute muriatic acid, by which the phosphate of lime is removed; and that of continued boiling, under high pressure, in Papin's Digester. The first of these processes, though perfectly efficient, is too expensive to be applicable where economy is the object. The second process has likewise been found objectionable; chiefly, as I understand, in consequence of the disagreeable flavour imparted to the soup prepared with this solution of gelatine. M. D'Arcet, a distinguished chemist attached to the French Mint, and a Member of the Institute, who has long devoted his chemical knowledge to practical improvements in the preparation of food, has paid especial attention to gelatine, as one of the nutrient animal principles from which far greater advantage might be derived than is at present the case. After numerous trials, he has succeeded in devising a process, by which the gelatine of bones, which is now lost even when they are employed for the purpose of making soup, may be obtained in a perfectly pure and inoffensive form, and with a regard to economy which renders it peculiarly applicable when it is important to furnish the largest amount of nourishment at the least expense. The process essentially consists in distilling water, during many hours, through the bones, previously broken to pieces. The very delicate solution of gelatine so obtained is employed as the basis of soup; which is thus rendered more nutritious, and consequently more wholesome, by the presence of a principle

which would otherwise have been lost. This process has now been employed for several years, and with decided advantage, in some of the largest Institutions in France. A working model of the apparatus employed, which I obtained in Paris, under M. D'Arcet's directions, has been placed in the Museum of the Polytechnic Institution; the Directors of which have kindly allowed me to adopt this mode of endeavouring to promote its introduction into this country, in which it might be extensively employed with great advantage. Wherever a small but constant supply of steam can be commanded, the solution of gelatine may be constantly obtained at a very trifling expense, to be converted into soup, either on the large or small scale. Those who desire further information regarding this mode of obtaining and applying gelatine may with advantage consult several French Articles, written by M. D'Arcet, and those who have tried his process.

NOTE (7.) PAGE 79.

After the brief sketch which I have just given of the principal sources whence our food is derived, it may be well for me to offer a few observations respecting the mode of employing them.

Many of the most useful and important may be obtained, with nearly equal advantage, at all seasons of the year: others, though scarce at some seasons, may during a portion of the year be obtained in great abundance, and at proportionably low prices. They are then said to be in season: and it is at these times, when they are within the reach of all classes of society, that they are in the best condition, to gratify the palate, and afford nutriment to the system. Those who seek them at other seasons, at exorbitant prices, and value them as delicacies in consequence of their rarity, are voluntarily taxing themselves to obtain an inferior commodity: and those who spurn them when in season, and reject them because their abundance renders their employment economical, are really injuring themselves, whilst they are ungrateful receivers of the bounty of Providence.

Many of these commodities, which are to be obtained in

great abundance at certain seasons only, instead of being consumed in extravagant and wasteful prodigality at these periods, might, by a little care and management, be employed, throughout the greater portion of the year, as means of subsistence and allowable gratification. In all the civilized parts of the globe, grain, of some kind or other, forms the most important article of food; and the time at which it is ripe—or, in other words, at which it is harvested—is the time at which provision is made for the whole year. If the same principle were applied to very many other articles of food, which may be obtained in great but temporary abundance, the resources and comforts of the operative and productive classes might be very greatly increased. In order to carry this recommendation into effect, it is necessary that the means by which many of these articles may be preserved, in a nutritious and palatable state, should be so far understood, that they may be economically and successfully employed. With the hope of facilitating attempts of this kind, I shall now offer a few hints respecting the different modes in use for the preservation of animal and vegetable food.

The great obstacles to the preservation of these articles are the chemical changes which, with few exceptions, they are all liable to undergo, from the combined influence of air, moisture, and the ordinary temperatures of the weather. As chemical changes cannot take place in bodies unless they are, at least partially, in a moist or gaseous state, it is obvious, that by removing moisture, and reducing the articles to be preserved to a perfectly dry state, the various changes which attend decomposition must be either wholly prevented, or limited to a very small extent, principally confined to the surface. The principle of preservation of articles of food by means of drying is capable of very general application to alimentary substances derived from the animal and vegetable kingdoms. It is a process which has been employed from the most remote antiquity; and is found in use amongst uncivilized tribes, who have recourse to it to enable them to keep a store of fish and flesh. In this country, it is employed on the sea-coast to preserve certain kinds of fish; but it is generally

accompanied by another process of great utility, for the same purpose, of which I shall have hereafter to speak—I mean, salting. There is no doubt that drying, either simply or in combination with salting, might, with great benefit, be much more extensively used in this country than is now the case; especially in those seasons in which some species of fish are caught in such prodigious shoals, that they are spread as manure upon the soil, which is certainly a much more indirect application to the purposes of human nourishment. In Scotland, where the climate is much less favourable to the process of drying, the provident disposition of its inhabitants has given a far greater extent to the use of drying, as a means of preserving fish, than is the case on our own coasts. I am not prepared, by any positive facts on a sufficiently large scale, to advocate the advantage of drying as an economical means of preserving flesh; but it is probable that it might be so modified, as to answer a very good purpose. It is employed by the Hottentots and Caffres in Southern Africa: the noted Buccaneers made use of it on the coast of South America: and the *pemmican*, on which the North-American Indians and Hudson's-Bay fur-traders principally subsist through a great portion of their intensely-cold and protracted winters, consists of dried and pounded muscular fibre mixed with fat, which serves the purpose of preventing its imbibing moisture, as well as of improving the flavour and quality.

The ingenious D'Arcet, of whose process for obtaining gelatine I have already had occasion to speak, and who for nearly thirty years has laboured to apply his chemical knowledge to the benefit of his fellow-creatures by introducing useful and economical processes for the preparation of food, has informed me, that, at his suggestion, the plan of drying and reducing to powder, not only the muscular fibre, but even the blood, has been advantageously introduced into the public service, in France and Russia.

It is principally with respect to our fruits that the use of the drying process might in this country be extended, with the greatest addition to our economy and enjoyment.

We must all be familiar with the instances of fruits preserved

in this manner, in figs, raisins, Zante currants (*raisins de Corinthe*), and dates: but you will perhaps suppose that the process is one which requires the warmer climate of the South of Europe to render it practicable, and that the fruits which I have mentioned possess peculiarities which render them adapted to it, to a degree which is not to be fonnd in our own. There is, undoubtedly, some ground for such a belief. A fine bunch of grapes may be effectually dried and preserved by simply hanging it under the tiled roof of a Spanish house, but it would be spoiled were it similarly placed in an English one. When the fruit has been so preserved, we may often find in it distinct collections of sugar, which we might seek in vain in the most luscious and most carefully-dried fruits of this country: yet our own countrymen, who pay far greater attention to the production of good varieties of fruit than most continental gardeners, need not despair of preserving them in a dried state, and rendering them extremely useful and profitable at other seasons besides that in which they are gathered ripe from the tree. In the northern parts of France and Germany, where the climate scarcely differs from our own in respect of temperature, at the season at which fruits are ripe, the process of drying is employed, on a very large scale, for the preservation of apples. For this purpose they are peeled, by which means the evaporation of the watery part is very greatly facilitated; and, if the apples are large, the same effect is still further promoted by cutting them into quarters, or still smaller pieces, to extend the surface. When the fruit is small, it appears to be quite sufficient to peel them; yet it would probably assist, to scoop out the core. When they have been partially dried by the sun and wind, they are placed in a drying stove, on rails or lattice, to allow the dry air to circulate around them. Preserved in this way, apples will keep for years; and an abundant crop of one year might be made to remedy the deficiency of another, instead of reducing the price of cider, and furnishing an incentive to intoxication.

Apples are not the only fruit which are thus preserved in climates not more favourable to the process than our own.

In many parts of the North of Germany the sides of the road and hedges are completely stocked with plum-trees, of a species nearly resembling our muscle-plum. The fruit, when dried in slow ovens, in appearance nearly resembles the dried plums of the South of France; and though certainly inferior to them in quality, they are easily converted into a very agreeable and wholesome article of food. I have seen them in barge-loads; and they are sold at a price which would allow the poorest to make use of them. Cherries are sometimes dried in the same manner: and the state in which we occasionally find a neglected bunch of currants, on a currant-bush in autumn, convinces me that the drying process would not be wholly inapplicable to them; though there are other modes of preservation better suited to this fruit.

Perhaps there is no article of food to which this mode of preservation might be applied with more extensive advantage than to the potatoe. When the rind has been taken off—to effect which a ready means has been invented—it may be reduced to fragments, and dried. In this state it may be ground; and used alone, or in combination, for many of the purposes to which wheaten flour is generally applied. By this means we may take advantage of the potatoe in its most perfect state; and, like the fruits which I have just mentioned, it may be kept unimpaired for years beyond that of its production, without any danger from frost, or the disposition to sprout.*

Although the preservation of articles of food may be effected by means of drying, as in the examples which I have adduced, it must be borne in mind, that the object may be defeated if

* It is understood that a patent has been taken out for a superior mode of thus employing the potatoe. Though it is most just and desirable that the ingenious contriver should be liberally rewarded for an invention which promises to be an important blessing to society, it is hoped that his patent may not prevent the poor and the public in general from taking advantage of the possibility of long preserving the potatoe by means of drying. The Author heard of it years ago; and this note relating to the subject was written nearly two years since.

the articles are allowed again to become moist. This is an inconvenience which the peculiarly humid atmosphere of this island is remarkably prone to induce; and it should be guarded against, by taking care to have them stowed in dry apartments, or in air-tight vessels, such as canisters and earthen jars.

As the presence of atmospheric air promotes most kinds of decomposition, and is absolutely essential to some, a very ingenious and useful mode of preservation has been contrived, by which various kinds of meat are stowed in cases hermetically sealed, and thus kept in a state of perfect freshness for an unlimited period of time. This fact has been fully demonstrated by the recent discovery of cases of provision preserved in excellent order amongst the objects recovered from the remains of the "Royal George." This method has the inconvenience of requiring cases specially made for the purpose; as the smallest aperture would be fatal to the result. On this account, though greatly superior to salting and every other species of curing meat for long voyages, the plan is seldom used, except for passengers of a superior class. The same principle is, however, not unfrequently employed for the preservation of fruit and vegetables. They are placed in vessels of glass, earthenware, or some other air-tight material: sometimes a little water is added: and having been exposed for some time to a temperature equal to that of boiling water, they are carefully sealed whilst hot. Still further to ensure any access of air, the vessels are sometimes kept inverted, or placed on their side.

Although this plan will sometimes completely answer, and prove as agreeable as it is economical, yet it is not always successful; which, I apprehend, is to be ascribed to the fact, that certain organic productions of a very low grade in the animal or vegetable kingdom may be generated, either without the access of atmospheric air, or at least with such small quantities as may escape expulsion even after boiling.

We may be convinced that such germination is not impossible, by the familiar experiment of placing acorns and other seeds to germinate in vessels hermetically sealed, and in

which, provided moisture be present, the young oak will sometimes attain the height of a few inches. The most conspicuous of the organized productions which thus defeat the industry of the careful housewife are the various forms of *mould*, which, though not necessarily accompanied by the general decomposition of the articles designed to be preserved, not only spoils them by its unsightly appearance, but imparts a very disagreeable taste. It is probable, that in the most successful cases of preservation by the method of which I am now speaking, either the germs on which the production of *mould* depends do not happen to be present, or have been rendered inert by the degree of heat employed.

There is another production of organized matter of a still lower description, and so minute as wholly to elude our sight unless aided by powerful microscopes, which is much more important, on account of the decomposition which attends it; since it may extend to the whole or greater part of the entire mass, and may pass into a state of complete putrefaction. I here allude to the process of vinous fermentation; which has been shewn, by a French philosopher, the Baron Cagniard de la Tour, to be invariably accompanied by, and even to depend upon, the production of an infinite number of very minute spherical bodies. These, although of extremely brief existence, have the faculty of producing particles like themselves, so long as any saccharine or other vegetable principle, capable of affording the elements for their developement, continues to exist in the material which is undergoing this process; unless some means be employed capable of arresting its progress; which may sometimes be done, by change of temperature, or by the addition of certain substances.

Although the exclusion of air tends to retard this fermentation or decomposition, it is evident that it is not wholly prevented, even in very closely-sealed vessels; as is shewn by the conversion of flat wines or beer into such as are ripe or sparkling, by keeping them for a sufficient time in well-corked bottles, and under such circumstances of temperature as favour the fermentation of some of the remaining portion of saccharine matter which they contain. One of the inconveniences which

attend the unwished-for fermentation of fruits designed to be preserved by the exclusion of air, is the production of carbonic-acid gas, which is the inevitable consequence of the change of chemical composition which is effected. It is this gas which occasions the bursting of the containing vessels, and the frothing over and loss of the articles to be preserved. This is perhaps the smallest part of the evil. The articles themselves are not unfrequently rendered very unwholesome; and this is particularly likely to be the case, if they run on to the acid or still further putrefactive stage, to which this process is the prelude.

Though this transformation may be regarded as allied to decomposition, it may, when successfully arrested in its progress, be rendered subservient to the preservation or preparation of various articles of diet. All fermented liquors are instances of the first description; but they exhibit remarkable differences in their capability of preservation to advantage. The preserving principle, which is produced as the result of the process in question, is not only taken advantage of to secure the keeping of the fluids with which it is conjoined; but, when existing in large proportions in certain fluids, great advantage is taken of it, for the preservation of organized substances which are immersed in it. We see examples of this mode of preservation in nearly all the cabinets in which specimens of organized substances are collected. It is occasionally resorted to for the preservation of fruits, as in the case of brandy-cherries; which I cite rather for illustration than approval. A change, almost identical to that just described as occurring in the fermentation of fluids, occurs in the making of bread, and constitutes the difference between leavened bread and biscuit.

I incidentally mentioned the occurrence of another change which sometimes succeeds that produced by vinous fermentation; and which has been called the acetous fermentation, from the circumstance of its being marked by the production of acetous acid, or vinegar. If the changes which the decomposing fluids may undergo are arrested at this, as at the former stage, they possess the faculty of being kept them-

selves, and of becoming the means of preserving other substances; as we see in the case of a great variety of pickles, *sauer kraut*, &c. This is not a mode of preservation which I am disposed to recommend for general adoption; yet I am inclined to believe that it will serve to illustrate a principle involved in the preservation of alimentary substances by other means than those which I have been describing; namely, those cases in which certain materials are employed either to invest or to become blended with the articles to be preserved; as when sugar, salt, or creosote, are used. Substances like these, which have the property of preventing decomposition, are called antiseptics, or opponents to decomposition. There are many substances possessing this property to an eminent degree, but which are, at the same time, so injurious to the living system, that they are wholly inadmissible amongst articles of diet; such are, the salts of arsenic and mercury.

When sugar is employed as a means of preservation, it is essential that it be in sufficient quantity, on the surface at least, to retain its own character; since, if this be not the case, it will have a tendency to enter into new compositions, and promote, rather than prevent, the evil which is to be guarded against. Frugal housewives should be aware of this, when disposed to be stingy in their use of sugar for their preserves. The too sparing hand incurs the loss of both fruit and sugar. Long-continued boiling may obviate this danger; but it only does so by reducing the quantity; and the maker is thus unconsciously increasing the proportion of sugar, whilst she is in some instances injuring the flavour of the preserve. In such cases, judgment is required, to decide whether it is best to reduce the quantity of fluid in the fruit by evaporation, or to employ sugar enough to preserve the whole. Salt, which is used in curing meat, acts somewhat similarly to sugar employed to preserve fruits. Though it does not increase the quantity of decomposing matter when inadequately used, it is still important to let it be added in sufficient quantity; and skill and judgment are required in the application. It must penetrate the entire mass sufficiently promptly and thoroughly, to anticipate and prevent the putrefactive changes.

The salt should neither remain dry on the surface, nor be mixed with so large a quantity of fluid as to produce a weak and ineffectual brine. There may be a saving, both of salt and of the juices of the meat, in repeatedly using the same brine; but this must require great care, as any taint in the brine would be both offensive and injurious. Equal care and knowledge are wanted, to determine the time which the meat should remain in the brine, that it may be susceptible of keeping without being over salt. The operation of salting is often very advantageously followed by that of drying, of which I have already treated. This not only opposes putrefaction, by bringing the elements into a state less favourable to their mutually acting on each other, but, in some cases, is the means of introducing another agent, such as creosote, which both improves the flavour, and contributes to resist decomposition. It is, on numerous accounts, of great consequence that the process of effectual salting should be quickly performed. To insure this end, in a cheap and available manner, a plan has been invented, by which, first, exhaustion of air, and subsequently high pressure, are employed to bring the brine into immediate action on every part of the mass. It promises to be of most extensive service; and has already been patronized by the Government, for the use of the Navy.

The subject of COOKING deserves very different attention from that which it has already received. It is doubtless often pushed almost to the extreme point of luxurious refinement, in order to provoke appetite, gratify the palate, and please the eye, by the various articles placed on the tables of the wealthy. Accomplished cooks are paid at a high rate of wages; and much connoisseurship, only to be obtained by undue attention to the pleasures of eating and drinking, may be displayed, both by the preparer and the consumer. In urging increased attention to the art of cooking, I allude to a very different department from that to which I have just referred; and to which alone the professed cook would perhaps be disposed to restrict the term. I have in view the plainest cooking, as it is necessarily and daily practised in

every family which has the means of making a meal, however frugal; but my attention is more directly turned to those cases, where, though economy is essential, absolute want is not felt. It is in these situations that I am persuaded that the true principles of cooking most require to be known and acted upon. It is in these situations—in which the commonest articles are to be prepared with very little variety; where the adventitious flavours of condiments and sauces are nearly unknown, or almost limited to pepper and salt; where waste would be more than a fault; and where the compulsory consumption of articles, rendered offensive and more or less unwholesome by improper preparation, would be equally blameable—that the increased attention which I am recommending is specially needed. Improved practice in the art of cooking might increase the comforts, without adding to the expenses of the working-classes generally: but it is in those situations in which a considerable number of persons require to be collectedly fed—as, for example, in Schools and Public Institutions—that these remarks particularly apply. I have no intention to render this note a substitute for a cookery-book; nor have I any pretension to the theoretical and practical knowledge of the subject, which would be required to carry into detail the principle which I am desiring to enforce. My point will be carried, if I succeed in calling attention to the subject in the quarters in which it is needed: and I would recommend the exercise of a little unoccupied talent, in producing, in the concisest and cheapest form, a small work on the Art of Cooking, considered in relation to Health and Economy. Some important principles may be extracted from Dr. Kitchener's "Cook's Oracle;" although his applications belong rather to those whose object it is to promote the pleasures of the table, than to the class of persons to whom my attention is directed. The "Cottage Comforts" of Esther Copley contain many frugal receipts, which, on her authority, I should be disposed to approve. Maxims of economy are enforced; but those principles which relate to the wholesome quality of the articles produced, and in accordance with which variations might be made by individuals, are not sufficiently specified.

Although the palate is not an unerring guide, and though the being a slave to its indulgence is a fault to be studiously guarded against, it may, I believe, be safely admitted, that it is essential to health, as well as to comfort, that our food should be such as not to offend against this natural censor. Hence it may be laid down as a primary rule in cooking, that all offensive, accidental, or adventitious tastes are to be carefully guarded against. As some of these have a very disgusting and revolting character, and may be induced by various causes, I shall endeavour to reduce them under particular heads. Perhaps the most striking, and those which it is the most important as well as the easiest to guard against, are such as result from the neglect of that essential virtue in a cook, *cleanliness*. From faults in this respect, almost every article of diet may have its flavour completely spoiled, either by suffering adventitious articles to remain attached to them, by allowing their mixture to take place, or by employing utensils which, from want of care, are themselves infected. There are few persons who have not sufficiently experienced the disagreeable effect which may be produced by a spoon or a knife smelling of onions, or of a greasy saucepan, to be able to appreciate the force of this remark. In alluding to the utensils employed in cooking, or for containing articles of food, it may not be amiss to notice a cause of disgust which is more likely to escape attention. Vessels which have cracks in them, whether of that small size which seems merely to affect the glasing, or sufficiently large to render them almost incapable of retaining fluids, necessarily become contaminated in a mode which causes them to impart offensive tastes and odours to those articles which have been kept in or are eaten from them. It would be better either to destroy such utensils, or wholly to confine their uses to those purposes in which they can do no harm.

Another essential point is, the careful exclusion of every particle which has become in any degree tainted, either by decomposition, or the production of mould, mites, or the like. Some offensive tastes derived from these causes may be removed by the use of carbon, chlorine, or pyroligneous acid;

but, for the most part, all attempts to render food, thus spoiled, fit for the table, are worse than useless; since they occasion a waste of the good materials which may be added to them, as the dish when prepared suits neither the mouth nor the stomach. I have often thought that the human stomach is the worst waste-tub, though it is frequently used as such.

The fire so essential to the process of cooking may, in two modes, be the source of so much offence to the nose and palate as to render the food extremely disgusting. The accession of a very small quantity of smoke, especially when a coal-fire is used, may effectually spoil the best breakfast, dinner, or tea; when a very little attention to the vessel and its lid, and to the mode of applying the one to the other, and both to the fire, might have completely obviated the evil. The second mode is that in which fire, by misapplication, alters the quality of the food itself; which it may do by being applied too long or too intensely to the whole mass; or, as is more frequently the case, by its irregular and partial influence.

The first, which has the greatest effect on the wholesomeness of the food, may be occasioned by a want of knowledge of the time which ought to be employed in cooking the particular article; but the second, which is quite as disagreeable in its effects, is more often to be attributed to want of care and dexterity. The most familiar examples of evils of these two forms are met with where milk and eggs are employed; both of which, when burnt, as it is commonly called, become excessively disgusting. As the former is much and properly employed in the food of children, attention to this point should be particularly observed by those whose business it is to prepare their meals; seeing that at their age disgusts and antipathies may be implanted, with reference to the most common and useful articles of food, the continued operation of which throughout life may be a frequent source of inconvenience.

There is one more point in which the application of heat in cooking requires to be considered: I allude to the second preparation of articles which have already been cooked. A very little attention to this subject will convince any one,

that different articles, both of the animal and vegetable class, bear the re-application of heat very differently; that some are little, if at all injured by it; whilst others are rendered truly offensive. There may even be a difference in this respect with regard to different parts of the same dish; and want of care, by allowing these to be indiscriminately re-committed to the influence of the fire, may render a mess prepared for the dinner of a hundred individuals a source of annoyance, instead of satisfaction, to each. My attention has been particularly arrested to this fact, by passing through the kitchen of a Public Institution. It is needless for me to descend into particulars, or to cite examples. It will suffice for me, in general terms, to recommend increased care in the selection and separation of those parts which may be re-cooked with advantage, from those which may better be eaten cold by themselves, or with the addition of some other article suited to be taken with them in that state; and from those which, after all economic care has been taken to preserve those of the former classes, it will be better wholly to reject, than to intermix with either, even in the smallest proportion. I am persuaded that there is no extravagance in this recommendation, but, on the contrary, that the cheap feeding, as well as the health and comfort of the parties for whom provision is made, will be effectually promoted by its rigid observance.

The several modes in which heat is applied to cooking deserve some attention, in addition to the short notice which I have already given of them. They may be comprised under the heads of roasting, broiling, baking, frying, boiling, and stewing.

Roasting.—Though this is perhaps, on the whole, the best and most agreeable mode of dressing meat, the predominance of which may be regarded as forming the characteristic of English cooking, it is neither the most certain nor the most economical. The remarks of Dr. Kitchener indicate that experience and tact are essential to complete success in roasting meat, yet I apprehend that a little attention to a few principles would simplify and shorten the road to success.

Thus, having the meat in the right state for being dressed, judgment must be used, in so placing it before the fire that heat may be properly adapted to the size and shape of the joint, lest a thin part may be scorched and injured, whilst that which is more solid remains undone. It is an equally important point to adapt the fire to the joint; since it would be an injury to the meat, as well as a criminal waste of fuel, to consume as much upon a small piece as would suffice to dress a very large one. At the same time, it would be very false economy to employ too little fire and to spoil the meat, by attempting to dress it with inadequate heat. Good management will therefore not only at all times economize fuel by those contrivances which obtain the most available amount of heat from the same quantity of fuel, and by adapting the size of the fire to the quantity to be dressed, but also by taking care that the fire shall be so supplied that it may be most brisk at the time when the greatest heat and the clearest state are required.

The crust which forms on the surface of roasted meat is, as I have already observed, of very important service in retaining the juices of the meat; but it is essential that this crust should not be formed too soon or too quickly, by which the exterior will be wasted, and rendered unpleasant and unwholesome, whilst the interior may remain in an uneatably raw state. The object must be, by the due regulation of the fire and the distance of the meat, to secure the heating of the whole mass, without scorching the surface. This result is no doubt somewhat influenced by the state of the surface of the meat itself. If the meat be wet and moist, it will furnish so much for evaporation, that the formation of the crust will be retarded, and, unless the joint be very large, the whole will be more or less injured. To avoid this error, it cannot be necessary to sacrifice cleanliness, by neglecting so much of ablution, as well as scraping, as a wholesome recollection of the hands, not always the cleanest, through which the meat has passed from the slaughter-house to the dresser, would suggest. Where the joint is very large, it becomes essential to keep down the undue action of the fire on the

surface by the occasional application of moisture; and I have heard, that on festive occasions, when an entire ox has been roasted in the market-place of a country town, that a mop has been used for this purpose. This expedient, in all probability, was absolutely necessary, to obtain the roasting of the interior, without the destruction of the surface. I have adduced this fact, to point to the principle which should regulate that part of the process which is called basting. Those materials used for basting which have a watery character, such as milk, vinegar, wine, salt-and-water, and even the gravy of the meat, by their evaporation will keep down the temperature of the surface, although it be before a brisk fire. They are therefore suited to the commencement of the process; and as they retard the formation of the crust, they favour the escape of some of the fluid parts of the joint itself; and it is probably for this very purpose that they are at times employed, as I believe is the case in dressing a hare. When the material is of a greasy character, such as melted fat or butter, it prevents evaporation, and allows the heat to be raised many degrees, without the parts being absolutely burnt: when the fat, osmasome, and fibrin, are unitedly subjected to this heat, they produce a peculiar flavour, which is generally much esteemed, and with some persons more than compensates for the greater dryness of the outside. A colour is also imparted to the gravy, which may be compared to that which is sometimes given by heated vegetable matter, such as burnt sugar and roasted onion, to which the cooks at times resort. If the heat be allowed to be too great, or too long-continued, by neglect of basting, or the exposure of a particular part, the fat matter will be so scorched as to acquire and impart an offensive rancid taste, almost as bad as that which is produced by burning cinders falling into the dripping-pan—an evil to be carefully guarded against, and quickly removed.

That which drops from meat, and is collected in the pan below, is a mixture, the nature of which deserves some attention. It in part consists of gravy, a watery fluid containing blood and other juices of the meat, a little gelatine, and osmasome. Under the action of the heat to which it is

exposed, albumen is separated by coagulation, and fibrin and extractive matter become inspissated, and blended with it. Each contributes its part to the richness and flavour of the gravy; of which, as Dr. Kitchener says, "take care; it will save many pounds of meat."

The gravy, as much as the fat, contributes to produce the offensive and disgusting smell and taste produced by coals and cinders falling into the dripping-pan. The melted fat forms the other essential part of the contents of the dripping-dish, but its quantity and quality must vary with the character of the meat which is roasted. For the reasons which I have already stated, it is a very essential article in the basting of meat, and, when not supplied by the joint itself, the deficiency must be made up from some other source. In order to retain it when applied, as well as to give an attractive appearance to the surface of the joint, its consistence is often increased by the addition of flour, sprinkled dry on the surface of the meat. From what I have said regarding the retention of the juices of meat, it will be obvious that all needless punctures of the joint should be avoided, whether from skewers or unnecessary insertion of the spit, since they will afford so many leaks, by which the gravy will escape.

The principles laid down with respect to roasting will partly apply to BROILING; but in proportion to the thinness of the steak or chop, it is important to secure the early formation of the crust by which the juices of the meat are to be retained; since, if these are allowed to run out, or are slowly evaporated, the meat will be injured in flavour and nutritive properties. In proportion to the greater exposure to the fire is care required that this should be in a proper state at the time at which it is wanted.

I have little to add to the opinion I have already expressed regarding BAKING; except, that the objections to which it is liable may greatly vary in degree, according to the size of the oven, the number of joints dressed in it, and the success of contrivances employed to obviate them: perhaps the most elegant and effectual, and one of the least expensive, is that which consists in the employment of gas, in a close chamber

of bright tin. The danger of producing empyreuma is so completely removed, that it is difficult to say whether the process ought not to be regarded as roasting, rather than baking.

The censure which I have passed on FRYING may require some mitigation; since it is a process of cooking which, it must be admitted, is well applied to some kinds of food, and more especially to fish; from which the over-heated and injured parts may be easily separated, when they are likely to offend delicate stomachs. There are some principles connected with this mode of cooking which it is essential to bear in mind. It is well known, that when water is placed over the fire, evaporation limits the temperature to about 212 degrees, unless a very considerable addition be made to the ordinary pressure of the atmosphere. The fixed oils, of which butter, lard, olive-oil, and other similar substances employed in frying are examples, admit of being raised to a much higher temperature, without evaporation or decomposition. Hence, articles which are fried may be raised to a much higher temperature than those that are either boiled or stewed, and the surface at least may be rendered crisp and brown. It is however desirable that this should be effected as quickly as the complete dressing of the dish will permit. If it be done slowly, the danger of rendering the fatty matter rancid by heat will be greatly increased, and the object fried will be more or less soddened. It must be obvious, that if this retain much moisture, whether on its surface or in its substance, or if the butter, lard, or oil, &c. contain watery parts, the heat must be kept down, and the evils just alluded to be produced. The care necessary to obviate this inconvenience may easily be taken, when the nature of the evil is once understood. It will also be observed, that in frying, as in other modes which have been alluded to, a crust is formed, which retains much of the juices of whatever may be fried: hence, it is the moisture on the surface, and that which may become mixed with the grease employed, which is chiefly to be guarded against. It is said that the escape of the last portions of moisture is indicated by a sort of crackling noise, which may be accounted for by the watery parts sinking

below the oily; and that when reduced to a few drops, they are rapidly converted into vapour, and produce little explosions as they overcome the pressure to which they are subjected.

Boiling.—Although, in subjecting articles of food to the action of boiling water, there is, in ordinary situations, no notable difference in the degree of heat, whether the water boil briskly or merely simmer, the effect produced may be greatly modified by a variety of circumstances. Thus the article to be dressed may be put into cold water, which may be slowly raised to the boiling point, or it may be suddenly plunged in water already arrived at ebullition: it may be boiled in much or little water: it may be boiled for a longer or shorter time: it may be kept in violent agitation, or be allowed to remain almost motionless. Each of these modes have their influence, which it may be desirable to shun, or to take advantage of. Thus immersion in boiling water, or quickly producing the boiling point, by promptly causing the coagulation of whatever is susceptible of this change, is likely to retain juices, and other principles, which might be extracted when a longer time is allowed for the subject under operation to be brought to the highest temperature. This method must consequently be unfavourable to the richness of the liquor: it may also occasion too great an inequality in the degree of dressing, and be unfavourable to tenderness. Slow boiling, on the contrary, will favour the extraction of whatever boiling water can dissolve, and promote the tenderness and breaking up of the more solid parts. Violent ebullition produces a compound effect, in which the influence of motion, as well as of heat, is concerned; and it may easily happen, that whilst the different animal or vegetable principles are softened by heat and moisture, their parts are more or less broken up and disturbed by the movements resulting from this cause. Vegetables lose their forms, and joints become detached, whilst the bones are deprived of their muscles and tendons. The question, whether much or little water should be employed, must be decided by the purpose to be served, by the liquor employed, and by the character of the substance to be dressed. Thus, Dr. Kitchener observes, no good housewife has any preten-

sions to rational economy who boils animal food without converting the broth into some sort of soup: but if the joint were boiled in a very large quantity of water, the broth would not deserve the name, and probably would be spurned by the poorest individual to whom it might be offered. But the article to be boiled may impart a disagreeable flavour to the water; in which case it will not only be proper to use a larger quantity, but even this may be changed. I have alluded to the coagulation produced by heat:—there are some points worth attending to, in connexion with this phænomenon, as connected with boiling. The coagulation may occasion a separation of principles, once dissolved in the water. If they are worth retaining, they may be diffused through, or suspended in, the concentrated broth; but if it is desirable to separate them, they may be readily removed from the surface, if the boiling be slow and steady; but it will be impossible to do so, if violent ebullition is maintained. In some compound fluids in which coagulation takes place, the coalescence of the separated particles may be very much promoted by the kind of motion which may be kept up in the fluid in which the coagulated particles are suspended. It is a change of this kind which takes place in various articles composed with milk, when they are said to be *turned;* and experience and tact are required, not to stir such fluids too much, or in an improper manner.

Although the production of accidental and adventitious tastes is to be guarded against, there are many additions intentionally made for the purpose of imparting to the articles of food flavours and other properties which are thought to render them more agreeable or more wholesome. With the use of these, whether singly or in combination, it is very necessary that even the most economical cook should be somewhat acquainted. The knowledge of them so essentially depends on experience, and the tastes and wants of one class of consumers may differ so widely from those of another, that it will be in vain for me to attempt to offer any precise directions. To enable attention to arrive at a practical

result, it will be well to remember, that the knowledge to be sought, is that of the kind of flavour the best adapted for addition to particular articles of food: and as more than one seasoning article is employed in the same dish, a part of the inquiry must be directed to ascertain how they may be best combined, so as to assist, rather than to clash with each other. Without some care of this kind, the cook in a numerous establishment may go blundering on in the preparation of large quantities of the best provisions and their accompaniments, without giving satisfaction to those for whom they are designed. In all these combinations—and the remark equally applies to other combinations in which flavour is not the principal object to be sought—the use of measure and weight is absolutely essential to success, whether health, economy, or gratification, be the object. I do not mean by this, that every addition of salt, and every application of flour, is to be made with grain-weights, as if we were administering a dose of calomel: the utensils necessarily employed may often serve as measures of sufficient accuracy, if their capacity be ascertained and remembered. Some flavours are modified during the process of cooking; and the knowledge of the peculiarities and adaptations of these are at least as much within the province of the cook as that which relates to purchased seasonings. I have noticed some curious applications of this principle in the receipts furnished to my friend, M. D'Arcet, to be employed in making the most economical soups from a solution of gelatine to be obtained from bone by the process which he has invented. These receipts were contrived by M. Carême, who had been cook to the Prince Regent, the Emperor of Russia, Murat, and Rothschild; and who appears to have acquired and merited a reputation in society to which the exercise of his profession does not always lead. These receipts were not the only service of the kind to which he condescended. He composed a work specially designed to give the result of his culinary experience, for the advantage of those to whom the most economical preparation of food is an important object. I have not seen this work; but I observe, in the receipts to which I have alluded, that he

particularly directs that even the very small quantity of greasy matter should be separately heated with such other of the ingredients as may require a high temperature, in order that they may be able to impart the flavour and colour desired, when added to the solution. Other articles, on the contrary, are carefully kept back till near the close of the process, lest they should lose the flavour which heat can disperse. Flavour is not the only point which is materially affected by proportion and method in the construction of food: consistence, and even form, are likewise conditions which may be influenced in this way; and they are more intimately connected with heathfulness of food than is perhaps generally supposed. Some of the most striking illustrations of this remark may be seen in the various uses to which wheaten flour is applied. When, in making bread, yeast is used in too small a quantity, or of bad quality, the bread, instead of being cellular, spongy, and light, has a close compact texture, resembling softened horn or the poorest cheese: it is masticated with difficulty, and is oppressive and indigestible in the stomach. By the proper addition of yeast or leaven, as I have before had occasion to remark, a chemical change is set up in the flour; by which a small quantity of carbonic acid is everywhere separated throughout the mass, and, by separating the solid parts, produces those minute cells by which the bread, when fully baked, becomes of a permanent spongy texture. The evaporation of superfluous moisture is likewise promoted; and the bread so prepared, not taken too new, is more wholesome, as well as more agreeable, than when the operation is less successfully performed. The addition of muriatic acid and soda, or of carbonate of ammonia, or of eggs beaten up to a perfect froth, is made to flour, for the same purpose. Lightness is obtained by the intervention of the gas, which is either disengaged or expanded by heat. These are not the only means by which the inconveniences resulting from closeness of texture, in the articles of food prepared from flour, may be obviated. Meal prepared from other grain than wheat cannot be so certainly or effectually rendered light by any of the processes to which I have

adverted: hence it is common to give preparations made from these kinds of meal a thin and extended form, as we see in the case of oaten-cakes. It is also employed with wheaten flour; when the use of leaven, or yeast, is religiously avoided. When preparations of flour are dressed by boiling, instead of baking, care is taken to secure the same object, and prevent the formation of close indigestible masses. With regard to wheaten flour, yeast, eggs, or various forms of fatty matter, are employed, which procure a spongy or flaky texture; or if none of these are used, form alone is generally depended upon, as we see in the case of those pastes which are called maccaroni or vermicelli. The farinaceous principle obtained from most other sources is prevented from being formed into a dense and indigestible mass, by different means. It is either employed in a soft and semi-fluid state, as in oatmeal porridge; or it is allowed to retain its original form of grains, each particle of which may be considered as dressed by itself; and, if the process be properly performed, does not completely coalesce with those that surround it, as in the case of rice, barley, and millet. This is following out the same principle as that upon which wheaten flour is converted into maccaroni; the only difference being, that the natural grains are employed, instead of the artificial form. In some instances, the artificial form is also had recourse to; as, for example, in sago and tapioca. I cannot adduce a more striking example of the evil resulting from the neglect of the principles which I have briefly pointed out, for regulating the form and texture as well as the flavour of food, than in the misapplication of flour in making some kinds of batter-pudding. I know not what ought to be the proportion or even the number of ingredients to be employed in properly making a pudding of this description; but I believe, that whatever has the pretension to this name, contains, besides flour, eggs, milk, and some other ingredients for the sake of flavour. In large establishments, where a scrupulous regard is paid to the reduction of expense, puddings of this description are at times prepared which may, indeed, contain all the ingredients necessary, but in such proportions that they do not answer the purpose intended. For

example, the proportion of egg is necessarily so small, as altogether to fail in producing any degree of lightness; and may therefore be regarded as nothing better than wasted, since the mass is of that density and tenacity, that the school-boy, on whom the work of eating it is generally imposed, has it as strongly impressed upon his memory as the most difficult or disagreeable task which may have been appointed him in the school-room. I believe such a composition is as unwholesome as it is offensive; and it will be well if these remarks shall have any influence in putting a stop to this misapplication of ingredients, wholesome in themselves, and capable of being rendered easily and cheaply agreeable. For example, let adequate lightness be ensured by some of the means which have already been pointed out; or even by the due admixture of crumbs of bread, in which the process of lightening has already been perfected; whilst the eggs, which are literally thrown away in the production of batter such as I have described, might be advantageously employed in making a sauce, to be supplied to each consumer when the pudding is served.

NOTE (8.) PAGE 91.

In the construction of diet-tables for the use of Public Institutions, such as schools, workhouses, hospitals, and prisons, it is not merely necessary to consider the properties of different articles of food in relation to general principles of the kind which have been here explained, and, keeping these in view, to let economy be regarded as a first object to be obtained. Were this all that is required to be done, a few common forms of dietary might easily be contrived for universal adoption. It is absolutely necessary to consider what have been the previous habits of the parties to be fed—what is the nature of the situation of the Institution in which they reside, and also the kind of occupation in which their time is employed. I strongly suspect that attacks of illness—affecting, in a larger or smaller proportion, the inmates of Public Institutions, and which have been attributed to almost criminal errors in the supply of food—may really have depended upon some unintentional, and even unsuspected, error

in these respects, by which the influence of an unhealthy season has been greatly promoted. Thus, for a group of individuals, whatever may be their age and station in life, if they have been accustomed to wheaten bread, solid animal food, fermented liquor, and other elements of what I have described as a generous diet, it will be highly inexpedient to adopt the plain wholesome dietary, in which soup, vegetables, oatmeal, and potatoes should predominate. The dietary tables of Institutions must therefore be constructed with regard to the previous habits of those for whom they are designed. The character and quality of food must be consulted, even should it be at the expense of quantity, to an extent which it may be somewhat trying to bear. It must likewise be remembered, that those who have been accustomed to an active and laborious mode of life, in which they may have been habituated to the use of an essentially vegetable and succulent diet, will not be able to support its continuance, to the same extent, when their bodily exertions are reduced—when they have less enjoyment of the open air—when they are more closely brought together—are exposed to depressing mental affections—when the residence may be in a damp or relaxing situation — and, at times when it is known that disorders affecting the intestinal canal are prevalent in the immediate district. The lives as well as the comfort of individuals—and, consequently, the reputation and satisfaction of directors of Institutions—may be most seriously affected by perfectly inadvertent errors in these respects; and the public will do wrong when they pass censure on what may be regarded as the prodigal dietary of one place, and the spare and miserable diet of another, if, in making the comparison, these considerations are overlooked. I am the more disposed to press the importance of this part of the subject, from the belief that they may furnish the true explanation of some affecting cases, respecting which the sympathetic feelings, and perhaps in some degree the indignation of the public, has been excited, but in which unsuspected or uncontrollable causes have been in operation.

The disposal of a soldier's pay may serve as a specimen of

the mode in which a small sum may be so laid out as to provide an agreeable and full diet.

A foot-soldier receives 13*d.* per day. For 6*d.*, out of this 13*d.*, they are always supplied with one pound of good wheaten bread and three-quarters of a pound of fresh meat, to messes of ten men each: each man subscribes 3*d.* per day, which procures the mess five pounds of best bread, ten pounds of potatoes, pepper, salt, coffee, &c. &c.; leaving each man 4*d.* per day to purchase beer and tobacco, (except that soldiers provide themselves with shirts and stockings out of their pay). Thus each man lives well, at a cost of 9*d.* per day for food, having three meals, as under:

BREAKFAST—Coffee and toast.

DINNER—Soup, hot meat, bread, and potatoes.

SUPPER—Cold meat and bread.

The meat is boiled, and the liquor made into soup: each mess has seven pounds and a half of meat: from this they always leave enough for supper.

NOTE (9.) PAGE 112.

It has been clearly shewn by Alfred Taylor, that the purest water, such as rain-water, by attracting carbonic acid from the atmosphere, acquires the power of acting to a considerable degree upon the lead of pipes and cisterns. It does so to a greater degree than water which is rendered less pure by containing some salts, such as the sulphate of soda, the sulphate of magnesia, or sulphate of lime, in solution: and, as an extremely small quantity is sufficient to produce this effect, it is recommended to add some of these salts to water destined to be kept in leaden tanks. I have understood, from an old and experienced plumber, who has directed his attention to the subject, that there is considerable difference, as respects the quality of the lead itself, in regard to the amount of effect produced by the water which it contains or conveys; but I have no information regarding the alloys or other causes which may produce this difference. A careful experiment, made by my friend Dr. G. O. Rees, has ascertained that distilled water may be kept in tinned leaden pipes without

receiving any contamination. Such pipes, if well made, may therefore be confidently relied upon as a valid protection against the injurious influence of leaden conduits.

NOTE (10.) PAGE 122.

Although I have sanctioned the occasional use of a few grains of green tea in addition to black, for the sake of flavour, I greatly prefer the mixture of a small quantity of Orange Pekoe, or some other highly-flavoured black tea; by which the taste may be equally improved, without the risk of causing any inconvenience. Such teas, when moderately used, may be taken with impunity by highly-nervous subjects. They are the essential ingredient in the notorious Howka's mixture.

Almost universal use has rendered tea an article of necessity, rather than of mere luxury. Direct experiment has proved its power in recalling the vigour of those who have been exhausted by fatigue—a faculty which it possesses to a greater degree than either beer or spirits. Where injury or inconvenience attends the employment of tea, it may almost always be attributed to excess in the quantity taken; and, in these cases, the sugar, the milk, and even the water, are equally concerned with the tea.

NOTE (11.) PAGE 125.

There is a modification of cocoa or chocolate, called Broma, which has the advantage of being nearly or quite free from oil, and of containing a small quantity of some delicate farinaceous substance. When well made, it is an excellent article; more nutritious, and less likely to offend the stomach than any other form of cocoa.

When treating of coffee, cocoa, and chocolate, as beverages, it seems necessary to make a remark respecting the milk which is generally taken with them. In the preparation of the two last, it is common to boil them with the milk; and to the former, boiled milk is usually added. Cold milk would be a less agreeable substitute; but it should be generally known, that boiling renders milk much less nutritious, and more likely to offend the bowels. I have known a grown

person wholly subsist for many months on milk, to the exclusion of every other article, fluid or solid. Boiled milk, though most palatable, was soon found to be inadmissible; but unboiled milk quickly produced a great improvement in flesh and complexion. I would recommend that the articles referred to, be boiled in water; and that milk warmed, but not raised to the boiling point, should be subsequently added. Those with whom the care of providing food for children and young persons may rest, should pay strict attention that the milk which they may use, if it be warmed, be not actually boiled. For a similar reason, caution is required in the use of those puddings which contain boiled or baked milk.

NOTE (12.) PAGE 126.

By evaporating the strongest beef-tea, or other pure animal broth, till the watery parts are driven off, we may be convinced that they contain far too small a quantity of solid matter to have much sustaining power. Nevertheless, such well-made decoctions of meat have a very remarkable effect in recalling muscular strength, when exhausted by fatigue or fasting. Dr. Edwards, after performing various experiments with the dynameter, an instrument by which he was enabled to ascertain the amount of strength lost or gained, arrived at the conclusion, that such decoctions surpassed every other means for the purpose of restoring exhausted strength; and that wine or spirits, which are generally relied upon, are very inferior in this respect. It does not, however, necessarily follow, that successive portions will continue to add to the effect in proportion to the quantity taken. On the contrary, it is extremely probable that large draughts of these, as well as of any other fluids, would prove oppressive, and produce inconvenience of various kinds. The fact however, pointed out by Dr. Edwards, is of very great importance; and, whilst it may be urged as an argument against the great abuse of beer and spirits, which are habitually employed by coal-whippers and others employed in very severe labour, it suggests the kind of substitute which their total-abstinence friends should recommend for their use.

NOTE (13.) PAGE 128.

Although it has been my sincere and earnest desire to advance the cause of temperance, both by setting forth the numerous ills which result from its violation, as well as by setting forth the many solid advantages which temperance offers to those who strictly adhere to it, I have not escaped the uncharitable censure of some of the over-zealous total-abstinence advocates; to whom it appears I have given no little offence by the statement of the decided advantages which, under certain circumstances, it is my firm conviction, are to be derived from the employment of some kinds of fermented drink. Not only the manifest improvement in general appearance, but the prompt amelioration and ultimate healing of sores and wounds which take place under the judicious employment of these drinks, and the dissatisfactory progress which they were making without their assistance, leave no room to doubt that they possess a power which may be turned to advantage; and I have no hesitation in saying, that our dietetic resources would be grievously deficient were we to be altogether deprived of the class of fermented drinks. In saying this, I am far from desiring to undervalue the very great general good which has been gained by the advocacy of total abstinence. I believe, however, that this cause would further commend itself, by increasing its charity, as well as by that admission of exceptions to their rule which strict adherence to truth requires.

NOTE (14.) PAGE 129.

In giving a caution against the excessive and needless use of beer, I may not have said all that the subject requires. There is a practice which is common amongst the working classes, which is not only useless, but very injurious—I mean that of taking beer, and other kinds of drink, between meals. This is regarded so much as a matter of pleasure and hospitality, that it seems to be scarcely possible for individuals of this class to meet at any time of the day without their drinking beer or spirits, or both. No practice is more likely than this to lead to criminal excess and intoxication, seeing

that the parties who get into this habit may be tempted to drink many times in the course of the day. But were the quantity kept within what are esteemed the bounds of moderation, and never allowed to affect the head—a restriction which it is scarcely possible to observe—still the injury done to health may be very considerable. No practice is more likely to injure the digestive powers and produce oppression of head and chest, and, by promoting inordinate perspiration, to prepare the way for various evils resulting from its interruption. It is altogether a delusion, to suppose that the system requires such frequent and copious supplies of fluid. Even in the hottest climates, in which the system sustains the most rapid loss of its fluids, practice enables the inhabitants to do with a very scanty amount of drink; and experience has taught them, that they are much less liable to disease when they thus limit themselves. It should be felt to be a disgrace and shame to any man, to shew himself so thoroughly sensual a being, that he can have no pleasure in finding a companion, unless he is engaged like a pig at his trough. The plan of concluding bargains at an alehouse, and of giving drink as a reward for the performance of little services, are likewise serious evils, which seem designed especially to introduce and encourage needless and pernicious drinking.

NOTE (15.) P. 142.

Spirits are not necessary to counteract the effect of cold.

The following anecdote I owe to a medical friend, on whose accuracy every reliance is to be placed.—"Many years ago, in the county of Galway, two extensive graziers met at dinner; when, upon a discussion taking place between them respecting the best method of enabling their herdsmen to endure the cold, watching, and fatigue, to which they were exposed in driving cattle to Ballinasloe, it was resolved upon by one of the graziers, that he would supply his herdsmen with abundance of good and wholesome food, but give them only water to drink; while the other determined that he would give his men an abundant supply of whiskey. Accordingly, the two sets of herdsmen set off, at the same time, to the October fair at

Ballinasloe. They were all able-bodied young men, of similar habits: the journey which they had to perform was of the same length, the fatigue the same; the weather was wet and inclement; they were all drenched with wet, and obliged to sit up during the night in their soaked garments. On carefully contrasting the water-drinkers with the whiskey-drinkers, the result was decidedly in favour of the former, who were in full vigour, had never quitted their posts, and bore up well to the last; while the others were so completely exhausted, that during part of the time at the fair they were useless, and, on their return home, were scarcely able to drag one leg after the other."

NOTE (16.) PAGE 146.

To those who may feel any curiosity respecting the still-mysterious subject of spontaneous combustion, the following extract from a foreign work may not be uninteresting:—

"If a death in flames be in itself fearful and shocking to every feeling of humanity, it is truly appalling only to think of the possibility of a flame bursting spontaneously from the interior of the body for the purpose of consuming it, and speedily and unceasingly reducing it to soot and ashes. It is a fact, that brandy-drinkers have been found consumed to a few remains of bones, without it being apparent how fire could reach them from without; from which it was concluded that they were burnt by a fire proceeding from their own bodies, and to this the name 'spontaneous combustion' has been given. More closely considered, it appears that, in most well-attested cases, there was a proximity of fire to the places in which the bodies were found. Among thirty-two cases, there were eight in which it is expressly to be remarked, that, on the evening before the fatal event, the consumed had taken spirituous liquors till in the most extreme state of intoxication. All complete combustions of this kind occurred in the night, and most—namely, twenty-three—happened in France, where fire-places are used instead of stoves; and those in winter, or the colder days of other seasons. In fifteen cases were found, in the rooms where the combustion had taken place, inflammable bodies, either actually burning,

or but recently extinguished, by which it might have been occasioned; and the greater number of the consumed were found lying near a hearth, fire-place, or chafing-dish. In two cases, two persons were burnt simultaneously. If, from the facts here shortly collected, it is probable that the combustion began by a kindling from without, this view is supported by the following further reasons. According to the experiments of the celebrated French physicians, Barruel and Dupuytren, carcases, if fat, when once ignited, will burn without further assistance, in small and weak flames. It is further to be assumed, that brandy, even if it is not received by the blood in an unaltered state, must, immediately after it is taken, be evaporated by the stomach, and, to a certain degree, penetrate the texture of the body, thereby naturally increasing its inflammability and readiness for combustion. All taken together, renders the opinion that the phænomenon which goes by the name 'spontaneous combustion' is nothing further than the burning of a man in the ordinary manner; that is, from external ignition, though under circumstances favourable to the event. The progress of combustion is, according to Dupuytren, the following: — An individual, thoroughly intoxicated by an excess of spirituous liquor, accidentally comes near a light, burning coals, &c.; the fire seizes the clothes, or ignites the vapour of alcohol proceeding from the mouth; proceeds undisturbed, on account of the stupefaction of the person, produced by the brandy, and sometimes by the smoke; and is supported by the burning fat, to which the clothes and the firm parts of the body serve as a kind of wick; until it at last perishes from want of nutriment, leaving the well-known residue of soot, saturated with stinking oil. Many writers relate, that from the throats of those who in a short time have taken a great quantity of brandy, a blue flame has plainly been seen to issue—doubtless the burning vapour of alcohol, kindled by a light in the proximity."

NOTE (17.) P. 150.

The following authorities respecting the tendencies and effects of intemperance deserve serious attention.

Spirituous Liquors.—Dr. Rush: "Their mischiefs may be summed up in a few words. They fill our churchyards with premature graves; they fill the sheriffs' docks with executions; they crowd our jails; and lastly, they people the regions . . . . . ! But it belongs to another Profession to shew the terrible consequences in the future world."

An experienced and upright judge, the well-known Sir Matthew Hale, says, "The places of judicature which I have long held in this kingdom have given me an opportunity to observe the original cause of most of the enormities that have been committed for the space of near twenty years; and by a due observation, I have found, that if the murders and manslaughters, the burglaries and robberies, the riots and tumults, the adulteries, fornications, rapes, and other great enormities that have happened in that time, were divided into five parts, four of them have been the issues and product of excessive drinking, of tavern or alehouse meetings."

Dr. Tissot, in his "Causes of Popular Maladies," says: "Drunkenness destroys by retail, at all times and everywhere. The poor wretches who abandon themselves to it are subject to frequent inflammations of the breast, and pleurisies, which often carry them off in the flower of their age. If they sometimes escape from these violent maladies, they sink a long time before the ordinary approach of old age, into all its infirmities. Their constitutions, worn out by excess, cannot be acted on by the usual remedies; and diseases of weakness, resulting from this cause, are almost always incurable."

Drunkenness is not merely in opposition to virtuous courses, but it unceasingly saps those barriers, which, by prudence and the better feelings of human-nature, are raised against every other species of sensuality, against every moral, and, I may say, physical degradation. "No lust there is that finds not man thereby disarmed and fenceless": and, in proportion to the loathsomeness of this vice is its fascination, insomuch, that, as has been emphatically said by Sir W. Raleigh, "It were better for a man to be subject to any vice than drunkenness; for all other vanities and sins are recovered from, but a drunkard will never shake off the delight of his beastliness."

Notwithstanding this, which is unhappily too often supported by fact, I would not have the drunkard despair, if he would but seriously enter on the right course.

Monthly Review, — 11, 1831: "The chief impediment to longevity about that time (the last century, about the middle) appears to have been produced by intemperance; and the effects of that vice were of such a shocking nature, as to call for the interference of the Legislature. We find, that in the ten years before 1751 the average number of deaths within the bills of mortality in London, from fever, was 4351 annually; whilst in the ten years which succeeded that date, the deaths from this disease fell to 2565 a-year. In looking for adequate materials to explain the reason of this remarkable decline of deaths from the effects of intemperance, we are at once struck with the fact, that the use of ardent spirits was suddenly restrained by a bold and severe legal enactment. The restraint imposed by law was rendered still more strict by a total prohibition of the manufacture of spirits. This prohibition was chiefly confined in its operation to the period between the years 1757 and 1760, when the annual average of deaths from fever was reduced to 2136. The policy of the Legislature was altered in 1761; spirits became more accessible; and we find that the deaths from fever attributed to the year 1763 are no less than 5742."

For one of the following extracts, as well as for others introduced into these Notes, I am indebted to the columns of the British Temperance Advocate, with which I have been obligingly favoured by the Editor. It is no less a pleasure than it is an act of justice, to bear testimony to the worth of this and similar publications. They are replete with valuable matter, both arguments and facts; of which the most important and persuasive, as well as the most encouraging, are the details of extensive conquests over intemperance, and of the great results to which they have led.

Offences in the Metropolis.—The following is the official result of the labours of the metropolitan police for the last year:—Number of persons taken into custody, 63,474; discharged by the magistrates, 32,544; convicted or held to

bail, 27,817; committed for trial, 3113; convicted and sentenced, 2,237; acquitted, 608; not prosecuted, or bills not found, 267. The number of drunkards apprehended during the year was 21,704; of whom 7523, or rather more than one-third, were females.—2. 4 mo. 1836.

The borough of Oldham contains a population of about 63,000 persons. In 1831, the number of publicans was 250; of whom 188 were in the township of Oldham. In 1834, the town and immediate vicinity contained 96 old public-houses, 100 beer-shops, and 156 unlicensed beer-houses: total, 352. In 1839, the publicans and beer-sellers in the borough were 343, and the unlicensed beer-sellers 200: total, 543. The sum annually spent here, in intoxicating liquors, amounts to 135,000*l.*, of which 100,000*l.* is doubtless paid by the operative classes. The entire yearly expense of all the religious, charitable, and legal institutions in the borough is 16,000*l.* The number of drunken and disorderly persons apprehended yearly is about 720; and the annual amount of petit-sessions' offences and causes (two-thirds of which spring directly or indirectly from intemperance), including disorderlies, is 2160. In nine years, from 1830 to 1839, there were in the borough 79 accidental and sudden deaths, clearly traceable to intemperance; and in the ten years from 1829 to 1839, there were 45 cases of self-destruction, in 23 of which the predisposing cause resulted from drinking. These are not random statements, but truly appalling facts; which the writer has been enabled carefully to ascertain, owing to the nature of his professional situation.

NOTE (18. PAGE 151.

In Germany, a tract, exhibiting the folly of giving way to intemperate or even unnecessary drinking, has been distributed, under a title which may be translated "*The Fools' Pence.*" It was reported to have owed its publication to the accidental circumstance of the thriving landlady of a drinking-house having been heard by a customer to say, that the good fare and comforts which she was procuring for her family were derived from the Fools' pence. The customer, who knew

the want of these things himself, felt that he was one of the fools; and thought, that the best plan for him to adopt for the future, was to change the mode in which he spent his pence. By adhering to his resolution, he was able greatly to add to his own comfort: and told the landlady, when she remarked that she had lost his custom, that she was not going to have any more *fools' pence* from him. It would be well if the tippling and besotted portion of the poor of this country would look at the numerous *gin palaces* which have been reared in almost every district; and recollect the magnificent houses and splendid equipages which are bought and maintained by the fortunes which are made in them. They might then reflect how many fools' pence must have been paid to build them; and how many more must be paid, to make it answer, to construct such costly traps for fools. A few pence saved two or three times a day would soon amount to a sum by which some useful article of lasting advantage might be purchased; and these, multiplied by a few months, would clothe the back and furnish the room of the workman who stops throwing away his fools' pence.

NOTE (19.) PAGE 155.

It has been urged as an objection to the disuse of strong drink by the labouring class, that were they to adopt this plan, it would soon be discovered by their employers that they could make less wages suffice to keep them as well off as they were previously, and that their pay would be reduced in proportion. I do not believe that such would be the case; but, if we could suppose that it would be so, this could neither justify the practice, nor prove that it would not even then be less injurious to the employer than to the workman. Why is the price of the liquor to be wasted, rather than it should be suffered to remain with the master? And why is the man's stomach, which is the worst place for the purpose, to be made to receive this waste, and cause it to rob him of his time, his strength, his health, his comfort, his character, and his life? Let the workman save himself from these losses; and if his wages were reduced, there would still be a balance

in his favour. Having more time, and more thought, he would be occupied more hours, and get more work done. This, whether he work by the piece or the day, would eventually tell on the rate of his wages. The master's profits would be increased in various ways; and this would bring competition, by which the workmen are benefitted, since it creates a demand for hands. The fact, however, is just the reverse of that which the objection pre-supposes. The temperate man and the abstainer keep up their wages, whilst the drunkard lowers his. The drunkard is either taken on when other hands cannot be had; or, as a matter of favour, he is with reluctance engaged on very inferior terms, which it rests with his reformed habits and confirmed sobriety to improve. I have been told by a reformed drunkard—a workman in a branch of manufacture in which wages have fallen—that he has, on the average, obtained better wages than formerly; that his family, instead of being miserable, were well fed and well clothed; and that he had time for his own enjoyment, as well as to devote to others. The workman who thus takes care of his earnings and of his time will be most likely to obtain correct information as to the state of his trade, as well as to have the means of conveying himself to those situations in which permanent employ is likely to be found, when prudence dictates a change of place. The objection, however, is altogether groundless; since it is a truth, almost without exception, that masters, for their own interest, are solicitous to promote temperance and economy amongst their workpeople; and frequently make an addition to their savings, to encourage the practice. The coal-whippers are almost the only class of labourers whose wages are really kept up by excessive drinking; but, as they are taxed to the full amount of any difference which might be made, by the quantity of liquor which they are obliged to take, they really gain nothing by the sacrifice of health which they make, and by the worse than needless expense which they bring on the public.

NOTE (20.) P. 159.

A remedy proposed.

"Could you not induce some of the more respectable publicans—I am now speaking more particularly to you, decent and respectable mechanics!—could you not induce some of these numerous publicans to establish coffee-houses on a moderate plan; where you could read the newspapers as well as in foul-smelling spirit-stores; and where you might get, at all reasonable hours, a pint of very good hot coffee,* with bread and butter, for less money than a tumbler of punch or a pot of porter stands you in, and be safe from the results which ever attend the followers of strong liquors?"— *Observations and Advice addressed to the Mechanic and Industrious Classes. Dublin*, 1830.

An experiment of this kind was long since encouraged by Timothy Claxton, an able and enlightened friend of the mechanic class, who has risen amongst their own ranks. The undertaking was highly successful.

By far the most important and extensive practical results in connection with this subject, are those which have been obtained by Temperance Societies; which have shewn what may be done in a good cause, when united opinion and systematic well-directed zeal are enlisted in its favour. The following is a striking instance of the good obtained in an individual case, through this instrumentality, in Ireland, when drunkenness was notoriously prevalent, but when—thanks to the labours of the truly patriotic Matthew!—these examples have now become the rule, rather than the exceptions:—

"We entered, one day, a cottage in a suburb of Cork: a woman was knitting stockings at the door: it was as neat and comfortable as any in the most prosperous district of England. We tell her brief story in her own words, as nearly as we can recall them:—'My husband is a wheelwright, and always earned his guinea a-week: he was a good workman, and neither a bad man nor a bad husband; but the love for the

* Doubtless tea and good soup might also form part of such an establishment.

drink was strong in him; and it wasn't often he brought me home more than five shillings out of his one-pound-one, on a Saturday night; and it broke my heart to see the poor children too ragged to send to school; to say nothing of the starved look they had, out of the little I could give them. Well, God be praised! he took the pledge; and the next Saturday he laid twenty-one shillings upon the chair you sit upon. Oh! didn't I give thanks on my bended knees that night! Still, I was fearful it wouldn't last; and I spent no more than the five shillings, as I was used to; saying to myself, May be the money will be more wanted than it is now. Well, the next week he brought me the same—and the next, and the next, until eight weeks passed; and, glory be to God! there was no change for the bad in my husband; and all the while he never asked me why there was nothing better for him out of his hard earnings: so I felt there was no fear of him; and the ninth week, when he came home to me, I had this table bought, and these six chairs; one for myself, four for the children, and one for himself: and I was dressed in a new gown, and the children all had new clothes and shoes and stockings, and upon his own chair I put a bran-new suit; and upon his plate I put the bill and resate for them all—just the eight sixteen shillings they cost, that I'd saved out of his wages, not knowing what might happen, and that always before went for drink. And he cried, good lady and good gentleman, he cried like a babby—but 'twas with thanks to God. And now where's the healthier man than my husband in the county Cork, or a happier wife than myself, or dacenter or better-fed children than our own four?' It is most unlikely that such a family will again sink into poverty and wretchedness."—*Hall's Ireland.*

NOTE (21.) PAGE 159.

Extract of a Letter from Alexander Thompson to his Brother; dated, "Delhi, East Indies, December 19, 1839:—

"DEAR JOHN—By the blessing of Providence I am still alive; and, what will give you scarcely less delight to hear, I am an altered man. Adversity, and illness unto death, have

wrought great changes in me: but I had better give you an account of what has happened to me since I left you, four years ago, a cursed and silly drunkard. Never shall I forget my feelings when I awoke, the morning after that fatal night, and found myself bound to a service which I detested. The idea of perpetual banishment from my country, and the certainty of leaving my bones in a foreign land, almost drove me to distraction. I remained in that state, driving away reflection as far as possible, by drinking as much spirits as my pay would afford, till long after I had arrived in India. Here signs of diseased liver were not long in shewing themselves; and the doctors looked on me as a doomed man. I could feel the fatal enlargement in my side; and not till then did I think of leaving off the use of the poison which was killing me; and at this anxious time I fortunately got acquainted with a comrade of the name of James Stephenson, also a Northumberland man, who was a stanch teetotaller, and, by acting on its principles, had preserved his health here for twelve years; whilst hundreds of his fellow-soldiers, who were without his wisdom, fell victims to disease. By his advice and example my mind was strengthened, and I practised temperance, drinking only pure water for the last nine months; and at present I feel myself better, both in spirit and body, than I have been for many years. Oh, John, if you have not done so, let me beg of you to lose no time in joining a Teetotal Society. We have got up a Temperance Association among the soldiers here, which is weekly increasing in numbers. We find that we can get many little comforts now, with the money that drink used to swallow up."

From Corporal G. Godfrey, 13th Light Infantry, Oct. 11, 1839.

"When the army was assembled, and in progress, we met with others of the same mind in other regiments, so that we numbered about 30; and a few joined us on the march, making altogether 42 temperance men with the army of the Indus. Our marches were oftentimes long; and it is supposed, that, on reaching Cabool, we had marched upwards of 1300 miles, having lost but one of our numbers. He was a good man, and

died at Candahar. At times, water was bad and scarce: indeed, our privations were many, and very trying to men's constitutions. The whole army was without spirits, or any substitute, for two months. On the 23d of July, our troops captured Gheznee, without being primed with spirits; and there the soldiers displayed sober, cool courage; which was so effectual, as to cause our colours to be planted on the fort in two hours' time, as signals of victory to both European and Affghan beholders.

"It is commonly reported in our camp to-day, that a soldier, who had lost his arm at Gheznee, belonging to the Honourable Company's European regiment, was smothered last night with liquor, in his tent. This is another instance of the awful consequence of the habit of drinking. Occurrences of this kind often take place amongst soldiers in India. Dram-drinking amongst us is a dreadful practice: it causes crime, disease, and death, in various forms; and has ruined many thousands of British soldiers, both for time and eternity. It is to be hoped our Government will, ere long, do something to remove this great obstacle to our happiness. I have refrained from using spirits more than seven years, and am well persuaded that a man is much better without them. I would not use them again on any account whatever. I find that the account of the soldier dying in liquor, just referred to, is a true one."

Quitting intemperance by degrees.

It is observed by Dr. J. Reid, "that Webb, the noted pedestrian, who was remarkable for vigour of body and mind, lived wholly on water for his drink. He was one day recommending his regimen to one of his friends, and urged him with great earnestness to quit a course of living by which his health and his intellects would equally be destroyed. The gentleman appeared convinced, and told him that he would conform to his counsel; but thought he could not change his course of life at once, but would leave off strong liquors by degrees. 'By degrees!' (said the other, with indignation: 'if you should fall into the fire, would you tell your servant to pull you out by degrees?' "

NOTE (22.) PAGE 164.

IT is truly gratifying to be able to bring forward statistical proofs that the cause of Temperance is advancing in the British Empire; and that, although the prevalence of drunkenness amongst our countrymen has given some decided advantage to the manufacturing as well as to the shipping interest of foreign rivals, there is reason to hope that reform may reach us before it be too late. The following statements regarding the state of crime, the deposits in Savings' Banks, and the course of trade in Ireland, are re-copied from the *Temperance Advocate.*

"Richmond Bridewell, the largest Penitentiary in Dublin, is divided into two sections:—the one for long committals, say from three months upwards, which is called the *Old* part; the other for summary convictions, varying from seven days to a month, is called the *New* wing, and is divided into six compartments; the sixth being the hospital. The following Table exhibits a comparative view of the number of prisoners confined in each, at three particular periods:—

Number of Prisoners.

At this Date.	In the Old Part.	In the New Part; in Compartments.						
		No. 1.	2.	3.	4.	5.	6.	TOTAL.
Sept. 1, 1839	177	29	29	34	19	19	6	136
Nov. 9, 1839	198	14	14	15	10	17	1	71
Nov. 9, 1840	128	6	0	0	0	14	3	23

"In the commitments to the New wing, a diminution will be observed to have taken place on the 9th November 1839, by about one-half (taking the actual number confined on the particular days as the criterion of an average), in little more than two months, dating from Sept. 1st preceding; the numbers having dropped from 136 to 71. This may be traced to the operation of large Temperance Societies, which during that period became rapidly more effective and influential. But the most extraordinary circumstance is, that a still further reduction of two-thirds upon this diminished number should have taken place during the past year, in the New wing; and of

nearly one-third even in the Old: the former having diminished from 71 to 23, the latter from 198 to 128, on the 9th November last. At that date, 100 cells of the New wing were untenanted; and of the 23 prisoners confined, it may be safely averred that few of them would have been there, had it not been for the increased vigilance of the police. The highly respectable governor, THOMAS PURDON, Esq. has been indefatigable in his exertions to promote the cause of temperance. Our advocates have visited the prison weekly, to bring the subject before its inmates, and with much success.

"It should be noticed, that the very great reduction in the New wing did not commence until about half the current year had expired: it may be dated, in fact, from about the period of Father Matthew's first visit to Dublin, in March last; from which time there has been a steady diminution. But, taking the entire commitments during consecutive annual periods, the result is also very satisfactory. Thus the commitments were,

During the year ending Nov. 9, 1839.....	3202
During the year ending Nov. 9, 1840.....	2018
Less by above one-third during last year; viz.	1184

On reference to the books of the Smithfield Penitentiary, it appears that the number of males committed for drunkenness were,

During the year 1838.....	11,028
In the first nine months, ending Nov. 9, 1840, only	4172

being a comparative reduction by about one-half. The large number now committed arises from the increased attention given by the police to notice cases of drunkenness, now that the tide of popular feeling is turned against that vice. The female drunkards are sent to Grangegorman-lane Penitentiary.

"But Smithfield Penitentiary is now closed—we trust never to re-open for the same purpose! It had been some time talked of, till the altered state of the population at length rendered it clear there was no longer any pretence for keeping it open. The steady declension of the committals to Richmond Bridewell (nearly 1200 less this year than last)

has prepared the way for this step. Here is one of the many savings arising from temperance! The citizens of Dublin are relieved by it of the entire expense of one prison.—In England, alas! prisons are yearly multiplied; increased accommodation is required in existing ones; and the attendance and attention of magistrates at public offices in our towns, in their anxiety to give an early delivery to the inmates, is everywhere increasing; while in many places the absolute necessity of clearing the lock-ups, to make room for a new supply, and the knowledge of the fulness of places of permanent confinement, render it impracticable for the magistrates to discriminate, and reserve for punishment the most criminal of those scores of cases, in which offenders, discharged with a mere reprimand, leave the room, either considering themselves very hardly used by being confined at all, or laughing in the sleeve at the cheap rate at which they have got off; and wondering that Her Majesty's justices should deem it worth the waste of their breath to treat them with a word of admonition. And so it is, gaol-rates and county-rates are increasing, and the value of property decreasing. Landlords and tenants both suffer; and though they may have deemed our principles below their notice, self-interest may, some day or other, force them into unwilling consideration.

"Another criterion of the improved habits of the people is, the increase of the deposits and depositors in the Savings' Banks. Our information is derived from the Meath-Street Savings' Bank Association, which has three branches; viz. one in Meath Street, one in Abbey Street (late Marlborough Street Branch), and one in Linen-Hall Street. We have taken a three-monthly period, being the months of July, August, and September, in each of the three past years.

Number of Depositors.	1838.	1839.	1840.
Meath Street	2323	2409	3019
Abbey Street.....	3419	3504	4030
Linen-Hall Street.....	1522	1520	1904
Total.....	7264	7433	8943

"The pressure of the depositors in the Abbey-Street Branch

has since become so great, that the Committee have had to open the bank another morning in the week.

"Our readers will not fail to remark the very slight increase during the second year over the first, and the very large one during the third. The whole has progressed proportionately, according to the influence exerted by the Temperance Societies; and the reason is obvious—the people do not now spend their money on strong drink, but are saving it for useful purposes.

"There is another striking fact. The gross amount lodged in 1840 does not exhibit an increase proportionate to the increased number of lodgments. The reason is, that the new accounts are, in general, very small. The new depositors are mostly of the humblest class, who have been most immediately benefitted by the temperance reformation; and it is an additional and most gratifying proof of the legitimacy of the increase in savings. How many of these little hoards may hereafter come to be referred to, as the nucleus around which has been gathered a large fortune raised by industry and perseverance in the honourable pursuit of trade! A new æra is rising in the trade of all Ireland.

"A return of peculiar interest to us, as indicating the stability of the foundation upon which the Temperance reformation rests in Dublin, has been furnished by the Commissioners of Police there. It is, a return of the number of public-houses closed within the metropolitan police district since Jan. 1840, as follows:—Division A, 80; B, 48; C, 34; D, 47; E, 16; F, 12—Total, 237.

"But does any one for a moment imagine that the owners or tenants of these 237 houses are therefore ruined? Does any one even suppose that the houses themselves are permanently closed as places of business? No such thing. We know that these questions will naturally occur; and we put them to the reader, purposely to supply the answer. The proprietors have wisely yielded to the great moral movement, and have diverted their capital and attention to other and more legitimate sources of emolument. The money which was formerly spent in strong drink is now turned into channels of

profitable consumption; and it is delightful to observe the rapid increase of shops, in which useful articles are sold. It is not long since, one Saturday evening, some friends of ours were obliged to leave the foot-way in Thomas-street, in consequence of the crowd of people endeavouring to obtain entrance into a provision-shop. As for clothing-shops, they are multiplying as rapidly as the public-houses are decreasing."

NOTE (23.) P. 166.

I have adduced my friends the Printers, as affording an illustration of the injurious effect of combination for the purpose of drinking, because the evil in their case has come under my own observation. I here offer the bright example of one of their craft:—I mean, the illustrious Dr. Franklin.

"I now began to think of laying by some money. The printing-house of Watts, near Lincoln's Inn Fields, being a still more considerable one than that in which I worked, it was probable I might find it more advantageous to be employed there. I offered myself, and was accepted; and in this house I continued during the remainder of my stay in London.

"On my entrance, I worked at first as a pressman; conceiving that I had need of bodily exercise, to which I had been accustomed in America, where the printers work alternately as compositors and at the press. I drank nothing but water. The other workmen, to the number of about fifty, were great drinkers of beer. I carried occasionally a large form of letters in each hand, up and down stairs, while the rest employed both hands to carry one. They were surprised to see, by this and many other examples, that the 'American aquatic,' as they used to call me, was stronger than those who drank porter. The beer-boy had sufficient employment, during the whole day, in serving that house alone. My fellow-pressman drank every day a pint of beer before breakfast; a pint, with bread and cheese, for breakfast; one between breakfast and dinner; one at dinner; one again about six o'clock in the afternoon; and another after he had finished his day's work. This custom appeared to me to be abominable: but he had need, he said, of all this beer, in order to acquire strength to work.

"I endeavoured to convince him that the bodily strength furnished by the beer could only be in proportion to the solid part of the barley dissolved in the water of which the beer was composed: that there was a larger portion of flour in a penny-loaf; and that, consequently, if he ate this loaf, and drank a pint of water with it, he would derive more strength from it than from a pint of beer. This reasoning, however, did not prevent him from drinking his accustomed quantity of beer, and paying every Saturday night a score of more than four or five shillings a-week for this cursed beverage; an expense from which I was wholly exempt. Thus do these poor devils continue all their lives in a state of voluntary wretchedness and poverty.

"After this, I lived in the utmost harmony with my fellow-labourers, and soon acquired considerable influence among them. I proposed some alterations in the laws of the chapel (printing-houses in general are thus denominated by workmen), which I carried without opposition. My example prevailed, with several of them, to renounce their abominable practice of bread-and-cheese and beer; and they procured, like me, from a neighbouring house, a good basin of warm gruel, in which was a small slice of butter, with toasted bread and nutmeg. This was a much better breakfast, which did not cost more than a pint of beer, namely, three-halfpence, and at the same time preserved the head clearer. Those who continued to gorge themselves with beer, often lost their credit with the publican, from neglecting to pay their score. They had then recourse to me, to become security for them; 'their light,' as they used to call it, 'being out.' I attended at the pay-table every Saturday evening, to take up the little which I had made myself answerable for, and which sometimes amounted to nearly thirty shillings a-week. This circumstance, added to my reputation of being a tolerable good *gabber*, or, in other words, skilful in the art of burlesque, kept up my importance in the chapel. I had, besides, recommended myself to the esteem of my master, by my assiduous application to business, never observing *Saint Monday*. My extraordinary quickness in composing always procured me such work as was most

urgent, and which is commonly best paid; and thus my time passed away in a very pleasant manner."—*Benjamin Franklin.*

NOTE (24.) PAGE 167.

Other objections, besides those which I have mentioned in this Lecture, may doubtless be urged against the practice of smoking. I have been reminded of one, which is of far too great importance to have been omitted. Smoking occasions a risk of fire, and consequently a danger of the loss of lives and property, to an extent which it is impossible to calculate, and which no one can justify for the sake of so contemptible a gratification. In lighting the pipe or cigar, a material is often employed which is peculiarly likely to support a slow and insidious combustion, and is frequently thrown away without due attention being paid as to its being extinguished or not. Whilst the smoking is going forward, ignited particles are frequently dropping from the smoker's mouth or hand. When the pipe or cigar is done with, it is not unfrequently carelessly thrown aside; when, if it happen to fall on any material which can easily be set on fire, a conflagration will probably follow; which is the more to be dreaded, as the effect is not likely to take place until a considerable time has elapsed after the pipe or cigar has been thrown away, and the spot on which it may have fallen has been heated and dried by the continued slow combustion. In the extensive plains of North America, a little fire from the hunter's smoking apparatus has, in all probability, been the frequent cause of setting fire to thousands of acres of dry grass; when many of the inferior animals, including even the swiftest deer, have been overtaken by the flames; and even man himself has not always escaped the widely and rapidly spreading devastation. It was strongly suspected that an idler's cigar occasioned the burning of the heath at Wanstead, which, a few years since, continued for several days, and was not extinguished without great expense and difficulty. Such instances may be mentioned, for their remarkable character; but they are scarcely worth thinking of, in comparison with the more frequent and destructive fires which are taking place in our populous cities

and towns; and which expensive establishments, and the courage, activity, and skill of a numerous band of firemen, serve only to check, rather than to prevent. I must not omit to mention one illustrative instance; which made the stronger impression upon me, from its occurring very nearly at the time at which the omission which I am now supplying was pointed out. A traveller by some night-coach happened to go into a stable, in which about thirty horses were kept. A burning fragment from his cigar, which he carelessly left behind, became the means of setting fire to the premises, and occasioned their destruction, and that of nearly all the horses.

"The practice of smoking cigars in the public streets, to the great annoyance of the passengers, is increasing; and even schoolboys have become smokers.—So long as two centuries ago the custom prevailed; and became so great a nuisance, that, in the year 1616, a Derbyshire gentleman, named Peter Campbell, made his will, bequeathing to his eldest son all the household goods towards housekeeping, on the condition, that if, hereafter, any of his brothers or sisters should find him smoking tobacco, that he or she so finding him should become entitled to the said goods, or the full value of them in money."

LECT. III.

ON

MUSCULAR MOTION AND INTELLECTUAL FACULTIES.

I COME now to the third of the principal divisions under which I have thought it convenient to arrange the subjects of these Lectures. I have therefore to call your attention to the organs or instruments by which we move both ourselves and the bodies around us; and also to the intellectual faculties by which these powers are directed.

Not only the limbs, but also the neck and trunk, are concerned in these motions. I might here speak of the bones, and their joints or articulations, which, by composing the skeleton, give form to the body and limbs, and are essential to fit them for their several purposes. They are highly important and interesting; and afford many curious and beautiful examples of the infinite wisdom with which every part is exactly adapted to its peculiar uses. I shall, however, pass them over, as being rather passive than active, and as being little concerned in the explanation of the precepts which I am about to lay down for the cultivation and preservation of our moving powers.

The muscles are the organs on which motion essentially depends. They constitute the principal portion of the fleshy masses by which the bones are

covered; and are sometimes called the lean part of the flesh, in counter-distinction of the fat. The muscles are composed of bundles or packets of threads or fibres, placed nearly or quite parallel to each other. The fibres composing these packets may be divided into still smaller threads; which, when seen through a powerful microscope, exhibit a very beautiful and peculiar arrangement of delicate lines, crossing the fibres nearly at right angles. This appearance is quite peculiar to muscular fibres; and is found in all animals, from man down to the smallest insect or worm. The bundles of fibres of which the muscle is made up are united by a small quantity of loose cellular membrane, in which a small quantity of fat is sometimes found. Fat, in larger quantities, is found filling up intervals between muscles, or external to them. When muscles act or perform their office, of producing motion, the individual threads, of which they are composed, contract in length, and the entire muscle is shortened, but at the same time rendered thicker. When this shortening takes place, the points to which the ends of the muscles are fixed, are brought towards each other. In most instances, muscles act on bones; but there are situations in which muscles are attached at one extremity to bone, and by the other to some soft part; as, for example, the muscles which move the eyes, the lips, and some of those which act on the tongue. Sometimes the points to which the end of a muscle are attached, mutually approach each other; but it is more common for one end to be nearly or quite fixed, whilst the principal movement takes place at the other. One end is called the origin; the other, the insertion of the muscle. In many instances, muscles have neither their origin nor insertion imme-

diately from the parts to which they are attached, the intermediate connexion being made by means of tendons. Tendons, like muscles, are composed of fibres; but the fibres of tendons have no power of producing motion; and being straight, firm, and closely packed, admit of great passive strength being collected into a small compass; whilst the muscle itself, on which the moving power depends, requires a larger space. Muscles taper, or become smaller, towards their tendinous attachments, and are thickest near the middle, where the fleshy mass is called 'the belly of the muscle.' The great advantage, obtained by muscles being made to act on the parts to be moved, through the medium of tendons rather than by their own immediate attachment, is strikingly and beautifully seen in the wrist and hand. The muscles which move these parts are chiefly situated at the upper part of the fore-arm. If, instead of acting on the wrist and fingers by their long and slender tendons, the mass of flesh which they compose were distributed about these parts, the hand, instead of being the admirable instrument which it is, would be clumsy, and incapable of performing much which it now executes, and the muscles themselves would be constantly exposed to more or less serious injury. Muscles, besides their tendons, have, in some instances, another appendage, which serves both to assist their action and secure them from injury. I allude to a covering or casing, composed of tendinous fibres called fascia, which may be proper to a single muscle, or common to two or more. The fascia, which is applied to the bellies of muscles, keeps them in their proper place, represses inordinate distension in width when the muscle is powerfully acting, and increases the surface to which the muscle

is attached. Some idea of the use of fascia may be formed from the inconvenience which is felt when it is injured, as is sometimes the case from violent exertion. This sometimes takes place in the calf of the leg, from violent jumping or running; in which cases the inconvenience is in some degree remedied by a bandage, or laced stocking, which in some respects answers the purpose of fascia.

When, before the use of fire-arms, slings were used as weapons of war, slingers were accustomed to bandage their arms, for the purpose of assisting their muscles, and protecting them against injury from prolonged and violent action. These bandages acted on the same principle as the natural fascia. It is even said that some slingers went so far as to brand their arms, not only for the purpose of restoring them when injured by over-action, but, in some instances, as a measure of precaution. The contracted scars, or cicatrices, produced by this operation, supported or braced the muscle, after the manner of fascia. The cruel practice of firing horses, to counteract the effects of strains from undue exertion, is performed on the same principle; except that it is generally designed to brace the sheaths of tendons, rather than the fascia of muscles.

The muscles present several curious and important differences in the mode in which, as moving powers, their force is applied. A beautiful adaptation of means to ends is seen in the provisions which are made, in some instances, to secure extent and rapidity of motion at a sacrifice of power; whilst in others, power is economised at the expense of velocity and extent of motion. Thus, the strong muscles situated at the temples and at the back part of the cheek, and

which raise the lower jaw, as in the act of biting, act on the lever of the third kind; the force being applied between the joint, which is the fulcrum, and the teeth, the bodies to be moved, the loss of power at the front teeth must be very considerable. The muscles by which the fore-arm is bent upon the upper, and also those by which it is extended, are striking instances of power acting upon this kind of lever, as well as of the rapidity which is the result. The movements of the hand are too quick for the eye to follow them, and almost equal the rapidity of thought itself. The muscles which pull down the lower jaw, and open the mouth by being inserted at the chin, sustain no loss of power by the part of the lever on which they act: a little, however, is lost by the direction in which they pull. The muscles of the abdomen, when they assist in expiration, act with great advantage, as to force, on the ribs; being levers of the second kind, with the fulcrum at one end, and the power towards the other. Some muscles move the parts to which they are attached in directions differing from those in which they themselves act, in consequence of their tendons passing over a kind of pulley: this is particularly the case with one of the muscles of the eye, and in one of the pairs by which the lower jaw is depressed.

Such of you as may be desirous of seeking further information respecting the action of muscles as moving forces, can scarcely do better than refer to the number of the Library of Useful Knowledge, entitled Animal Mechanics, in which the subject has been ably illustrated by Sir Charles Bell. (1)

Although, after death, the muscular structure does not appear to be possessed of much strength, but is

soft, easily torn, and may even be reduced to a pulp, it is during life possessed of very great strength.

In this respect, muscles doubtless differ very much in different individuals; yet it is a very uncommon thing to find the muscles of a living animal torn, except where some other violence besides mere extension has been applied. When laceration, from distension, does take place, it is probable that in most instances the muscle has been previously diseased. I once saw a slight rupture produced in one muscle of a feeble old woman. It was in a case of a dislocation of the shoulder-joint, which had been allowed to remain out of place. Strong and steady pulling was employed for a considerable length of time, but without effect: a greater degree of force was then exerted: the united strength of several persons, aided by powerful pulleys, produced no effect: every thing like a jerk was, of course, avoided; but the force was kept applied with the hope that the fatigued muscle would yield to it, and allow the desired reduction to take place. In the mean time, a few muscular fibres gave way, when the attempt was immediately abandoned.

The muscles of a healthy and vigorous individual have been known to resist the united force of several horses. In the reign of Louis XIV., a man in France was condemned, I believe without his having committed any crime, and through religious intolerance, to be torn in pieces by horses. One was attached to each extremity; but no effort which the horses could be urged to make, was sufficient to effect the purpose designed; and the executioner was at last obliged to cut through the muscles, before the wretched victim could be torn limb from limb. The great strength of

living muscles is not only shewn by their passive resistance, but also by the force which they are capable of actively exerting. A man has been known to carry eight hundred weight, and a horse as much as one ton, for upwards of a mile; a weight which proved sufficient to crush him to death, when he at length fell under it. The master was thus justly deprived of a useful animal, which he had wickedly and wantonly oppressed.

Topham, who formerly lived in Islington, was an extraordinary example of great muscular strength. The following account of this individual is given in "Nelson's History of Islington."

"Duke's Head, Codd's Row, near the Green, kept by Thomas Topham, the strong man.

"His father was a carpenter, and brought him up to the trade, which he quitted soon after his apprenticeship.

"The first public exhibition of his extraordinary strength was pulling against a horse, lying on his back, and placing his feet against the dwarf wall which divided Upper from Lower Moorfields. He afterwards pulled against two horses; but his legs being placed horizontally, instead of rising parallel to the traces of the horses, he was jerked from his position, and had one of his knees much bruised and hurt; whereas Dr. Desagulières thought, that had he been in a proper position, he might have kept his station against the pulling of four horses.

"By the strength of his fingers he rolled up a very strong and large pewter dish, as another person would roll a sheet of paper.

"He struck an iron poker, about a yard long, and three inches round, against his bare arm, till he bent it to nearly a right angle: he then pulled it almost

straight again. He lifted a rolling-stone of eight hundred pounds weight, with his hands only. He lifted three hogsheads of water, weight one thousand eight hundred and thirty-one pounds, in Cold-Bath-Fields, on the 28th of May 1741, in commemoration of the taking of Porto Bello by Admiral Vernon; and this he performed in the presence of the Admiral and thousands of spectators.

"On his way home one night, finding a watchman fast asleep in his box, he took both on his shoulders: and carrying the load with the greatest ease, at length he carefully dropped the guardian of the night and his wooden tenement over the wall of Bunhill-Fields' burying-ground; when the poor fellow, between sleeping and waking, and doubtful whether he was in the land of the living, on recovering from his fright, seemed to be only waiting for the opening of the graves around him.

"At another time, sitting at the window of a low public-house, while a butcher was passing by with nearly half an ox upon his back, Topham relieved him of it with so much ease and dexterity, that the fellow, almost petrified with astonishment, swore that nothing but the devil could have flown away with his load.

"He cracked a cocoa-nut with as much facility as one would crack an eggshell.

"Two quarrelsome guests in the tap-room insisted upon fighting the landlord; and as he could not appease them any other way, Topham, at length, seizing them both by the nape of the neck, with the same facility as if they had been children, knocked both their heads together; till, perfectly sensible of their error, they became as abject in asking pardon, as they had before been insolent in giving offence.

"The strength of twelve men was united in him. He was extremely muscular.

"He took one of the kitchen spits, and bent it, like a handkerchief, round the neck of another who had offended him.

"Having left Islington, and taken another public-house in Hog-lane, Shoreditch, in a fit of phrensy at the infidelity of his wife, after beating her most unmercifully, and stabbing her in the breast, he inflicted several wounds upon himself with the same weapon; and, after lingering several days, died, in the flower of his age, on the 10th of August 1749. His wife afterwards recovered."

Although the strength of muscles, to a great degree, depends on individual peculiarity, it is, nevertheless, within certain limits, very much under the influence of modifying circumstances. Provided a human being, or other animal, is in good health, the muscles increase in strength, when called into frequent exercise: and those muscles which are principally exercised, provided their efforts are not pushed to an injurious extent, acquire a considerable increase in size and firmness. This is seen in the arms of smiths and boatmen, and in the legs of those who have much exercise in running and jumping.

The first effect of the exercise of particular muscles, after they have long remained in a state of inactivity, is the production of a considerable degree of pain, especially under pressure, and when the muscle is called upon to renew its exertions. This is well known to those who have taken a long walk, or a long ride on horseback, without having been previously accustomed to such exertions. If the exercise is repeated when the painful effect has somewhat subsided,

the inconvenience is not renewed, but, on the contrary, the power of endurance is increased; and if this be taken advantage of for the continuance and increase of exertion, the increase in the size, firmness, and power of the muscle, to which I have alluded, progressively takes place. If, however, the exertion of muscles be pushed beyond the proper limits, the muscles themselves, and more especially their appendages, the tendons, and their sheaths, become permanently injured. The inflammation which has been excited, causing a thickening and rigidity of parts, is apt to produce a permanent loss of the extent and freedom of motion which the limb originally possessed. You will easily conceive, from what I have already stated, that the perfect condition of all the muscles throughout the body can only be maintained by the frequent exercise of them all, and by varying, as far as possible, the extent and direction of their movements. Many of the habits of society are far from being favourable to this general and uniform development of the muscles; and the occupations of persons engaged in certain businesses have the effect, not only of producing the extraordinary increase of some muscles, but as equally remarkable a diminution of the size and power of other muscles:—this is often exhibited in the walking of boatmen, coachmen, and horsemen. On the other hand, agility, precision, and increased power, are acquired by constant general exercise. I might here mention the natives of some uncivilized countries, whose food and clothing are chiefly supplied by hunting. The North-American Indians are remarkable in this respect, and acquire from their habits an extraordinary degree of agility. A friend of mine, travelling on horseback in British North America,

was overtaken by an Indian, who kept pace with the horse for a long distance. My friend at length pulled up, fearing the man might injure himself by the exertion; but the Indian increased his speed, and was soon out of sight.

Another gentleman mentioned to me, that during his travels in Southern Africa his party fell in with a troop of Caffres; who, I should observe, are a fine race of people, possessing mental and moral faculties of a high order. One of these Caffres appeared particularly swift of foot, and kept pace with the mounted party through the day; and towards the close of it, in a trial of speed between him and a horse disencumbered of his burthen, the Caffre was the victor. Some of this race, indeed, are reported to be so swift as to be able to run down the antelope, one of the fleetest of known quadrupeds. It is not probable that they are swifter than the antelope in a short distance; but that they possess the power of continuing their speed for a great length of time, by which they fatigue and exhaust the animal so far as to be able to overtake and stab him running. The Caffres as a race, as might be expected, have the muscles of the lower extremities peculiarly developed, so as to appear disproportioned to the arms, which are small; yet they can use them with great force and precision.

It is related, that during the Caffre war, a party of Whites came in sight of a single Caffre. One of the party prepared to fire at him: the man remained firm, and waited until his enemy fired and missed his aim: he then threw a spear with such force and precision as to wound him in one arm. The white man's companion then prepared to fire, and again the Caffre stood waiting the event: the shot again missed him;

and he then threw another spear, which wounded the first assailant in his other arm. (2) The Hottentots, who differ materially from the Caffre race, being of small stature and comparatively weak, are, however, very swift. One of them, at the request of a friend of mine, ran at least two miles in ten minutes, though a considerable part of the distance was up hill.

The South-Sea islanders present remarkable examples of strength and agility, particularly in swimming and diving. These men will swim in the roughest surf, and remain for an astonishing length of time in the water. Some few years ago, when many schemes were projected by Public Companies, an Association was formed to fish for pearls, in the Pacific Ocean. An expedition was fitted out, provided with diving-bells; but as they were found to be unmanageable at a greater depth than thirty feet, and the pearl-oyster-bed was at a depth of sixty feet, they were useless; and recourse was had to the South-Sea-islands' divers, who descended to the depth of sixty feet, and brought up the pearl-oysters. They continued this throughout the day, without any considerable manifestation of distress or fatigue. In this country, men are capable of astonishing performances, when they are trained for feats of strength or speed, or for the purpose of engaging in brutal and ferocious conflicts. They are thus prepared by regular exercise and diet.

I have stated, that an accession of power is gained by the exercise of the muscles; and have shewn you that their power may be lost or injured, if the exercise be too great in degree, or too long continued. If the tendons are strained beyond what they will bear, the injury becomes permanent; and the joints become either stiff, or so far relaxed, as to possess but little

power. This is very observable in horses who have been over-worked, and become incurably lame. You may have noticed the same thing in women who are occupied in washing clothes. They frequently strain their wrists, so as to cause a weakness from which they never recover; and often resort to a bandage on the wrist, to strengthen and support it. It is true, that the injury may sometimes be in degree repaired by repose and care; but it frequently happens, that a straining of the tendons inflicts an injury more permanent than a fracture of the bone. Exercise of the muscles has a powerful effect on the blood, as I shall now endeavour to explain.

To make this explanation intelligible, I must say a few words respecting the circulation of the blood, and the heart and blood-vessels, by which it is performed. With the general appearance of the heart you are doubtless familiar. Internally, it is more intricate than most of you are probably aware. It consists of four distinct chambers or cavities: the two principal cavities are called ventricles. They are placed side by side, and form that part of the heart on which its well-known figure depends. The two smaller cavities are called auricles, and are situated at the base or broad part of the heart, where they seem like appendages to the ventricles. These four cavities communicate with each other, by means of openings, furnished with valves, which prevent passage from one to another, except in a certain order and direction. There are also valves to those blood-vessels by which the blood leaves the heart: they are placed at the very commencement of these vessels, so as to prevent the heart from receiving any blood flowing back from them. There are no other valves to

the arteries, or the vessels that carry away the blood from the heart: but the veins which bring the blood back again, have many valves, so placed as to prevent the blood from going back again towards the arteries. Whilst this beautiful apparatus is in order, a perpetual change is effected in the blood throughout the body, in a direction and order which cannot be interfered with; but we shall presently see that the rate of its progress may be disturbed in particular parts. The blood enters the heart from the veins at the right auricle: from this chamber it passes, through a valve, into the right ventricle: by this ventricle it is sent, with more or less force, to the lungs. Of the changes which it undergoes in the lungs, I have already said enough. The veins of the lungs convey the blood back to the heart, which it now enters at the left auricle: the left auricle sends it to the left ventricle, through a valve very similar to that which it passed in going from the right auricle to the right ventricle. It is sent out of the left ventricle through a large artery called the aorta, as it was from the right ventricle through the pulmonary artery; but instead of going to the lungs, it is now sent all over the body by means of arteries, to most of which there are corresponding veins to return it to the right auricle, which it enters by two principal veins.

The blood, in circulating through the body, passes very near to the muscles; and the veins, the vessels which are employed in returning the blood to the heart, are pressed upon; and the valves in these vessels prevent the blood from passing in any other direction than forwards: hence they communicate the effects of the pressure to the larger vessels: this is particularly seen in the act of running. The blood is

poured into the heart with great rapidity; and has to relieve itself of the burthen, by sending it in greater force to the lungs, which are necessarily overloaded; and the person experiences a difficulty in breathing. If, however, he continues the exercise, as there is no actual increase in the quantity of blood, but only of force and rapidity in its circulation, in a little time the blood is again more equally diffused, and the force is distributed generally: thus the balance being restored, the difficulty in breathing goes off. This is what is called getting second wind. In cases where the lungs are diseased, the sensation of being out of breath will not be likely to go off whilst the exercise is continued. If the heart be weak or diseased, extraordinary exertion is productive of permanent ill effects; as the increased exertion is not met by any increase of power, and the heart consequently yields to the pressure and becomes dilated. In other cases, the valves of the heart are injured. The celebrated race-horse, Eclipse, is said to have had an enormously enlarged heart: I think it is said to have been two or three times the natural size. I do not remember to have heard it mentioned before; but I have known, after running for a considerable time, the suddenly coming to a state of rest produce considerable uneasiness and palpitation, much greater than if the exercise were continued. This, I believe, is owing to the balance of circulation being again disturbed. I believe it to be very important to guard against this, by coming more gradually to rest.

Some kinds of exercise are better than others. Horse exercise has been much recommended; and perhaps it is best suited to persons of weak and delicate frames, who are unable to bear much muscular

exertion. Walking or running are both natural kinds of exercise: but running has been said to shorten life, when pushed to excess. (3) Too great a degree of rest occasions the muscles to waste; as we see in some animals which are well, and strictly confined. They may appear fat, but their muscles are small and flabby; the same thing may be observed in persons who exercise one arm or one leg more than the other, in their daily occupations: these are usually found to have the limb that has remained in a quiescent state, small and wasted; whilst the other has increased in bulk and strength.

I shall now follow up these general remarks, by noticing the influence of particular occupations: but in doing so, I shall not confine myself to the effects produced on the muscles, or moving apparatus, but rather take this opportunity for offering whatever observations may suggest themselves respecting the injurious tendency of particular modes of employment, let the organ or function which is disturbed be what it may.

I have already noticed the peculiarities observable in the size and vigour of the limbs of boatmen, coachmen, and smiths, induced by the unequal allotment of exertion and rest which their different muscles receive. Some occupations are injurious to health, by reason of the position which they require. Shoemakers, weavers, and turners, are examples of this. I have frequently noticed the fact in shoemakers. From the position in which they sit at their work, the chest is distorted, and the stomach pressed upon. Pain in the lower part of the chest, indigestion, symptomatic headache, and sickly countenance, are the consequences, and the action of the bowels is apt to be irregular and

sluggish. A careful combination of exercise with work, and attention to diet, would tend much to counteract the evil;—but I must take this opportunity of recommending a reform in the position in which shoemakers work. I have proved, in practice, that this may be managed, for at least a part of their work, by their imitating the method of sewing adopted by saddlers. In general, I must confess that I have found the shoemakers too much disposed to continue their pernicious position.

My attendance on the patients of the London Dispensary convinced me that weavers are liable to pain of chest, accompanied with indigestion, forming a complaint very similar to that of shoemakers. The cause, I suspect, is nearly the same; namely, an habitual bad position of body, too much bent forwards, and attended with constant pressure against the chest. (4)

Other occupations are pernicious, from their being attended with exposure to noxious vapours or other poisonous agents; as in mining, and in smelting of ores, in which process the vapour of arsenic is often disengaged. Painters suffer from the poison of lead; which is the cause of our frequently finding them with paralyzed wrists, called "the painters' drop." Another disease, to which they are very liable from the same poison, is "the painters' colic," a disease attended with much pain and danger. Gilders, and those who are employed in silvering looking-glasses, suffer from the poison of quicksilver, which is used in the operation.

Those who are engaged in manufacturing the various articles into which tobacco is converted often have their health impaired by the poisonous properties of the plant. I have heard that something similar

is observable amongst those who are much employed in tea-warehouses, and especially with the dust of green teas.

Some trades expose those who are engaged in them to injury, not so much from the poisonous properties of the materials with which they are employed, as from the form in which they act on the system; as, for example, when the substances are reduced to a very fine powder, which may affect the health by entering the air-passages with the air which we breathe, or by applying itself to the surface of the body and destroying the functions of the skin. Of this description are various kinds of grinding: thus, needle and knife grinders are liable to inhale the fine dust arising from their grindstones, in which are intermixed some extremely small particles of metal. The effect of this exposure is, to give rise to disease of the lungs. It is a slow and lingering complaint, by which the patient is in most cases carried off: it is called the grinders' rot. Although the particles of iron appear to be those on which the mischief mainly depends, this must be ascribed to their form, rather than to any pernicious chemical property; since iron, not without reason, is regarded a wholesome metal. In consequence of the fatal effect of this disease, attempts have been made to prevent the inhalation of the particles of iron; and a plan proposed by my late friend, Hall Overend, of Sheffield, appears completely to answer this purpose. It consists in placing magnets in such situations that they may attract the particles of iron, and not allow them to enter the mouth or nose. Notwithstanding the dreadful fatality of the grinders' rot, and the happy result of the ingenious contrivance which has been devised to counteract it, it is to be

feared that many grinders continue the old and unprotected practice of the trade. Glass-cutters, and those masons who are engaged in working some kinds of stone which produce much dust, are liable to serious and fatal disease of the lungs, from a similar cause. Some of the processes through which cotton and hemp must pass in the course of manufacture, expose those who are engaged in them to an atmosphere charged with fine floating particles, to a degree which often renders it insupportable to the unaccustomed, even for a few minutes. Some of these evils have been fully proved on evidence before the Committee of the House of Commons, on M. T. Sadler's Factory Bill. The injurious effects of dust on the lungs might, in many instances, be very much obviated by the work-people wearing thin gauze veils whilst they are exposed to it; a plan which has been successfully adopted in some factories. Those whose occupations oblige them to remain in an atmosphere charged with extremely active and even poisonous particles, as is often the case in chemists' laboratories, find an effectual protection in breathing through a mass of light cotton wool, tied before the face, so as to secure the mouth and nose.

Bakers and millers afford examples of fine powders acting on the skin. Bakers' itch, and other eruptions, are the consequences to which may be frequently added an impaired state of the general health. Bakers, however, are exposed to other causes; which, as they probably have more influence than the flour in disturbing the health, will induce me to return to the consideration of this class of tradesmen.

There is no occupation in which the person is so constantly and generally exposed to the influence of a

fine and subtle dust or powder as in the case of sweeps; but the miseries which attend the abominable practice of employing climbing-boys are so numerous, so various, and so grievous, that it would be difficult to refer to each the amount of its share of destructive influence. Not only does the general application of the soot to the surface of the body interrupt the natural functions of the skin, but it tends to produce a very serious ulcerating disease in parts of the body which are exposed to friction. As this disease is evidently the effect of soot, it is called chimney-sweepers' cancer. Other ill effects of the soot, to which sweeps are exposed, are not so apparent; but it is probable that the soot has some share in producing the stunted growth, the distorted limbs, and general weakness, so commonly observed amongst this unfortunate class.—I cannot allude to this subject without saying something more respecting it, since the practice of employing climbing-boys to sweep our narrow flues, charged with coal-soot, is a crying evil, which, as long as it exists among us, is a foul stain to our age and country. The humanity of our countrymen has, with success as well as reason, been appealed to in behalf of the oppressed African, torn from his friends and dragged into slavery, subjected to the horrors of the middle-passage, exposed to the indignities of the slave-market, and doomed, through a period of hopeless slavery, to toil and hardships, greater and more destructive to life than those to which our worst criminals are condemned, when transported for life: but I think that we are inconsistent with ourselves, and wanting in our duty, so long as we withhold our deepest sympathy, and our strenuous assistance, from the suffering and helpless class of climbing sweeps, on

whom are too often inflicted the combined miseries of the slave-ship and the terrors of the slave-driver. The sufferings which they undergo in this metropolis, peopled as it is with those whose benevolence, extending beyond the limits of our own country, reaches to the most distant spots of the globe, would seem fabulous, were they not incontestably proved, and daily taking place, almost under our own eyes. (5) The wretched children who, in their tender years, are sacrificed to this horrible employment require the same fostering care as other children of the same age; but, victims of profligate parents, or kidnapped by inhuman wretches, they are doomed to pass through a short life of filth, and of misery in every shape, including cold, hunger, nakedness, disease, and depravity of mind. Besides the chimney-sweepers' cancer, which is not apt to shew itself in very young persons, sweeps are at times subject to a very exaggerated form of rickets, to softening of the bones, and to a great tendency to fractures. Whilst it is the object of the laws to protect the innocent from the encroachments of the guilty, and to impose restraints on the perpetrators of violence and injustice, it surely ought not to be regarded as an unwarrantable extension of the power which makes and executes the laws, to suppress this signal enormity, and espouse the cause of the unfortunate infants who have neither power nor influence to effect any thing in their own defence.

Some trades and occupations are injurious to health, in consequence of the extremes of heat or cold, or of the rapid changes of temperature to which those who follow them are exposed. Glass-blowers, and those who are engaged in many of the processes connected with the working of metals, are subjected to a degree

of heat which, without great care and prudence, cannot fail to be injurious to health, and even destructive of life. The points to which they should be particularly attentive, are, First, duly to regulate their daily work; in order, if possible, to avoid being confined to it for many hours in succession at one period; whilst at another they may scarcely keep up the habit of enduring it, or even expose themselves to an opposite extreme. Secondly, to pay attention to the functions of the skin, that perspiration may not at one time be excessive, and be stopped at another; and that it may not be allowed to accumulate on the skin, intermixed with filth and dirt. To obviate this, the habitual practice of bathing, washing, or sponging the whole body, as the peculiar circumstances of the health and employment of the individual will point out, is of great importance. Thirdly, they should pay particular attentention to the rules respecting eating and drinking, which I have laid down in my former Lecture; and, as great heat has a necessary tendency to produce thirst, they should be more particularly on their guard to avoid excess in drinking. The quantity taken, even of water and other diluents, should be as small as possible. It must, of course, be somewhat greater than the quantity taken by persons who are not exposed to inordinate heat; but if they drink much more freely, they promote excessive perspiration, which will not only increase the tendency to thirst, but prove very debilitating, as well as favour their proneness to injury from its suppression. It has been proved that the purest spring-water is the best beverage which these persons can employ. Fermented liquors, and more especially ardent spirits, are decidedly injurious. Their inferiority to pure water has been shewn by

actual experiment. The disadvantage of gratifying thirst whilst exposed to a high temperature is felt by persons in hot climates, and more especially by those who traverse the hot and parched deserts of Africa; who learn, like their camels, to resist the calls of thirst, except at the stated intervals devoted to meals and rest. The case of our countrymen confined in the Black Hole at Calcutta, which I related in my First Lecture, forcibly illustrates the impropriety of gratifying thirst, when persons are crowded in heated apartments.

Bakers are another class of persons whose occupation exposes them to an injurious and long-continued high temperature; and although the degree of heat, to which they are subjected, is not so excessive as in the case of the trades and manufactures of which I have before spoken, its effects are combined with several other injurious influences. They have to perform their labour at unseasonable hours, by which their rest is shortened and disturbed; they are constantly exposed to fine dust over their bodies, the effect of which I have already noticed; they often work in confined and ill-ventilated apartments; and breathe an atmosphere charged with the vapour arising from new bread, which not only contains a considerable quantity of spirit, which it is now in contemplation to save, but also a disagreeable empyreumatic oil, and a small quantity of sulphuric æther, the production of which can only be accounted for by attributing it to the alum introduced into the bread. Instead of counteracting, by prudent and careful management, these evils, some of which are inseparable from their trade, they too often immensely aggravate them by an intemperate and dissolute course of

life, which is unhappily so prevalent as to affix a general reproach on this useful and very necessary class of men. There are few trades, the unhealthy tendency of which is more apparent, in the complexion and countenances of those engaged in it, than in the case of bakers; whose pale faces form a striking contrast with those of butchers, whose employment, although laborious, is of a much more healthy character.

Exposure to a high degree of heat in confined apartments constitutes one of the evils to which those are exposed who attend the spinning-mills in cotton-manufactories, and more especially in those in which fine thread is made, since such a temperature appears to be indispensable to the proper working of the material. Though this can scarcely be urged as a proof of inhumanity on the part of the manufacturer, who is obliged to accommodate his articles to the prevailing taste of the market, yet it is a strong argument in favour of those salutary restrictions which tend to reduce the evil to its lowest degree, and to divest it of needless superadded aggravations;—restrictions which entitle M. T. Sadler and Lord Ashley, whose zealous exertions have led to their adoption, to the lasting praise of the community. The wearers and consumers of those articles, which, from the fineness of their quality, place the children and others engaged in manufacturing them under the necessity of enduring a pernicious degree of heat, would do well to reflect how far they are justified in supporting and encouraging the evil.

There is another class of individuals, whose health is very often exposed to serious injury from the occupation in which they are engaged: I allude to the girls employed by milliners and dress-makers. I am

aware that the temperature in which they live forms but a part, and perhaps only a small part, of the evils to which they are subjected; yet I cannot mention them more suitably than in connexion with the factory-children, in order that they may share in that kind sympathy which has been so generally and warmly excited in behalf of that class. The evils to which the dress-makers are exposed are very numerous, and generally operate at a time of life in which attention to health is particularly necessary and important. They are often confined to their working apartments, in which several individuals are crowded together in the unhealthful and painful position which needlework requires, during a larger portion of the twenty-four hours than any other class of work-people are required to devote, with short intervals for meals, and none for relaxation. They frequently commence their work at six in the morning, and sometimes much earlier; and are obliged to continue it till a late hour of the night, sometimes beyond midnight. I need not tell you that they become debilitated, relaxed, and sickly. This general effect you may have observed for yourselves. They are peculiarly liable to obstinate and painful indigestion; to distressing hysteric affections; to liver complaints; to pain, especially of the side, generally extremely obstinate, and often very severe. They are subject also to glandular swellings; and to a painful affection of the legs, which frequently terminates in distressing sores. Some of the most trying and untractable cases of debility in females which I have ever witnessed, have occurred in persons of this class. They furnish, I believe, a larger proportion than almost any other class of young women in this country, to the awful number annually cut off by

pulmonary consumption. In addition to these serious evils affecting the bodily health, there are others no less important, which influence their habits in life and their moral character. They are utterly cut off from the means of acquiring domestic habits, and deprived of the opportunity of becoming acquainted with domestic pursuits. They acquire a pernicious taste for finery, which the miserable pittance which they earn is insufficient to gratify. They make an appearance in the world which, whilst it removes them from commiseration, increases the number and magnitude of their temptations, and prepares them to join those whose ways lead to the gates of death.

If we inquire why these things are so; and ask why the mistress who may have received an ill-spared premium with her apprentice is not summoned before the lord-mayor, or some other magistrate, to answer for the abuse of the confidence reposed in her; we shall find that it is stated in her defence, that ladies of rank and fashion have pressed them to get their work done by a fixed early day, in default of which the order would be returned on their hands: and a little further inquiry may lead us to the discovery, that this certain early day has been mentioned, to enable the ladies to attend some great ball or assembly, rendered specious by the pretext that its profits are to be devoted to some charitable object; whilst it must be notorious, that not a twentieth part of the outlay can reasonably be expected to reach the end proposed. Is not this a striking illustration of the assertion, that "the tender mercies of the wicked are cruel"? (6)

Hitherto I have only spoken of high temperature artificially produced. I must not dismiss the subject of heat, without noticing the influence of warm

climates, which are often visited by sailors, artisans, and merchants' agents.

Although most persons who have visited these climates describe the heat as not being distressing to the feelings, in proportion to the degree to which the thermometer is raised, and that the heat occasionally experienced in this country is almost equally oppressive; this remarkable fact is mainly to be attributed to the circumstance, that in warm latitudes the heat is generally progressive and constant, on which account the feelings become accustomed and gradually inured to it; whilst with us the temperature from day to day is very variable; and the few days in which the heat is felt to be intensely great occur almost solitarily, and consequently our feelings are unprepared to support them. Notwithstanding this accommodation of the feelings to tropical countries, their influence on the constitution is almost always injurious. In many cases, it is speedily destructive of life upon the spot; in others, it lays the foundation of dangerous diseases of internal parts, under which the patients may labour for a longer or shorter period, before they become either directly or indirectly the cause of death. Some persons are either so constituted as to find the heat congenial to them; or have sufficient strength of system to resist its baneful influence, and attain to a late old age, notwithstanding long-continued exposure to the influence of tropical climates.

The injury which the health is apt to suffer in these climates is not solely attributable to heat. This cause is often complicated with others, chiefly attributable to local circumstances co-operating with heat: thus, in some situations in which the heat is very great, the air is charged with moisture, raised by evaporation,

from an extensive surface of shallow water. In such situations, the thermometer may stand some degrees lower than in other situations, far less distressing to the feelings. When the air is moist, it is a much better conductor of heat; on which account the heat is more easily recognised by the feelings. It is also in a condition less favourable to carry off the insensible perspiration, which is a great means of enabling our bodies to resist a high temperature: these two causes render the heat on the coast of Africa, and some other parts, circumstanced as I have described, extremely oppressive. Causes still more fatal are, in some tropical climates, not unfrequently conjoined with those which I have just mentioned; and are, perhaps, the principal agents in producing the great mortality which at times occurs in them. I allude to the seeds of pestilential diseases, which probably consist of miasmata, or poisonous vapours, which appear to be produced by the decay of animal and vegetable matter. All these causes of disease and death, furnished by tropical heat and its attendant circumstances, are rendered far more destructive by the imprudent or culpable habits in which those who visit them are too apt to indulge. As the most criminal, and at the same time the most pernicious of these habits, must be mentioned the use of ardent spirits, which are often drunk in these situations to an enormous extent. The very superior degree of health generally enjoyed by those crews who have abstained from these excesses, and adopted the system of total abstinence from spirits, affords a strong evidence in proof of the degree to which the vice of intemperance increases the fatal influence of hot climates. Europeans, and more especially the British, who visit these climates, are apt to

fall into another error of diet, which contributes to the injury of their health: I mean, the employment of too large a proportion of heating animal food, which must often be in a state by no means the most wholesome.

Another error which Englishmen are apt to commit in warm climates, is the imprudent exposure of their persons at unseasonable hours of the day. Instead of adopting the course pursued by the natives, who may be supposed to be directed by experience, they too often omit to take shelter and repose during the hours of intense heat, in the middle of the day. Even in the South of Europe, where the heat scarcely admits of comparison with that within the tropics, the natives, during the middle of the day in summer, almost with one accord retire to bed. This mid-day desertion of the streets cannot fail to be very striking to our countrymen, who are unaccustomed to such a sight. Without being apprised of the cause, one would imagine that pestilence, or some other great and general calamity, had caused the town to be deserted. It is at this time, as the natives observe, that dogs and the English are the only living creatures to be found in the streets. In our own country, the most serious consequences, sometimes, though very rarely, follow continued exertion under the noon-day sun. Such accidents most frequently happen to those engaged in the harvests of hay and corn, who, from such undue exposure, sometimes experience an effect similar to that which is not unfrequent in hot climates, and is known by the name of the 'stroke of the sun'; which, when not quickly fatal, is mostly followed by alarming fever, or some most serious affection of the brain. The hint which these remarks are designed to convey might therefore with advantage be received and acted

upon by some classes in this country, as well as by those who visit warm climates. Renewed vigour, as well as protection from sickness, would well repay the labourer for retiring to some shady but dry spot during the hours of excessive heat, which is only felt during a small part of a few of our summer and autumnal days.

Another error not unfrequent on the part of our countrymen, when they visit some of the most unhealthful tropical climates, is the opposite to that which I have just mentioned; yet it is often rendered additionally injurious by being combined with it:—I mean, exposure to the open air at nightfall, when dew renders the atmosphere peculiarly loaded with moisture, and when those unhealthful vapours, which seem to be the seeds of fever, are peculiarly intense and powerful. Our sailors are sometimes exposed to both these evils, in procuring water, and other stores, on the low shores of some tropical countries. The morning would, in all probability, be the most favourable time for the execution of such work; but when this time could not be devoted to it, I believe that even the middle of the night would be far better than the evening, especially if the body were protected with additional clothing, as well as not rendered unduly susceptible by the noon-day exposure, of which I have been just speaking. This last suggestion may also find some scope for application in this country, more particularly in the aguish districts of Kent, Essex, and Cambridgeshire.

Dismissing the subject of heat, I must now make a few remarks respecting the opposite state, or cold, as connected with some of the arts or callings of life. Although an extreme degree of cold is sufficient to

produce speedy death—of which the fact, that man and the inferior animals have sometimes been frozen to death, is a sufficient proof—it is very certain, that within the range of temperature to which most of us have access, the destructive influence of cold is very much less than that of heat. This assertion may afford you some surprise, since in common conversation we hear a very large proportion of cases of indisposition attributed to cold. On careful inquiry, however, it will be often ascertained, that in these instances there has been no exposure to an intense degree of cold; but that the true cause of the injury received, is to be attributed to a partial application of a moderately-reduced temperature; as when a draught of air comes through a hole or narrow crevice, upon an unprotected part of the body; the pernicious effect of which has long been well known, as we may conclude from its being the subject of a warning adage, to the following effect: "When the wind comes upon you through a hole, It is time to make your will, and take care of your soul." Such partial exposure, to a temperature which, in comparison with the warmth of the rest of the body, may be considered as cold, appears to be injurious, by giving rise to local inflammations. Sudden transition from one degree of temperature to another is likewise a cause of exposure to a very moderate degree of cold being regarded as productive of mischief to the health. But even in these cases it is not the perception of cold only which is to be taken into the account: the relaxing warmth to which the person has, in all probability, been accustomed, and by which the susceptibility to cold is increased and the power of resisting is diminished, must be taken into the account. The sudden return from cold to

warmth has also a very considerable share in producing those ill consequences which we are in the habit of setting down to the charge of cold alone. This observation is most strikingly illustrated in the case of parts which have been frost-bitten, in which state cold has nearly or quite put a stop to the processes of life going on in them. For a considerable time these processes are suspended, rather than abolished; and they may often be restored by a careful mode of treatment, in which the early application of warmth is forbidden, and which mainly consists of gentle friction with some material capable of keeping down returning warmth,—for which purpose, snow is not only the most easily obtained, but the best. An unguarded application of warmth would either lead to a distressing sore or chilblain, or occasion the death or gangrene of the part. Great practical advantage, with respect to the preservation of health, may be derived from a knowledge of the principles on which low or reduced temperature affects the living body. These principles are fully developed and illustrated in the very interesting work of Dr. Edwards, "On the Influence of Physical Agents on Life"; to which I have already had occasion to refer. Without attempting to notice all the conclusions to which he has arrived, I must mention one or two which bear particularly on the influence which the system receives from being kept for a considerable time at particular temperatures, and from the transition from such a temperature to one of an opposite character.

It has been clearly shewn by Dr. Edwards, that by a long continuance in a warm temperature, the power of producing animal heat, or, in other words, of resisting cold, is very much diminished. Thus animals produce less heat towards the close of summer

than they do after having lived through a winter's cold. We must all have been sensible, that the same temperature, as shewn by the thermometer, produces the effect of cold in autumn; but is oppressively warm in spring, when it is combined with the greater energy in the production of heat which we have acquired during exposure to the winter's cold. The degree of cold to which animal bodies are exposed, as well as the duration of the exposure, greatly influences the effect produced. The constitution of the individual exposed, is also a very important element in the result. When a person is plunged for a short time into a bath, which produces to his feelings the sensation of cold, he will generally experience, soon after coming out of it, a grateful glow of warmth; the stimulus to the production of heat continuing to operate after the application of cold has ceased. It is on this principle that the cold bath, suitably repeated, is of so much avail in invigorating the system. If the degree of cold be too great, and too long continued, the power of producing warmth, instead of being excited, is suppressed; and, instead of the glow which follows the proper use of the cold bath, there is a continued disagreeable sensation of cold, notwithstanding the individual may return to the same temperature, and put on the same dress to which he had been accustomed before his exposure to the cold. A striking instance of this kind occurred, in Paris, to a young man who fell into the river Seine, when it was frozen over. A considerable length of time elapsed before he could be rescued from the ice-cold water. This protracted and excessive cold so exhausted or oppressed his power of producing animal heat, that he could not get rid of the painful sensation for several days. The same

effect may sometimes be seen, but to a less extent, in the use of the cold bath. If the degree of cold be too great, and more especially if it be too long continued, the pleasant glow and increased vigour are not felt, but, on the contrary, a disagreeable chilliness, or almost a death-like coldness, accompanied with distressing languor and weakness. Hence the cold bath, when ordered as a remedy for weak and delicate patients, has often only aggravated their ills. The difference in the constitution of individuals, which may be either natural or acquired, is strikingly seen in these cases; since the bath which is salutary to one person is injurious to another. Let the temperature be somewhat raised, and the duration of exposure be shortened; and instead of an exception to the general principle, we shall find a confirmation of it. The weakly individual who comes shivering from the cold bath derives the same grateful glow and increase of vigour from properly-managed sponging, which his stronger friend does from the cold bath. These principles are not only of great importance in laying down rules for patients, but they are susceptible of extensive application to persons in health, whose different occupations and modes of life require them to be differently careful in the manner in which they may expose themselves to the vicissitudes of weather and season, and to other causes affecting temperature.

Another conclusion at which Dr. Edwards has arrived, is the more remarkable, as it seems not only to be opposed to some previously-received opinions, but may at first appear to be a contradiction to some of the Doctor's own results. Dr. Edwards has discovered, that when the living body is about to be exposed to

a diminution of temperature, it will be better able to resist it if it have previously been placed in a warm situation. This will necessarily increase the extent of the transition; and it is contrary to the advice, not unfrequently given, to avoid going into a hot situation before exposing oneself to the cold external air. It also at first seems opposed to the principle already stated to have been proved by experience, that exposure to warmth not only supersedes the necessity for the production of animal heat, but really diminishes the power of producing it. It must however be observed, that there is a distinction to be made, which removes these apparent contradictions. It requires a long-continued application of warmth materially to lower the power of producing animal heat:—thus we see this effect brought about at the close, not at the commencement, of summer; whereas the application of warmth here recommended, as favouring the endurance of cold, is to be but of few minutes' duration, lest it should induce exhaustion and relaxation. It is not designed to be the scorching of a part of the body; in which case the sudden transition to cold would be likely to cause inflammations of the parts so treated; but it is to be the transient application of warmth to the whole body, which seems to act as a stimulus, which enables it to resist the likewise transient application of a degree of cold sufficient to prove in some degree distressing, and more or less suppressive of the energies of the system. The principle here set forth, and the recommendation grounded on it, does, therefore, not militate against the conclusion before arrived at, that the exposure to the gradual and continued cold of winter strengthens the power of resisting it, and of developing animal heat. The case

before us is a transient preparation for a transient exposure: it confirms the propriety of the recommendation empirically given by some, though strongly opposed by others, that it is advantageous to get a warming before going into cold. It has long been acted upon, in some parts of Russia, by those engaged in fishing for the caviare-sturgeon, and who in winter are obliged to remain some time under water whilst the surface is covered with ice. The suspension of respiration, as well as the degree of cold, prevents their remaining more than a limited time immersed; nevertheless, they find it necessary to raise their temperature in a heated apartment, both before and after going into the water. Though this plan seems to answer for a time, and enables these divers to endure and repeat an exposure from which one would be led to expect a fatal result, there can be little doubt of its becoming, sooner or later, destructive to the constitution. The divers before mentioned are said to become the victims of premature decrepitude, and seldom to survive above thirty years of age.

The fate of the divers just mentioned must not be regarded as a proof of the pernicious effect of cold; since it is rather the result of the combined influence of both extremes of heat and cold; and the effect on the system is probably very similar to that which is experienced by those who are engaged in the hottest operations of our iron-works. On the other hand, we must not be induced to suppose, by the remarkably small mortality which has taken place amongst the companies of men engaged in the more recent expeditions to the polar regions, that a very low degree of temperature is favourable to life. It doubtless tends to diminish the activity of many vital processes, which,

when disturbed, may occasion the destruction of life. But when we consider the small numbers and the feeble physical condition of that branch of the human family which has inhabited those regions for centuries, we cannot, I conceive, set aside the conclusion, that a very low temperature is alike unfavourable to the propagation and development of our species. (7)

The glass-blower, whose occupation keeps him for a large portion of the day in a temperature higher than that of summer-heat, must necessarily have his power of producing animal heat diminished: it would therefore be preposterous for him to expose his body to a degree of cold, which the driver or guard of a coach would be able to bear without the smallest inconvenience. He would find it necessary to protect his body more generally, and more completely, with clothing adapted to secure him from the abstraction of warmth: and although he may be so protected, he must be careful that the time of his exposure should be limited to a short period. It will be in vain for him to attempt to accustom himself to bear low temperature with little clothing: his constitution must be so modified as to render such an attempt one of great risk. Nevertheless, it must be admitted, that individual peculiarity may enable a solitary glass-blower to bear a degree and continuance of cold which will be destructive to his companions; and, on the other hand, the guard or the coachman may be so constituted as to prevent his acquiring the same degree of hardiness and power of resisting cold and inclement seasons which most individuals engaged like himself are able to bear without difficulty. A similar comparison might be drawn between the butcher and the baker: and as these two classes are not unfrequently

brought together, by congenial tastes, for the purpose of diversion, I have no doubt that a careful inquirer would discover that the bakers generally endure exposure to the weather far worse than the butchers. We will suppose, for instance, that an equal number of persons belonging to these two trades meet for a game of cricket. Both the butchers and the bakers will be heated by their exercise; but the former, in all probability, will bear with pleasure, and without inconvenience, the cool air to which they are exposed in the intervals of their exertions. The bakers, on the other hand, though they may find their general warmth raised, and perspiration excited by the exercise, must be protected from exposure, when it is their turn to rest; otherwise their glow will soon be converted into a chill, and a few hours after they will probably find themselves labouring under catarrh or some other local inflammation. How, you may inquire, ought the glass-blower and the baker to manage themselves, so as to counteract the influence of their occupation, and enable them to bear cold more nearly like their neighbours? In the first place, they should contrive that the necessary evil of their exposure to heat is not greater, and of longer continuance, than is absolutely unavoidable; and secondly, they should cultivate the power of producing warmth for themselves, by habituating themselves to the temporary influence of a lower temperature, by means of the cold bath, cold effusion, or sponging; always bearing in mind, that it is the effect of their occupation to render that a cold bath to them which would only be a tepid one to other individuals. The temperature of the bath, and the time of remaining in it, must therefore be carefully adapted to the powers of the individual

using it. It is also a point very essential to be borne in mind, that these means should only be employed when the body is in its best state of vigour; and not after exhausting fatigue and exertion, when the system, instead of beneficially obeying the call to produce warmth, would be still further exhausted, and suffer a diminution of the heating power which it already possessed. It is probable, that some bakers find the influence of the bakehouse, in degree, counteracted by that of their out-door occupations; but as this transition is not conducted on principle, or aided by the means which I have pointed out, it is likely that many young men are lost in the seasoning; which I think I have had reason to infer, from my own observations as well as from theory. It is obvious, that the theory of these remarks is applicable to other cases besides the trades which I have mentioned. Means, similar to those which I have proposed, would enable persons engaged in forges and furnaces to diminish the risk which they run, in exposing themselves to a lower temperature than that to which their occupations habituate them. To render these precautions the most availing, they should be accompanied by strict attention to diet, and more especially to the articles employed as drink. Stimulating liquors, for which hard work in a heated atmosphere excites an unusual craving, greatly aggravate the mischief: they increase the disturbance of the circulation, and keep up excitement beyond that which the power of the system can bear; and it consequently sinks the lower, when the stimulus of heat and alcohol is removed. It has been proved by direct experiment, that those workmen engaged in furnaces, who are rigid water-drinkers, have generally much better health, and live longer, than

those who are accustomed to seek for support and gratification from the use of strong drink.

Having now noticed several branches of trade or handicraft which furnish examples of the different modes in which our daily occupations may become more or less injurious to the health, or to the powers of some part or parts of the body; and thence taken occasion to call your attention to some physiological principles, which serve in part to explain the mode in which the injury is brought about, or to point out the means which might be adopted either to set aside or counteract such injurious tendencies; there yet remain a few remarks for me to make, before I quit the subject of muscular motion. You will perhaps be disposed to inquire what are to be regarded as healthful occupations, seeing that there are so many which have an unhealthful tendency. To this, I have no hesitation in replying, that those pursuits which require a general exercise of most parts of the body, and which keep the individual for a large portion of his time in the open air, such as agriculture and gardening, have produced the most striking instances of longevity. Excepting in districts in which the air is charged with those poisonous vapours which tend to induce ague and fever, the agricultural portion of the community present a striking superiority, not merely in the healthful appearance of their countenances, but in the general development of their persons. I must not, however, lead you to suppose that agriculturists and gardeners are necessarily led by their occupations into a healthful course, which needs no correction. Both of these classes are exposed to the inclemency of the weather, to a degree which, notwithstanding the seasoning and hardening which they receive from their

daily avocations, they are often unable to bear without suffering; more especially as they advance in life, when we have too often the pain of witnessing the agricultural labourer suffering from incurable rheumatism, subjecting him to frequent pain, and limiting or destroying his power of earning for himself the small sum on which his frugal habits would allow him to subsist. A little prudent attention to precautionary measures might greatly diminish this evil, with very little expense or loss of time, and without inducing any thing like effeminate and luxurious softness and tenderness. A loose cloak, or a yard or two of coarse cloth, thrown about the upper part of the body, and which would be neither expensive nor inconvenient, would, I am persuaded, prevent many attacks of rheumatism to which this class of persons are peculiarly subject. The uncivilized hunter, whose activity and prowess has overmatched the king of beasts, does not hesitate to protect his brawny shoulders with a lion's skin; which serves at once to attest his courage, to grace his person, and preserve his health. The Scotch Highlander, whose vigour and hardiness have often been put to proof, not only in his peaceful and laborious pursuits on his native mountains, but by the fatigues and hardships of the roughest campaigns, thinks it no degradation to wrap himself in his plaid, and even to seek protection from it against a moderate wind, if he should happen to have been overheated. I have often observed the great use which they make of this garment; and on one occasion, I was particularly struck with a Highlander's care in this respect. Some years ago, I happened to be in the neighbourhood of Fort William; when a labourer at work in a field, having understood, when I had passed him, that

I was a medical man, ran after me, to consult me about a relation of his: and having overtaken me, he begged a plaid from my shoulders, to cover his own whilst we were conversing, although the day was perfectly fine. I immediately gave it; and received a hint from the circumstance, which I wish the field-labourers of England to profit by.

It is far from my wish to see our manufactories deserted; or to inspire those who labour in them, either with a dislike for their occupations, or with envy towards their agricultural countrymen. I have set forth the beneficial tendency of bodily exercise in the open air, for the purpose of promoting a taste for those healthful amusements which consist of vigorous exertion out of doors.

Those whom choice or necessity may lead to follow some of the very useful occupations which are generally carried on in populous places, which often bring many individuals together into large manufactories, and to which some of the evils which I have pointed out are inseparably united, would find a very great advantage in having recourse to some of those bodily exercises which are engaged in for the purpose of recreation and amusement. If judiciously managed, as to their kind, and the time and energy to be devoted to them, they might be made the most powerful means of counteracting the injurious effects arising from the disuse of particular muscles, and from the distorting and cramping positions to which the operatives in some kinds of business are unavoidably subjected. These exercises, besides greatly benefitting the body, might have a very important influence with respect to the mind and moral feelings. They would serve as a diversion from many corrupting and

baneful modes of passing away the time not devoted to business, which too often lead the operative classes into practices which bring ruin on their families, and are more injurious to their health, and destructive of life, than the most unhealthful manufacturing occupations to which I have had occasion to allude. Games of various kinds, requiring the active exertion of the body, combined with skill and agility, have, in almost all ages and countries, been resorted to, for the gratification both of those engaged in them, and of those who assemble for the purpose of witnessing the feats of strength and skill exhibited by those who have attained to excellence in these sports.

In the best days of the polished States of Greece, public games were kept up with great spirit at stated intervals; and prizes were awarded to the conquerors, in bodily as well as in mental competition: and the distinction which the acquisition of one of these prizes conferred on the victor was an object pursued with the greatest ardour and perseverance.

The preparation necessary for these games required the habitual employment of these various exercises in the intervals. Suitable places, in or near the Grecian towns, were set apart for the young men to exercise themselves in, and persons were engaged as directors of the different sports; and so much attention was paid to the subject, as almost to give it the character of a science, under the name of gymnastics. In our own times, this subject has been taken up with much spirit in Germany and France; and some attention has been paid to it in this country. It has, however, been chiefly attended to amongst the middle and wealthier classes of society; and many young men have found their bodily strength and agility wonder-

fully increased, besides having their mental and moral qualities greatly improved, under the regulations and exercises imposed by the superintendants of those gymnastic recreations. It must not, however, be supposed that these sports were made the subjects of compulsory education; which would effectually deprive them of their charm. The powers which they developed, and the emulation which they excited, rendered them very attractive; and they might easily and injuriously have withdrawn those engaged in them from the more useful, but severer exercise, essential to the cultivation of the mind. The gymnasium was therefore made subservient to school-lessons and other mental exercises; and the proper performance of these was made essential, as a means of obtaining admission to the gymnasium or place of exercise. A similar care would doubtless be desirable, as a salutary restriction to the encroachments which athletic games might make on business or family duties, were they ever to become an object of general interest with our operatives. It is not my object to enter into this subject much more deeply, or to consider minutely the merits of particular kinds of games which might be promoted. Various healthful exercises, such as Cricket and Fives, performed with a ball; running, and leaping; tend to increase the useful powers of body and unbend the mind; but they may easily induce an excess of exertion, by which irreparable mischief may be sustained. Swimming-schools, in situations which admit of them, would give to many the means of saving either their own lives, or those of their fellow-creatures. It is a subject for great and increasing regret, that almost every open space in town or country, favourable to indulgence in these and other

healthful exercises, is becoming progressively and rapidly occupied. It is, in fact, a crying evil, which drives boys and young lads to expose themselves, as well as passengers, to the most serious accidents, from their playing in the high-roads: and what is far worse, it drives our young men to seek amusement and recreation in the odious retreats of idle, corrupting, and dissolute association.

In recommending the athletic exercises which were esteemed and cultivated amongst the Greeks and Romans, I must not omit to notice the very important exception which must be made with respect to those which are likely to stir up angry and ferocious dispositions, and can scarcely fail to have a hardening and brutalizing tendency. Such were boxing and wrestling, amongst the Greeks; and, in a still greater degree, the murderous sword-fights of the gladiators in the Roman amphitheatres;—and such are the barbarous prize-fights which disgrace this country. Their demoralizing effect is by no means confined to the parties actually engaged in these combats: in fact, some of these may give proof of admirable courage, agility, and perseverance, which we must regret to see prostituted to so base a purpose. Perhaps, in many instances, the greatest evil is the effect produced upon the spectators. They have been supposed to encourage a martial spirit, and on this account might allowably be valued in those heathen countries in which warlike exploits obtained the highest praise; but they cannot be too much discouraged in this, whose inhabitants have too keenly felt, and still feel, that war is pernicious and impolitic, and who know that its practices. and the passions which it excites, are essentially sinful and anti-christian. Since, however, the British Senate

has been disgraced by speeches designed not merely to palliate, but positively to promote these and similar amusements, on the ground that they tend to keep up and raise the standard of spirit and courage in the country, I think it right to point out the fallacy of this, even if the object were a desirable one. There can be no doubt, that the habit of witnessing these spectacles blunts that natural sensibility which must make every uncorrupted mind feel pain at witnessing the distress and suffering of others, even whilst he may admire the prowess and fortitude which accompany them. When this sensibility is destroyed, it is soon succeeded by the opposite state. Pleasure is felt in witnessing these sufferings, and the desire to indulge in this gratification grows to a detestable passion; and not only their fellow-creatures, but numbers of helpless animals destined for the use of man and placed under his protection, are barbarously sacrificed to satiate it. In short, they are become cruel in the extreme: and cruelty, you know, is the associate, the twin-brother of the basest cowardice, and utterly repugnant to genuine courage and valour. I might point to the titled leaders of those who style themselves "the Fancy"; and ask, whether the young, innocent, and lovely, whom they have betrayed and corrupted, and finally ruined and abandoned, do not fully prove my assertion? Look at those speaking pictures, which the admirable Hogarth has drawn from real life, to mark the progress of Tom Cruel; and let them be present to your mind's eye, whenever you are invited to join the prize-ring, or enter the cockpit.

My having urged as an objection to some of those exercises which have been resorted to for the purpose of recreation and to improve the bodily powers, that

they tend to give a fierceness of disposition, and to encourage a taste for combat and struggles for mastery, which are supposed to be favourable to warlike feelings and pursuits, will have led you to conclude that I totally disapprove of war. Though I have omitted to mention the profession of a soldier amongst the pernicious occupations in which man may engage, either for his livelihood or his gratification, it has not escaped my recollection. A course of life in which hundreds of thousands, and sometimes millions of Europeans are engaged, should, were it only on this ground, claim a little of our attention. But when, in addition to this, it presents so many important bearings as the art of war does, I am persuaded that you will agree with me in thinking that it deserves special and distinct examination. It will not do to judge of the business of a soldier simply on those principles which we have had to consider with respect to manufacturing and other productive occupations. It will not do to say, the soldier has his regular allowance of wholesome food, equally distant from want and from excess ([8])—the soldier has his regular exercise, calculated to promote his general health, and the well-being of his muscular limbs—he is well clothed and well housed, therefore the occupation of a soldier is desirable, and that the chances of death in fighting may be set against the evils inseparable from many of the arts of peace. Should such a mode of reasoning run through your minds, when you may be invited, and tempted, and pressed to enlist in the army, let me assure you that you would be grossly deceived by so erroneous and partial a view of the subject. Even in a time of profound peace, the life of a soldier is liable to many and serious objections; and even then the recruit should

feel all the force of those more numerous and much more weighty evils which are attached to his profession during actual service in war; and which he not only sanctions, but lays himself out for, the moment that he enters upon the life of a soldier.

War is so essentially opposed to the precepts of our Saviour, That we should do to others as we would that they should do to us—That we should love our enemies—and, That we resist not evil—that I conceive it perfectly needless for me to enter into any argument respecting the unlawfulness of war, under the Gospel. (9) It is, therefore, only its expediency that we have to consider; since this is by some supposed to be such as to annul the most sacred injunctions against it. Though I consider that such doctrine ought to be absolutely rejected, even were the expediency to all appearance proved; yet, as some of you may not think with me in this respect, I shall endeavour to shew you that the idea of its expediency is altogether delusive, and its tendency inevitably adverse to the advancement of the human race. It occasions, more than any other cause, an immense amount of purely unproductive consumption. Whilst, with the most insatiable avidity, the productions of industry, past, present, and to come, are drawn within its grasp, it consumes them with the most reckless prodigality, and therefore subtracts an incalculable amount from those resources which might become a blessing to mankind were they devoted to their legitimate objects, the productive and salutary, the ennobling, and the pleasing arts of peace. But you hear it said, that war is good for trade, as it keeps money stirring, and makes many rich. Such an assertion is only founded on a partial and imperfect view of the subject. The

money which is raised for the purpose of carrying on a war must first have been produced by the talents and productive industry of man; and then withdrawn from some more or less useful and productive purpose, to which it was either applied or applicable. When it has found its way into the new channel of a war-administration, it will be seen that it has been thrown into a destructive torrent; for if you will watch it in the various shapes into which it is transformed, until it is brought to its ultimate annihilation, you will find, with very little exception, that not any of them are either useful or productive. You must not suppose that that portion alone is completely lost which is fired away in powder and shot, exploded in mines, or sunk in the ocean. That which has been spent in feeding and clothing a large army is completely consumed, without leaving behind it a trace of its existence; whereas that which is spent in feeding manufacturers or agriculturists re-appears in the articles which they are the means of producing. It is true, that human beings have been kept alive in both cases; but in the one case, they have lived to some purpose, and created property; in the other, they have done nothing, or worse than nothing; and instead of producing capital, have, perhaps, been the means of entailing on their posterity a lasting deduction from the proceeds of *their* industry. Are we not, each one of us, daily labouring to raise the interest of those vast sums spent in the late war, in which the least criminal expense was, perhaps, that which served to keep many valuable heads and hands in unproductive idleness? Perhaps you will say, that some portion has been spent in large and substantial public works. Most of these, however, are worse than useless in themselves; and, in

proportion to their durability, they may be regarded as exhibiting a protracted process of destruction, incurring further and similar expense. I will not deny, that individuals, who have received their pay from Government for services in some way connected with military affairs, may, as far as the amount of talent and exertion employed is concerned, have fully earned the sums which they may have received, and that a portion of the capital so expended may seem to be rescued from final destruction; as for example, when the professor of a military college has bestowed time and pains in cultivating the abilities of some promising youth, which his friends have destined to be devoted to the work of destruction—unforeseen events may derange the plan, and these cultivated talents may be brought into exercise for the benefit of mankind. Such examples, however, do very little to redeem the character of the system which I am endeavouring to expose. Perhaps you will say, that the sums which have been saved out of large military salaries, and the amount of pensions continued to military men when a war has ceased or the period of their service has expired, is rescued from its pernicious destination, and ultimately finds its way back into the capital of the country. These exceptions I do not admit, or, at most, only to a limited and partial extent. If the pay, whether given at the time or deferred as a pension, be really the just reward of the time and talents which the country has engaged in the worse than useless art of war, then must we look at the time and talents thus consumed without leaving a valuable trace of their existence, as an instance of as complete destruction as the firing of a rocket or the sinking of a ship of the line. But if the sums expended exceed

the value of the time and talents engaged in exchange for them, the nature of the evil is somewhat changed. It is evident that there must have been a profligate expenditure of the country's money; for which both the bestower and the receiver should feel the full punishment of public censure and internal remorse. Though we cannot say that the loss of such sums was exactly represented by the time and talent misapplied, yet little satisfaction can be derived from tracing it through the channels by which it has escaped. What is ill gotten is generally ill spent: we cannot, therefore, be surprised that these unearned salaries have been, in a large proportion, devoted to foolish or profligate expenses: nor is the evil limited to these expenses, seeing that they have done much to vitiate the tastes and morals of the age, and to lead to the similar expenditure of vast sums, which can never be taken an account of, in the expenses of a war.

I need not dwell longer on the impolicy of war, founded on its destructive influence on property. I must next endeavour to shew how impolitic it is, even as a means of defence, and of securing that which in every age has been regarded as one of the greatest blessings, and has been the chief prize, which has called forth the exertions of the greatest military talent, and produced some of the greatest instances of courage and self-devotion. Need I tell you, that the prize I allude to is LIBERTY, which has often been held more precious than life itself. Although History presents to us many instances of Liberty having been heroically and successfully contended for by force of arms, yet there are many more in which the struggle has been unsuccessful; the numbers and resources of the weaker party have been distressingly reduced; whilst the stronger

oppressor—who may also have felt the smart severely, as well as incurred great expenses—being chafed and irritated by the resistance which he has met with, has only increased the weight of evil to be inflicted on the vanquished, and rendered the recovery of their liberty more difficult and hopeless. Such a chain of circumstances, though by no means uncommon, is far from being the only mode in which war is unfriendly to liberty. Those powerful intellects and talents, and those remarkable powers of gaining personal influence and securing the prompt and undisputed submission of thousands, so essential to the success of a great military commander, are the very means by which that liberty, which they have been called to defend, is most likely to be sacrificed, or painfully restricted. With a very few exceptions—amongst which, General Washington may certainly be pointed out as one of the brightest and most striking—those military commanders who have appeared to be most successful in resisting encroachments on the rights of their countrymen have, ultimately, more or less abused the power and ascendancy they have acquired, and sacrificed to their ambition the liberty once committed to their care. Thus, in our time, Bonaparte, the democratic leader of the French Republicans, became himself the despot of France, and made her boasted liberty an empty name.

But perhaps you will say, that though the bravest defenders of their country against foreign oppression may sometimes fail in their exertions, and really add to the calamities that they have endeavoured to remove—that though some, who have placed themselves under the standard of Liberty, and sought by force of arms to maintain the rights of a people against the unjust and inordinate power of their rulers, have abused

the confidence which has been placed in them, and only transferred the exercise of tyranny from other hands to their own—there is, nevertheless, no other power than that of arms, by which a nation may preserve its rank and honour abroad, or repress the lawless usurpation of authority at home, and vindicate the people's right to participate in the independent privileges of our nature. Or, you may conceive, that if the art of war were to be no longer learnt, and the profession of the soldier laid aside, there would be no field for the exercise of courage and patriotism;—that virtues which have been regarded with admiration, and have commanded respect in every age and country, must become extinct; and that talents and acquirements, which have been highly prized and carefully cultivated, must become useless and neglected. Or, you may choose a less flattering, but possibly more cogent line of defence, and say, with an admission of the evils belonging to war, that the knowledge of human nature, and all past experience, support the conclusion, that wars will ever continue; or, that their coming to an end—to which we are taught to look forward—is so remote a prospect, that it is idle for us to contemplate it, instead of preparing men and implements to carry on a war, in case we should be brought, contrary to our inclinations, to engage in one.

I shall reply to this last objection, in the first place: and begin by admitting the very discouraging prospect which past experience holds out to us. Yet I may, nevertheless, point to a ray of hope, even there. Although one generation of mankind has succeeded to another alike industrious in giving proof of its proneness to evil, I cannot but believe that some progressive improvement has taken place; nay, I am persuaded that,

at the present day, its progress has become somewhat more rapid than it was formerly. At all events, there is a change even in the vices of mankind; and their evil propensities and weaknesses are differently exhibited at different periods of time. The vice of idolatry shews this change; which has taken place in the most decided, though in a very gradual manner. For thousands of years, the whole civilized world gave way to idolatry: even the Jews were constantly falling into it, in spite of the most powerful inducements to refrain from it. During the whole of this long period, the extinction of idolatry was more hopeless than that of war is at this moment. Yet what has been the fate of idolatry? In its ancient form, it is only to be found amongst uncivilized or semi-barbarous nations, who have but imperfect intercourse with the rest of the world;—and even in them it is declining.

Is it unreasonable to suppose that that which has happened to idolatry may also happen with respect to war? And can this happy and desirable change, to which we are taught to look forward with confidence, be promoted with more prospect of success, than by all those, who are convinced of its iniquity, making a decided stand, and scrupulously abstaining from being in any manner, directly or indirectly, connected with it, as they would in the case of a murder or a burglary—instead of giving way to the plea of necessity, and the allurements of false glory?

As I purposely refrain from entering on the discussion of this subject as a religious question, in order that these Lectures may have nothing of a sectarian character, I must not omit strongly to recommend to your attention the various publications of the Peace Society, in which the evils of war are discussed on

religious as well as on political and rational grounds: and in doing so, I must inform you, that that Society is by no means confined to the members of the small sect to which I belong, but consists of members derived from almost every sect of professing Christians. The very existence of such a Society is in itself a reply to the objection which I have been endeavouring to repel. I shall therefore quit it, in order to notice the first objection which I have supposed you to urge; namely, that war, with all its evils, is unavoidable and necessary, as the only means of defence. In support of my opinion, in opposition to this objection, I shall commence with the case of individuals; being fully persuaded that a similarity of reasoning may be applied to mankind collectively, whether as parties or nations, as may be shewn to hold good in the case of individuals. Hundreds of instances might, I believe, be adduced to shew, that those whose situation has deprived them of every means of resistance, as well as those whose scruples of conscience have rendered it impossible for them to employ arms for their defence, have escaped, when their lives were completely in the power of their enemies; whilst those who have trusted to arms have been cut off. Though such individuals have doubtless abundant cause to feel their hearts filled and warmed with gratitude to the Great Disposer of events for their signal escape, the secondary means, which have led to it, have often been so obvious, that those who, like ourselves, may contemplate these instances collectively, may be allowed to draw a general principle from them, on which all may be allowed to act; without, on the one hand, impiously rejecting the superintending care of Providence; or, on the other hand, irrationally courting danger, through

fanatical superstition, or irreverently tempting God, with the idea that He will work a miracle for their deliverance. Those who trust in an armed force for their defence must often bring themselves into danger, in seeking to employ such means in what may appear to them to be a favourable opportunity, when they might have escaped it had they remained quiet. Those who remain quiet, when the moment of extremity arrives, give an instinctive check to their enemies; during which, the kindly feelings of our nature may come into play for their advantage, which a single sentence, happily suggested at the instant of emergency, may complete. When the idea of safety from forcible resistance is altogether done away with, all the powers of the mind are directed to other means of escape; and opportunities are observed and embraced, which the armed man would overlook, or, if he observe, be unable to avail himself of. I am not here defending cowardice. Cowardice is incompatible with that presence of mind which I believe to have often been an essential element in the narrow escapes and providential deliverances to which I am alluding. It will be proper that I should lay before you a few examples; but as our time is limited, I must neither multiply anecdotes, nor enter into minute details; for which I must refer you to books, to the perusal of which a portion of your leisure may be agreeably devoted.

It has repeatedly happened, that the highway-robber, who had resolved on murder, and was prepared to commit it, has desisted from his purpose at the remonstrance of an unarmed individual, who was completely at his mercy.

"Barclay, the celebrated Apologist, was attacked by a highwayman. He made no other resistance than a

calm expostulation. The felon dropped his pistol, and offered no further violence.

"Leonard Fell was assaulted by a highway-robber, who plundered him of his money and his horse, and afterwards threatened to blow out his brains. Fell solemnly spoke to the robber on the wickedness of his life. The man was astonished:—he declared he would take neither his money nor his horse, and returned them both."

It is stated, that a similar adventure happened to the late venerable and devoted Rowland Hill, who afterwards found a valuable servant in the reformed highwayman.

Raymond, the traveller amongst the Pyrenees, says, "The assassin has been my guide in the defiles of the boundaries of Italy; the smuggler of the Pyrenees (whose first movement is a never-failing shot, and certainly a subject of dread to most travellers) has received me with a welcome in his secret paths. Armed, I should have been the enemy of both: unarmed, they alike respected me. In such expectation, I have long since laid aside all menacing apparatus whatever. Arms may indeed be employed against the wild beast; but no one should forget that they are no defence against the traitor; that they irritate the wicked, and intimidate the simple; lastly, that the man of peace, among mankind, has a much more sacred defence—his character."

The preceding instances, it is true, do not relate to war; nevertheless, they prove that force is not the only protection against violence; and they shew that "the laws of nature still exist for those who have long shaken off the laws of civil government."

The following examples more directly bear on the

subject of war. It is stated, on the authority of Lieutenant J. W. H. Handley, that some days after the last siege of Copenhagen, at which he served on board the 'Valiant,' he was walking among the ruins, consisting of the cottages of the poor, houses of the rich, manufactories, lofty steeples, humble meeting-houses: in the midst of this broad field of desolation stood, he says, one house—all around was a burned mass; this stood alone, untouched by the fire, a monument of mercy. "What house is that?" he asked. "That," said the interpreter, "belongs to, and is occupied by, a member of the Society of Friends: he would not leave the house, but remained in prayer with his family, during the bombardment." There is reason to believe that the person of whom this is related was not a member of the Society of Friends; though he might be of the same principles with them on the subject of war.

In Ireland, during the Revolution in 1688, and again in the Rebellion at the close of the last century, the members of the Society of Friends, although they appeared to be more particularly exposed than any other class of individuals—seeing that they were not only without defence, but incurring the displeasure of both the contending parties by their neutrality—almost universally escaped personal injury; and their loss of property, though very considerable, was much less than that of their neighbours. In the late Rebellion in particular, the practical advantages of their pacific principles were remarkably displayed. At the commencement of these troubles, a general recommendation to adhere to these principles was accompanied by advice, that all the fire-arms that might be in the houses of Friends should be destroyed. This request was

rigidly complied with, and proved an anticipation of the general search for arms ordered by the Government. It exhibited their loyalty, and cleared them from suspicion: it also disappointed the rebels in their attempts to collect arms; who, whilst they refrained from a search which they knew to be hopeless, were not exasperated by the idea that arms had been supplied to their opponents. Friends were threatened by the military, that no protection should be afforded them, because they refused to take any part with the army, or to sell the ropes and pitch to be employed in killing or tormenting those suspected of disaffection. Their houses were often invaded by the rebels, with intent to commit murder, not only for their loyalty, but also for their firm adherence to Protestantism; nevertheless, they were protected by either party, which happened to have the ascendency, and were pillaging and destroying the possessions of their neighbours. Savage and disgraceful atrocities were perpetrated both by the Government troops and by the rebels; and many of each party fled to the unprotected dwellings of Friends, as affording more certain security than the camps and garrison-towns. In some instances, Friends successfully interceded with both parties on behalf of their victims; and, in one town at least, acted as mediators between the insurgents and the army; inducing the one to return to obedience, and the other to desist from vengeance.

During the same rebellion, a small settlement of Moravians, in the north of Ireland, maintaining the same principles, as to war, as the Society of Friends, and rendered obnoxious to the rebels by its avowed loyalty, was twice assailed by these fierce and destructive bands, who nevertheless failed to put their

threats in execution. When the rebels were afterwards defeated, some of them obtained assistance in their distress, from this settlement.—The protection of the Moravian settlements on the Continent, during the late long war, was very remarkable. On a representation respecting some of them being made to Bonaparte, he is said to have declared, that as the Moravian Brethren and himself had one common end in view—the establishment of general peace throughout all the world—they should not be molested. He ordered the names of the four Silesian settlements to be written down, and promised them safety.

I have been told by an eye-witness, that during the day of the battle of Toulouse, a French miller, residing almost on the field of battle, continued his occupation without interruption, and supplied refreshment to the British troops. His life was safe, and his property was respected; whilst that of his neighbours was completely sacked and destroyed.

It is well known, that the early settlers in North America were often murdered, and their possessions pillaged, by the Indians, who cruelly retaliated the flagrant injustice and provocation which they received. The Friends, who treated the Indians differently, lived in perfect safety in their remote and solitary dwellings, even when the exasperated war-parties were killing, scalping, and making dreadful havoc around them.

"Such, in a multitude of instances, has been the lot of Christian individuals; and such might also be the experience of Christian Nations. When we consider the still degraded condition of mankind, we can hardly at present look forward to the trial of the experiment: but was there a people who would renounce the dangerous guidance of worldly honour,

and boldly conform their national conduct to the eternal rules of the law of Christ—was there a people who would lay aside the weapons of a carnal warfare, and proclaim the principles of universal peace, suffer wrong with condescension, abstain from all retaliation, return good for evil, and diligently promote the welfare of all men—I am fully persuaded that such a people would not only dwell in absolute safety, but would be blessed with eminent prosperity, enriched with unrestricted commerce, loaded with reciprocal benefits, and endowed for every good and wise and worthy purpose, with irresistible influence over surrounding nations."—*J. J. Gurney's Observations on the Religious Peculiarities of the Society of Friends.*

With the sentiments which I have just quoted, I heartily unite. ([10])

I shall offer you two or three examples, which shew that the same pacific means, which have answered so well in the case of individuals, are equally happy in their result, when employed by bodies of men. Till within the last few years, the Greeks, as a nation, have groaned under the oppression of their conquerors, the Turks. Some, trusting to arms, maintained an imperfect independence, by retiring to their almost inaccessible mountains. For their mode of life, they acquired the name of Klephts, or "Robbers." Even here they were continually the subjects of oppression and persecution. Those in the valleys, who yielded to their conquerors, though constantly liable to iniquitous exactions, managed, notwithstanding their degraded situation, to enjoy far more of the comforts of life than their mountain brethren, and still, to a certain degree, possessed the means of cultivating those fine talents which for ages their interesting little territory has not failed to

produce. Many individuals succeeded not only in acquiring fortunes as merchants, but in raising themselves to posts of honour and profit in the Government of Russia, and even in that of Turkey itself. Had some of these individuals acted with less servility and more principle, they might, I believe, long since have more effectually extricated their unhappy country from her degraded situation than she has yet been able to do for herself, with all the courage, devotion, and perseverance which she has displayed, and with all the tremendous sacrifice of life and property which she has made. Whilst the Greeks generally, prior to their late and still unsettled Revolution, were furnishing a striking instance of degradation; sometimes resorting to violence, for which they suffered fearful retaliation, and more often trusting to the common resources of slaves—artifice and deception; the inhabitants of one island exhibited a striking and beautiful exception. They successfully cultivated the arts of peace, and, to a great degree, kept aloof from political disturbances: they adopted a conciliatory course towards the Turks, who allowed them in fact, though not in name, a great degree of independence. The inhabitants of this island have—I believe against their inclinations—been involved in the Revolution, and have severely, if not irreparably suffered.

In Italy, the Republic of San Marino, too feeble to oppose itself to any state, and too prudent to join with any as an ally in war, has maintained its independence, and been respected by tyrants and conquerors, for ages; during which the surrounding territories have undergone many sufferings and changes. I might cite other examples, to shew that peace is an effectual refuge against foreign violence, when recourse to arms would make destruction inevitable.

I have next to shew, that the same pacific conduct is no less availing in those cases in which, instead of foreign invasion and oppression, the unjust usurpation of power at home is in question. The early Christians, who suffered every species of persecution, not only from the Jews, but from the Romans, rapidly increased in numbers and strength, whilst they offered no resistance to their enemies; but, on the contrary, requited their persecutors with acts of kindness, when the opportunity fell in their way. I need not tell you how completely their perseverance in this pacific course was crowned with success. Christianity triumphed over the Roman Empire itself. When you reflect on this striking achievement of the peaceful principles of Christianity, do not fail to recollect the abject degradation which befel, not only the Roman Empire, but also the profession of Christianity, when these principles were abandoned; and those under the Christian name, regardless of the examples of their predecessors, scrupled not to engage in foreign, and even in civil war. Some of you are perhaps aware how severely the early members of the society to which I belong suffered from the cruelty and injustice of those who were in power at that time. During many years, they were constantly the subjects of imprisonment of the most cruel description, of confiscations, and corporal punishment. It seems almost incredible that such a course of procedure could have been persevered in by any magistrates, towards those against whom it is not pretended that any criminality was ever proved; and I can only account for it, by ascribing it to the baneful influence of those passions to which civil war had given an unbridled sway. Strict adherence to peaceful principles, acts of kindness towards their persecutors

when occasion offered, coupled with stanch and unflinching passive adherence to the principles which they professed, finally brought them through their troubles with satisfaction to themselves, and procured for their successors that protection and those privileges which, whilst solicited as accordant with the principles of justice and Christianity, have been granted in a manner which has not failed to call forth the cordial gratitude of the society. I have already alluded to the Irish Rebellion. Let the deplorable events of that time ever be remembered, as a lasting proof of the weakness of brute force, compared with the power possessed by the peaceful, persevering exercise of persuasive reasoning on the side of justice, as exhibited in the ultimate concession of the Roman-Catholic claims.

The preceding facts will, I trust, have convinced you, that the force of arms is not the only protection against oppression, whether proceeding from a foreign enemy, or from bad governors at home. That protection, which I have shewn you may be found in a strict adherence to peaceable and inoffensive principles, coupled with persuasion applied with perseverance and firmness, is not only more consistent with the dictates of Christianity than the justest war can be regarded, even by its most strenuous advocates, but it possesses many other important advantages. It is manifestly the most economical course, and could never lead a nation into an oppressive debt. It would not divert the people from the arts of peace, or turn aside the abilities of many of the most talented amongst them from pursuits calculated to promote the good of mankind, to others, whose avowed object is destruction: and finally, it is able to exert a moral force, before which the oldest and most powerful dynasties,

when they depart from the principles and practice of good government, would totter on their trembling foundations. At the same time, its power cannot admit of abuse; because it must vanish like mist before the sun, could it ever be directed against civil authority in the hands of worthy men, faithfully and ably carrying forward good measures founded on just and righteous principles. Such a Government could have nothing to fear, from mistaken, yet peaceable opposition to its measures. It would only find in it the means of making the correctness of its views universally apparent, and derive from it strength for the performance of its praiseworthy intentions.

I think I must have almost removed your remaining objection, before I come professedly to the consideration of it. You must have seen, that it is not necessary to have recourse to arms, in order to exercise and exhibit courage and patriotism of the highest order. You will not find, in the achievements even of the most renowned heroes, the relation of whose exploits produces the most thrilling effect, greater examples of genuine courage and fortitude than have often been exhibited by those who have died, under excruciating sufferings, as martyrs to their peaceful religion. During the terrors of the Irish Rebellion, to which I have before alluded, many proofs were given that the Quakers were not wanting in the courage for which their more warlike countrymen have been long and justly celebrated. There is one consideration which you must not lose sight of, when you are contemplating the courage displayed by unresisting individuals. Their conduct is more truly the result of courage, than that which is exhibited in a fierce conflict, when the warrior may be hurried on by his excitement, like a fox-hunter to

an awful leap, into a danger from which, at his cooler moments, he would recoil. Again, the warrior generally acts in company, which gives him confidence as well as excitement. There are many who display courage in association, but who would prove themselves cowards alone. Convincing evidence, that a higher degree of courage is required to support the mind against individual danger, without the means of even attempting resistance, was, according to Froissard, exhibited at the siege of Calais, by Edward the Third. The long and successful defence maintained by that town proved the great courage of the inhabitants; but further opposition being useless and destruction inevitable, they tendered their submission. When the English king made the savage demand that six citizens should be given up to his vengeance, a general consternation was felt, and a greater degree of courage was required, to bring these generous patriots to the voluntary sacrifice of their lives, than that which led hundreds of their countrymen, before them, to hazard theirs on and under the walls of their city. The consequences of this affair are well worthy of your attention, as confirming the principle for which I am contending. Whilst hundreds and thousands may fall on the field of battle, or in defending the walls of a city, whose deaths are disregarded and passed over as the common occurrences of war, on the event of which they exert an insignificant influence, the devotion of these six unresisting citizens of Calais produced the most striking influence at the time, and has been handed down with admiration to posterity. When these six brave men, tendering their lives and bearing the keys of their city, appeared before the king, their fate excited the compassion of the queen, whose

prayers and tears obtained clemency from him, exasperated as he was by the losses and sufferings of his people.

A somewhat similar effect would, I believe, be generally produced, when defenceless individuals expose themselves to almost certain death for the good of their country. They extort respect and compassion from their enemies; which either rescue them from the death which threatens them, or make it an event not less important in its consequences and influence than a general engagement in which thousands may fall on both sides. The courage and devotion of individuals so displayed, cannot fail to prove an example to their countrymen, animating them to the like courage and constancy, for the endurance of the worst extremes which may await them; and at the same time, it raises up in their cause, advocates, even among their enemies, who must inevitably plead with success. There is no tyrant who could long persevere in acts of cruelty and oppression, when all the good, the generous, and noble-minded in his country are opposed to his measures; and when the female influence of his court, and perhaps of his country at large, stands directly opposed to them. Whilst human life, when sacrificed singly, without forcible resistance and in the maintenance of principle, may be said to be sold at the highest price, with respect both to the effect which it produces, and to the palm which posterity awards to the patriot; the fate of those who die in battle, notwithstanding all the glory falsely represented to attend them, is precisely the reverse. Have not millions perished in the pursuit of this phantom of glory, of whose name and exploits no trace has survived the day on which they fell?

Their accumulated numbers have merely contributed a small portion towards the celebrity of a few individuals. Those who are old enough to remember the late war, must be well aware, that on the field of battle a greater number of lives are lost in proportion to the sensation excited than by any other calamity, whether pestilence, inundation, or other terrific catastrophes. The countrymen of those who have been beaten, bewail the loss of strength which their cause has sustained, and almost forget the dead in their anxiety to replace them; whilst those of the conquerors exhibit their exultation in festivals and orgies, only less brutal than the war-dances of the savage, because scalps, and ears, and other visible proofs of the horrors which have given rise to their joy, are not exhibited to their inconsistently fastidious eyes. I have often considered it as one of the proofs that war proceeds from a malignant spirit, unfriendly to the well-being of the human race, that, whilst the progress of human knowledge in every other art and profession tends to increase the power of man, and to enable a few individuals, by mechanical and other contrivances, to effect more than numbers did before, modern warfare, on the contrary, requires a greatly increased number of men, converts the soldier into a machine, conceals his talents, and scarcely affords any means of individual distinction. It cannot therefore be, that war is necessary to call forth and exhibit courage, patriotism, loyalty, or any other virtues, which, from the earliest ages, have been regarded as the best ornaments of successful warriors. We have no cause to fear that these virtues would be lost or inactive, were armies out of fashion, and nations no longer to settle their disputes, or maintain their

authority by appeals to the sword. We should have generals without armies, and victories without bloodshed — no pestilential vapours from fields covered with carnage—no smoke from burning towns would rise, to tarnish the bright glory of the successful guardian of his country's weal!

Rest.—Although I have noticed the effect of rest, as well as of exercise, upon the muscular system, I have not as yet given any directions specially relating to the management of intervals of repose. I have merely pointed out, that a time of rest is necessary for a fatigued muscle to recover itself; and that, on the one hand, if this inactivity is too long continued, the muscle loses its strength, and, on the other hand, becomes injured, together with its appendages, if it be too long or too severely exercised. Were this the only consideration necessary to be borne in mind, in the regulation of rest, I might leave the application to your individual judgment and experience. Rest, however, requires to be considered not merely with reference to its restorative powers, as connected with the muscular system: it has an important influence on digestion, and on the strength and activity of the mind. Moreover, on the due limitation and arrangement of the hours of repose very much depends the proper and economical employment of that most invaluable possession, time. The misapplication of time in active pursuits is so self-evident, that the conscience can scarcely become callous to the evil; but it becomes insensibly seared against the insidious vice of consuming an inordinate length of time in sleep, or the inactivity of soft repose.

In considering the subject of rest, it is unnecessary

that I should make more than two degrees of it. The one, in which all bodily exercise is wholly, or to a great degree suspended; whilst the mind, though not put to the stretch, still retains its consciousness, but is not bent on any subject calculated to fatigue or disturb it. The other, well known by the name of sleep, in which not only the exercise of the body is, or at least should be, suspended, but the perceptions and consciousnes of the mind cease, and its operations are put a stop to. Even dreams are an imperfection in sleep: at least, they shew that it is not complete. It is needless that I should enter into the physiological consideration of the precise condition of the mind and body in sleep. The subject has been much considered and discussed by persons of great ability, well conversant with inquiries of this nature; but the question is, as yet, by no means satisfactorily set at rest. It is quite enough for our present purpose, that you are practically acquainted with this state, and know all the force of the poet's expression, when he calls it,

"Nature's sweet restorer—balmy sleep."

Although the exhausted system obtains relief from the degrees of repose to which I have alluded, yet they are far from being precisely similar in their effects, nor can the one be indifferently substituted for the other. You must be well aware, that when the body and mind are exhausted by long-continued wakefulness and exertion, a short period of sleep has an incomparably greater restorative effect than the complete tranquillity of body and mind without it, although the interval may be of longer duration. On the other hand, there are times when rest is necessary, but when sleep is undesirable. The first part of the

process of digestion does not seem to go on so well during sleep, as when the body is in a state of wakeful repose; and the mind, provided it has not been exhausted by long-continued application, is better fitted for some occupations after wakeful relaxation, than after sleep. The portion of time to be devoted to rest, and the part of the day in which it should be taken, are points to be specially considered in the regulation of rest. It will be improper to lay down one rule for all persons, with respect to the amount of time which ought to be spent in taking rest. Some individuals are of so very active a disposition, that a comparatively small portion of sleep is all which they can take; whilst others are so inclined to sleep, that they can give way to it at any time. Both of these extremes are undesirable; but they may, happily, be very much corrected by careful attention to the formation of habit. Those who possess extreme activity of mind or body, and greatly curtail the rest allowed to both, cannot fail seriously to injure their health. If they do not bring on some smart disease, under which their exhausted frames sink after a short struggle, they become almost inevitably the victims of premature old age, decrepitude, and death. On the other hand, those who give way to slothfulness, and devote an inordinate time to rest and sleep, have their energies destroyed; their bodies become flabby, bloated, and easily fatigued; and their minds, even in their most wakeful moments, are torpid, indisposed for continued attention to any subject, and unfit for close application. Such persons may be said to waste life in a threefold manner. First, all the time consumed in rest and sleep, beyond what the body and mind require, is lost: a second portion is lost in

the diminished value of their waking hours: and, thirdly, the term of their life is likely to be shortened by the injury which their health sustains. There is considerable difference in the amount of sleep required at different ages. Children, who have little power and much activity, are the soonest fatigued, and require the most rest. In old age there is generally the smallest necessity for sleep; yet exceptions to this are seen in the decrepitude of extreme old age, and in cases in which, in consequence of disease, there is great tendency to sleep. In the prime of life, when the system is capable of using and sustaining the greatest exertions, a medium portion of rest is required to restore the body, after exhaustion from fatigue; but even at this period of life, the differences depending on constitution and habit, to which I have already alluded, are very considerable. From nearly six to seven hours may be regarded as the average amount of time which those engaged in the ordinary concerns of life, and reasonably exercising the body and mind, may devote to rest in bed. Some persons have been able to do with from four to five hours; but I believe that in most, if not in all such cases, the mind is kept in a state of excitement, by a succession of momentous or intensely interesting subjects: hence instances of this kind are met with among severe students, military commanders, and persons engaged in political affairs. Health is generally injured, and life shortened, by a continuance of this habit. There are very few cases, excepting among persons with impaired health, in which the limit which I have mentioned need be exceeded. The following distribution of time has been prescribed by some superior individuals, who were well acquainted with its value. Lord Chief-

Justice Coke has laid down a rule, in the following couplet:—

"Six hours in sleep; in law's grave study six;
Four spend in prayer; the rest on nature fix."

This has been somewhat modified by that excellent man and accomplished scholar, Sir William Jones:—

"Six hours to law, to soothing slumber seven,
Ten to the world allot—and all to Heaven."

The late John Wesley, who combined great bodily fatigue with constant and varied mental exertion, in study, writing, preaching, and deliberation, devoted six hours to rest: and the advanced age to which he attained, proved that this arrangement was not inconsistent with health.

With respect to the portion of the day the fittest to be devoted to rest, we cannot do better than follow the dictates of Nature herself. Some animals are evidently designed to take their rest in the day-time, and others in the night. Those of the former class are distinguished by the character of their eyes; which cannot bear, without inconvenience, the glare of day; and whose large pupils take in and make the most of the faintest light which night affords. To this class, excepting in some very rare instances, man evidently does not belong: he is, therefore, disobeying the dictates of nature, in turning night into day, by devoting the latter to sleep, and the former to his occupations, whether of business or pleasure. Those who adopt this pernicious practice, from either of these causes, almost always exhibit a pale and squalid complexion, which forms a strong contrast with the fresh and ruddy countenances of those who rise early, to follow some healthful labour or amusement in the

open air. The experience of various persons who have attained to an extraordinary old age, is strongly in favour of the healthful tendency of early rising; the obvious effect of which is, to prevent the pernicious practice of turning night into day, and day into night. The healthful tendency of this practice is not wholly to be ascribed to the superiority of morning air; though I believe there may be something in this. A variety of advantages are secured, which must be regarded as combined in producing the effect in question. In my First Lecture, I stated to you the beneficial effects of light: the early riser receives the greatest portion of this influence. Early rising is almost necessarily conjoined with early retiring to rest; and it has often been observed, that sleep before midnight is more refreshing than a longer portion afterwards. Instances of the great longevity of early risers, who may have been in the habit of giving way to intemperance in drink, have been urged in opposition to those who have endeavoured to set forth the destructive influence of the want of sobriety. These instances, however, by no means bear out the argument attempted to be drawn from them: at the utmost, they would only shew that one bad habit is not so prejudicial as two. The truth, however, appears to be, that early rising is strongly opposed to intemperance in drinking; since the early retiring to rest calls off the drinker from his liquor long before his companions have finished; and though he may seem to have drunk hard, and have really taken to excess, he may, notwithstanding, have consumed much less than his companions. The difference in the immediate effect produced, appears to confirm what I have said, and to account for the longevity of some of these reputed

drinkers. Rising early on the morrow of their shortened debauch, they are found, it is true, the worse for their excess, yet engaged in their ordinary occupations; but those who have drunk through a large portion of the night, scarcely rise from their beds the next day; and are fit for nothing, if they do. I know that early rising has been the safeguard against the destructive effects of excessive drink, in the mode which I have just explained. It is also the surest means of avoiding giving up too large a portion of time to bed and sleep, which ought really to be regarded as a species of intemperance in itself, as well as the ally and promoter of many other forms of excess. John Wesley, in his discourse on Early Rising, which I strongly recommend you to read, says: "By soaking, as it is emphatically called, so long between warm sheets, the flesh is, as it were, parboiled, and becomes soft and flabby; the nerves, in the mean time, are quite unstrung, and all the train of melancholy symptoms, faintness, tremors, 'lowness of spirits' (so called), come on, till life itself is a burden." And he adds: "This fashionable intemperance does also hurt the soul in a more direct manner. It sows the seeds of foolish and hurtful desires. It dangerously inflames our sensual appetites. It occasions, and continually increases, *sloth*, so often objected to the *English nation*. It opens the way, and prepares the soul for every other kind of intemperance. It occasions an universal softness and faintness of spirit; making us afraid of every little inconvenience, unwilling to deny ourselves any pleasure, or take up and bear any cross."

The period to be devoted to rest must not be regulated solely with reference to the time of day. I have already remarked, that sleep is unfriendly to

the healthful performance of the first part of the process of digestion: it is therefore undesirable to retire to bed immediately after supper. Hence, if this meal be not altogether avoided, it should be light, and taken very early. It has been observed, that several cases of apoplexy have taken place in persons who have retired to bed after a full supper; and I believe that every one who will fairly try the experiment, will find that he rises in the morning far more refreshed by sleep when he has gone to bed fasting, than when he has supped the preceding night. These remarks with respect to sleep do not apply to rest of the body without indulgence in sleep. This, immediately after a meal, is as conducive to digestion as sleep is opposed to it. Almost every one who has used violent exercise after a full meal must be sensible of the inconvenience produced by it. Jackson, in his description of Morocco, states, that the Moors bring up their camels' milk, if they ride their swift horses or dromedaries soon after taking it: and I have known a similar result to be produced on a British stomach, after a hard gallop. The effect of exercise, in disturbing digestion, when taken immediately after a meal, was strikingly exhibited in an experiment tried on a young greyhound. Immediately after he had been fed, he was taken into the field, where he was thoroughly exercised in coursing: he was then killed, and the food in his stomach was found almost unchanged: whilst in the stomach of his brother, who had been purposely fed at the same time and left at home, the digestion of the food was well advanced. The allotting of a small portion of time to repose, without sleep, after a meal, is of very great importance to persons who are troubled with weak digestion; and

might with advantage be adopted by all. Were no unnecessary time devoted to bed and the actual taking of meals, and more especially to drinking, the indulgence which I am now recommending would prove no serious inconvenience or encroachment on time.

I cannot dismiss the subject of rest without again noticing and recommending the practice which prevails in many warm countries, of devoting a small portion of time to rest during the middle of the hot days of summer. I believe, that even in our own country the heat is often sufficient to render this practice desirable; and the length of our days at this season would admit of its being adopted with economy, rather than loss of time. ([11])

Nerves.—I shall now proceed to speak of the mode in which the muscles, which I have described, are made to act in such combination, as to perform, so admirably as they do, the various offices to which they are subservient,

Besides those bundles of fibres or threads, of which I have spoken to you as forming the mass of the muscle, we find other fibres, longer than those of the muscle, but much smaller as well as fewer in number. Instead of being of a reddish colour, like most muscles, these threads are white. The threads of which I am speaking, are called Nerves. If, when an animal has been just killed, we galvanize the nerve going to a muscle, or irritate it by pinching or pricking it, we make the muscle contract. What we thus do after death, by galvanism or the like, the will does during life; and it has been fully proved, that the influence of the mind or will acts on the muscles of the body through these same nerves; for if the nerve be cut or

injured, we in vain try to move the muscle. The will is not in the limb; but seems to be connected in some unknown manner with the brain, with which the nerves are in connection. ([12])

There are, however, other nerves besides those by which the will acts on the muscles. We all know, that when we have moved some part of our bodies against another body, or when this other body comes in contact with ours, we are immediately aware of it. This is called perceiving or feeling such body; and depends on a process something like that which takes place between the brain, and muscle which we wish to move; only it is in the opposite direction; and depends on a different set of nerves, which come out from a different part of the brain or spinal-marrow.

Touch.—The instance which I have just given, is a specimen of the simplest of our senses; viz. that of touch.

The sense of touch is not equally acute and delicate in every part of the body. It is particularly so in the ends of our fingers, in our lips, and at the tip of our tongues.

Besides the sense of touch, we have other senses, by which we become acquainted with different properties of bodies; such as, taste, smell, colour, sound. These all depend on nerves belonging to the second class, which I have mentioned; and which are sent to particular organs, specially devoted to the exercise of the different senses.

Smell.—Thus one pair of nerves, proceeding from the brain, is distributed to the delicate membrane lining the nose, and enables us to distinguish the character of small particles diffused through the air, by what is called the sense of smell. It is almost impossible for us to form any idea of the extreme smallness

of those particles, to the presence of which the nose is acutely sensible. Let a small quantity of some powerful scent—as, for instance, of musk—be placed in a large room, the air will soon become sufficiently charged with it for the perfume to be very perceptible, although the musk may be so little reduced in quantity that with the most delicate balances we can scarcely discover that it has lost any weight. Though the nose enjoys the faculty of smell, it also possesses the common sense of touch, which seems to depend on its receiving other nerves besides those which I have mentioned as bestowing upon it the sense of smell.

SIGHT.—Another pair of nerves of larger size pass to the balls of the eyes; in which they are expanded into a thin layer or membrane, lining the inner surface of the thick coat which encloses the clear humors of the eye. This pair of nerves are called the optic-nerves; and the thin expansion, or membrane, is called the retina: these give to the eyes the sense of sight, or the wonderful power of perceiving light. This is truly the most stupendous of all the bodily senses: it enables us to perceive minute particles brought within an inch of the eye; and also those distant stars, which are so far beyond the limits of our solar system, that light itself, which within distances of which we can form any idea seems to be quite instantaneous, may have been years in passing from them to us. The properties of light, which the eyes enable us to perceive, have been the subject of some of the most profound researches and important discoveries which have been made by the greatest philosophers. In the Mechanics' Institution you may have been taught some of the properties of light, and the laws to which they may be reduced; which are not only highly interesting, but

applicable to arts in which some of you may be engaged; as, for example, in the cutting of glass, either for ornamental purposes, or for the more useful objects of making spectacles and telescopes. A knowledge of these laws will not only enable you to understand the principle on which spectacles and telescopes act, but they will enable you to understand a little more respecting the eye itself than I shall attempt to describe to you on the present occasion. I may however observe, that as the eye is not required simply to perceive a diffused glare of light as distinguishable from darkness, but also to judge of the forms of bodies from which light proceeds, it is essential that a clear and defined image of these bodies, reduced to a size adapted to the size of our eyes, should be brought to that very sensible part which has the power of perceiving light. For this purpose, those clear humors which fill the ball of the eye, and of which you may form some idea if you cut open the eye of a sheep or an ox, are so contrived as to form a most complete optical instrument, having somewhat of the nature of the telescope.

Taste.—The next sense, that of taste, depends on branches of a particular nerve; and in some respects resembles the sense of smell, since it enables us to perceive and judge of some peculiar properties of bodies, by means of inconceivably small particles of these bodies applied to the perceiving surface; but in the case of taste, these small particles, instead of being diffused through or dissolved in the air, must be dissolved in saliva, water, oil, or some other liquid.

The senses of taste and smell are not only allied to each other in their character and mode of action, but are constantly associated in their object and exercise.

They are in an especial manner subservient to the purpose of enabling us to judge of articles of food, in order that we may reject the injurious, and choose the wholesome. We smell before we taste; because in so doing we receive a weaker influence from the body of which we are doubtful or suspicious. Then we taste, which brings us into contact with the body; and, if our taste approve, we feel instinctively disposed to allow the article to pass into the stomach. It is probable that taste and smell enable the inferior animals to make the right selection from the different articles which nature presents to them; but they are not always able to detect the pernicious agents which man sometimes disguises in their food. The instinctive power which man doubtless enjoys in common with inferior animals, for the purpose of directing him in the selection of his food, is so much altered and injured by his artificial habits, that it is often not to be trusted as a guide with respect to diet. We are therefore very much guided by the report of others, as to what is hurtful or wholesome; and we are so much under the influence of imitation, that we learn to take with satisfaction that which, when first tasted, excited our disgust. Having turned aside our guides—smell and taste—we allow ourselves to be conducted by them, till they have brought us into danger and harm; when we call in further assistance, in the form of medicine and rules for diet, which, if not well appointed, add to the evil which they were designed to remedy. The tongue is not only the organ of taste, but is also a very delicate organ of touch; for which purpose it is endowed with nerves adapted to convey the sensation of contact, as well as those which are sensitive to, and convey the influence of those particles which excite taste. It is

not, however, on this circumstance alone that the tongue is so good an organ of touch. Its pliability, and very varying muscular movements, enable us so to apply it to the surfaces of bodies, that we can accurately distinguish their form. In this respect it resembles the hand of man and the trunk of the elephant.

HEARING.—If the sense of taste bears some resemblance to that of smell, that of hearing may be regarded as having some analogy to that of sight. It does not, like sight, convey to us perceptions originating in the remotest stars of the firmament; but the perceptions which we receive through this sense are sometimes excited by causes which are very remotely situated, when compared with those of which we take knowledge by our other senses. Thus the sound of a large bell, like that of St. Paul's, may be heard for upwards of twenty miles. The noise of a heavy cannonade has been heard at a distance of considerably more than a hundred miles. The sense of hearing depends upon a pair of nerves specially devoted to that purpose. These nerves are distributed to the curious and complicated cavities of the internal ears. They are sensible to those extremely minute and delicate vibrations or undulations of air, liquids, and solids, on which sound depends, and by which it is conveyed from place to place, very much as the expansion of the retina or the optic-nerve is sensible to the mysterious influence of light.

Moreover, as it is necessary for sight that the optic-nerve should be furnished with an apparatus by which suitable images of bodies are produced, so an apparatus is necessary in order that the nerve of hearing may not merely distinguish noise from silence, but also distinguish the endless varieties of note, pitch, key,

rhythm or time, as well as the intensity of sound. This purpose appears to be answered by the complicated apparatus of the internal ear; which consists of curious canals and passages, and several extremely small bones, jointed together, and moved by proportionately small and delicate muscles. The external ear, or that which we commonly call the ear, and which differs so much in form in different animals, appears to be designed, not only to protect the internal ear from injury, but to convey to it the various impressions on which sound depends, and which, by its form, and by the movements which in some cases it can make, it is peculiarly adapted to receive and collect.

All these organs, which send particular sensations to the brain, like the muscles which receive an influence from it, are capable of acquiring a great increase of power from active, yet not excessive use. This effect is more particularly striking in one sense, when another has been lost or neglected. In this, also, there is a resemblance to what we have seen to take place with regard to muscles when similarly circumstanced. I shall illustrate what I have now said, by a few instances of extraordinary power of the senses produced by each of these causes. As an instance of exquisitely delicate and cultivated touch, I may mention the case of a gentleman whom I once had the pleasure of seeing, who, though blind from about two years of age, had become an excellent botanist; so good, indeed, that he was referred to, as an umpire, by other botanists, when they could not agree respecting the particular species of a plant. For this accurate discrimination he relied upon his exquisite sense of touch; which he carefully cultivated and guarded, both in his fingers and mouth. Another blind gentleman, who is become

remarkable for the extent of his travels, and the lively description which he has given of them, became an excellent judge of the Fine Arts, through the medium of the sense of touch: he could not merely decide upon the goodness of a statue, but also of the cutting of a gem or a seal. The blind have been artists themselves; and one or more have been known to execute the likeness of a person's face, by feeling the original and the copy.

The sense of smell is said to be brought to a state of great delicacy and accuracy by some uncivilized nations, who derive assistance from this faculty in the discovery of the game on which they subsist. Blind persons find the value of their sense of smell increased, and can often distinguish persons by it.

Some years ago there was a very remarkable lad in Scotland, who was both deaf and blind: he was therefore indebted to touch and smell for the limited information which he could obtain, respecting what was going on in the world around him. He managed far better than it might have been expected; and his history, which you may find in an old number of the Edinburgh Review, is very interesting. This lad recognised his friends, and formed his judgment of strangers, chiefly by the sense of smell. It is well known that the sense of taste is susceptible of great improvement, from practice and attention to its cultivation: thus, those that make the pleasure of eating and drinking an important object will distinguish several degrees of difference between various articles, both fluid and solid, when less particular and less experienced persons scarcely detect that any difference exists. It is necessary that those who deal in the articles of which the consumers make such nice dis-

tinctions should be fully competent to do the same: we consequently find the sense of taste, not only very delicate, but very accurate in those who excel as wine-merchants and tea-dealers. When the sense of smell has been impaired or destroyed by an accidental cause, that of taste sometimes becomes so acute, that it makes known the presence of those offensive particles which most persons detect by smell only.

Sight may be cultivated in various ways, according to the habits of the individual, and the particular kind of excellence which his occupation requires. Thus those who are engaged as artists on very minute work, such as engravers and watch-makers, acquire an excellent sight of objects near to the eye; but, for this advantage, they very often lose the power of perceiving objects at a distance. Sailors, on the contrary, acquire an extraordinary power of distinguishing objects which are at a great distance. They will decide on the form and size of a vessel, which to others is almost invisible. Some persons, whose sight is neither remarkably long nor short, acquire a surprising accuracy in distinguishing shades of colour, and slight variations in the texture of bodies. Some persons, by habit, acquire a faculty in which the sight is concerned, although it cannot wholly depend on that sense; I mean, that of forming by inspection an accurate judgment of numbers, weight, extent, and the like. Amongst some uncivilized races, the sense of sight is remarkably acute, and equally applicable to near and distant objects. This may be, in a great measure, the result of habit; but it would also seem in part to depend on original perfection of the organ, constituting one of the physical peculiarities of the race. I have been told by an African traveller of

great observation, that this peculiarity is very remarkable in the Hottentots and Caffres, and that it is lost or impaired in Mulattoes of this race.

The hearing, like the sight, is capable of cultivation in different modes. Some persons acquire the habit, not only of hearing, but of distinguishing very distant sounds. Some semi-barbarous nations cultivate this faculty in their mode of warfare; and acquire a remarkable power of perceiving by the sound the approach of an enemy, whether horse or foot. For this purpose, they take advantage of the earth's power of conducting sound, and apply their ears to the ground. By habit, the ear acquires a great nicety in distinguishing sounds, without particular reference to distance. As examples of this, may be mentioned the accuracy with which some persons distinguish the footsteps, voice, cough, &c. of particular individuals. This delicacy of hearing is also distinct from another faculty connected with this sense; namely, that of distinguishing time and tune. On this last faculty depend the taste and judgment of the musician. This may be regarded, to a great degree, as a native talent: nevertheless, it is susceptible of great improvement, by habit, combined with assiduous attention.

The next examples which I shall adduce, will serve to shew how, on the other hand, the organs of the senses may be impaired, either by disuse, excessive exertion, or exposure to various other causes of injury.

The sense of touch is unavoidably blunted by the thickening of the skin, in those who are employed in hard or coarse work; and this very circumstance is, to such, an advantage; seeing, that although it unfits them for various occupations which require delicacy of hand, it secures them against much suffering, to

which a fine sense of touch, together with the roughness of their occupations, would inevitably expose them. At the same time, there can be no doubt, that if more care were exercised, the hands of many workmen might be, in some degree, preserved from the very great injury which the sense of touch sustains, without their suffering more than they do at present from the work in which they are engaged. For this purpose, coarse gloves, and shields for particular parts of the hands, might be used, and more care taken in the mode of handling the different objects with which they are engaged, as well as in avoiding accidental injury to the hands; and also in the treatment of such injuries, when they take place. It is by no means improbable, that the reasonable degree of care which workmen might give to their hands is often neglected, in consequence of the individuals having seldom employed these useful members in a way to make them feel the advantage of a good sense of touch, and the power of delicately holding and working on small or tender objects. Even the act of writing requires the hands to be in a good state; and those workmen who have either never learnt to write, or who have ceased to practise writing, amongst the many disadvantages which they sustain, may place that of wanting one great inducement to take care of their hands. Cleanliness is very essential to the preservation of the hands, as well with regard to the sense of touch as in other respects. I believe that an important hint may be given in this respect. It is certainly injurious to the hands, either to soak them long, or to wash them very often. Workmen would therefore do well not only to avoid needlessly fouling their hands, but as far as possible to do all that unavoidably makes them

dirty whilst they are in that state, rather than make them often pass from dirty to clean. Instead of many hasty and imperfect washings, it would be far better to wash the hands more seldom, but much more completely, and to take especial care to make them thoroughly dry afterwards. The sense of touch, and more particularly the power of holding and examining small objects, is very much injured by a mischievous practice, for which no excuse can be pleaded;—as in the case of the hard-working labourers, of whom I have just spoken;—I need scarcely say, that I now allude to the unsightly and disfiguring practice of biting the nails, which those who have given way to it should resolutely break off at once.

The sense of smell may be injured and blunted by constant exposure to powerful odours: thus persons who are engaged in situations in which such smells exist soon become nearly or quite insensible to them. The dirty and injurious practice of taking snuff, and also diseases and accidents affecting the nose, not only injure, but occasionally destroy the sense of smell. In order that the sense of smell should be in good condition, it is necessary that the delicate membrane lining the passages connected with the nose be neither too dry, nor covered with much secretion. Colds affecting the head, as is well known, for a time injure the sense of smell: they do so, in great measure, by putting the delicate membrane in question into one of the states which I have mentioned: it is therefore important, with reference to the sense of smell, not to allow such colds to take firm hold and become lasting. Did not a sense of decorum make every one feel the propriety, nay, the necessity, of keeping the nose in good order as to cleanliness, I should have to lay

great stress upon this, with reference to the sense of smell. General cleanliness is also very necessary to the preservation of this sense; and those who are dirty from poverty or negligence, or, what is worse, from both combined, seem to be totally unconscious of the offensive smell which proceeds from their persons and apartments, to a degree which is disgusting, or insupportable, to others.

The taste may be injured very much, in the same way as the smell, by too frequently accustoming the mouth to receive those substances which have a very strong taste. Persons who commit this error become insensible to the pleasure and relish created by fine and delicately-flavoured articles; and materially injure themselves, by bringing the mouth to allow those substances to pass into the stomach which are highly injurious to it, and often ultimately fatal to the system. Thus, a sup of ardent spirits, which the wholly inexperienced can scarcely hold in the mouth, after a little fatal practice is taken, not only without suffering, but with great apparent satisfaction; insomuch, that it leads hundreds to spend the greater part of their earnings in the support of gin-palaces, although they know full well that their health is injured, their lives shortened, and their character and comfort destroyed by it. Those meats which the unaccustomed cannot take without pain or inconvenience, and the accompanying symptom of a wry mouth, or even a watery eye, are, after a time, sought with avidity, and swallowed with pleasure. What child is there who does not suffer pain from a few grains of Cayenne-pepper, which the epicure takes with enjoyment? and who is there in this country, who, without sickness, could taste, much less swallow, a glass of the train-oil which

the Russian or the Laplander would take with as much pleasure, and with much less injury, than many of our neighbours would take a quartern of Hodges's best gin?

That the sight may be injured by the disuse of some of its powers, is well known to those whose occupations keep them constantly employed in looking at very near objects; and who become so short-sighted, that, without the help of glasses, they scarcely make their way with safety, and, at a little distance, might as well attempt to recognise their friends by smell as by sight, and by the voice much better. We have almost daily proof, that the sight may be injured by the want of the proper protection of so delicate an organ as the eye, in the effects of strong light, keen winds, smoke, lime, and other acrid substances: and we need only pay a short visit to the waiting-room of that invaluable Institution, the Eye Infirmary, to be convinced how many and distressing are the cases of injured sight, and how numerous are the causes which lead to them. ([13])

The cases of enfeebled hearing, from the want of the due exercise of that sense, are much less frequent, or at least less striking, than in the case of the last-mentioned sense; yet I have known several engravers whose dulness of hearing seemed to have been promoted by the too exclusive employment of the eyes. The hearing at other times is injured from want of sufficient care to preserve the organ. Though the ear is the most securely lodged of all the organs of the senses, it is nevertheless liable to suffer from cold, more especially when applied in the form of moisture or draft. It may likewise be much injured by very loud noises, as that of the explosion of gunpowder.

The due exercise of this sense, as well as that of sight, may be seriously and even dangerously obstructed, by the manner in which the head is dressed. This remark is more particularly applicable to females, who, in following the caprices of their bonnet-makers, are often led to adopt forms which only allow them to see those objects which are directly in front of them; and which, at the same time, so compress the ears, that they fail to give correct information of the danger which may be approaching them from either side. If, under these circumstances, they should happen to hear, it would seem that the sound first perceived is that which is reflected from the inside of the bonnet, and consequently arrives at the ear in a direction the opposite to that from which the danger is threatening. Those who have observed the great risk to which females often expose themselves and others in merely crossing a street, will feel the force of the remark which I have just made. ([14])

The short sketch of the senses which I have now offered, will give you some idea of the advantages and gratifications, beyond what are generally enjoyed, which might be possessed by those who, being blessed with the perfect condition of the organs, do not neglect to improve their powers by the just regulation of the employment of them; and, although I have not thought that my limits allowed me to enter into details, the hints which I have offered will easily suggest the precautions necessary, both for the preservation and the cultivation of our invaluable organs of external sense.

The various and wonderful powers of sense, and also the muscular or moving powers, which I have mentioned in this Lecture, would be useless, without

some principle, to take knowledge of what is received by the one, and to direct the other. This principle we have in the Mind, or Intelligence, which, in some wholly inexplicable manner, is connected with, and co-operates with, the brain.

The nature and operations of the human mind or intellect have occupied the attention of the ablest and greatest philosophers; who have found the subject more than a match for their mental powers. The very brief sketch which I shall now attempt to offer you will not be shaped to the opinions of any particular philosopher, and may, to some, appear irregular: my object will however be gained, if I make myself understood, and direct you to some particular points, which may assist in the cultivation of the intellect.

The first faculty of the mind which claims our attention, is called PERCEPTION. It is that by which the mind receives ideas, or internal images, of whatever it takes knowledge; whether the objects be external to us, or be passing within ourselves. With respect to those objects which are external to us, the perception is indebted to those organs of the senses which I have been describing to you. Perception takes knowledge, not only of the being or existence of things, but also of their various qualities. If the mind is indebted to the external senses for perception, all the other faculties of the mind are dependent on perception: hence the great importance of having good perception. In this respect, there is a great variety amongst mankind.

Another very important faculty of the mind is called MEMORY. It is, as you well know, the power by which whatever may have been brought under the operation of perception at one time, so as to have ideas produced in the mind whilst the object or subject was

really present, is again brought before the mind in idea only, when the objects are not present, and may not have been so for a very long space of time. It is by means of the memory that we are enabled to store up the knowledge of every description which we may obtain at one time, and employ it at another. The vast importance of having this faculty in good order must be sufficiently obvious to strike you all. Memory may be good in two respects: first, as to the length of time which may pass without its losing the power of recalling whatever may have been the object of perception. A person may have a good memory for some things, and a bad one for others: this is very often seen in old men, who recall with ease the preceptions of their youth, but with difficulty those of their latter years. The memory may also be either good or bad, with reference to the fidelity and accuracy with which it produces or renews past ideas or perceptions, without reference to time. You must all have observed, that different persons present a remarkable difference in their memories in this respect. Some persons, in remembering particular occasions or events, recall with great accuracy and minuteness many or all of the attendant circumstances:—such recollections are said to be vivid or lively. Other persons, who may long retain the remembrance of events, do so in an imperfect manner; either forgetting the circumstances altogether, or remembering them inaccurately, as to the order of time, and other relations which they bear to each other.

Another faculty of the mind, and certainly one of the most important which it possesses, is called JUDGMENT. It is the faculty of distinguishing the various relations which things, whether present and

perceived, or absent and past, and of which the ideas are therefore supplied by the memory, may bear to each other: we compare them, and give to each their relative position, as to their different qualities. We form, by the action of the judgment, new ideas; in which we are assisted by experience, which in this place may be understood as memory, respecting the observations which we may have made, of the action of one thing upon, or in conjunction with, another. The judgment may employ the new ideas which it has produced, in making new comparisons, and forming fresh ideas; and it may continue to do this through a long series. This process is called REASONING; and the art of performing it in a correct and straightforward manner is one of the greatest importance, and is the true meaning of what is called Logic. The judgment may be quick or slow, strong and sound, or weak and erroneous.

There is another faculty of mind, called IMAGINATION, by which it is enabled to create ideas of objects which do not exist, which never have existed, and probably never will exist. These constructions of the imagination are, however, necessarily made up of ideas with which perception has at some time supplied the memory. Their novelty consists in the new combination and arrangement of the parts of what is imagined. Thus, the fabulous animal called the mermaid is a creature of the imagination; which has produced a new idea, by combining the well-known and real objects, the upper part of a woman with the tail of a fish. When the imagination produces out-of-the-way or impossible objects, as in the example just given, it is called a *wild imagination*. It is by no means upon such objects only that the imagination is necessarily

engaged: it may construct forms, and combinations of forms, which are quite compatible with nature; as when an artist, either sculptor or painter, represents a man, or other animal, whom he has never seen. If by his imagination he can collect the different points of beauty, which he has observed in numerous specimens in actual life, rejecting all those points which are blemishes and defects—if he can combine them in a way which is perfectly consistent with, and calculated to set off, the various beauties which he has collected, and then give this creature of his imagination existence as a picture or statue, so that the figure shall be as beautiful as a whole, as the different parts were separately —he will have produced a specimen of what is called ideal beauty, and he will have proved himself to possess a *fine imagination*. You will see that this is a most valuable faculty to all artists, who are not simply engaged in copying the works of others. Imagination is not confined to the production of a few new forms, but may be carried to a series of ideal events: thus, we may conceive a child to be born, to grow up, and meet with a great variety of circumstances, some calculated to make him happy, others miserable. We may conceive, or imagine him, as he grows up, to take a vicious course, blast all his good prospects, grovel in vice, become an enemy to himself and a curse to others, and, whether rich or poor, die a miserable death, neither lamented nor regretted by any: or, we may conceive the individual, whom our imagination has created, taking an opposite course, choosing what is good, turning advantageous circumstances to the best account, and profiting by the experience of others as well as his own; leading a correct and virtuous life, happy in himself, and promoting the

happiness of others; till at last death meets him, but without its terrors, and removes him, whether rich or poor, beloved and respected by all who knew him. It is this kind of imagination, conjoined with the power of conveying such created ideas to the perceptions of others, in expressive and harmonious language, which constitutes the talent of a poet, whose imagination is said to be *lively* or *grave*, *pure* or *vicious*, according to the character which he gives to the creatures of his imagination, and the tendencies of their supposed example. You will easily conceive that the exercise of the imagination, in the mode of which I am now speaking, may be made either a source of pleasure or pain, of infinite mischief or possibly of real good: yet there are some who, not without reason, are of opinion that imaginary examples, though of a good and virtuous character, have in some respects an injurious tendency.

There is an exercise of the imagination, of much greater and more general application than those of which I have been speaking;—I mean, that exercise of imagination which is necessary to produce what is called CONTRIVANCE. A good contriver is indebted to his imagination for those expedients and combinations which it is his object to have brought into actual practice. It is necessary that the imagination of the good contriver, though prolific, should be of what is called the *sober* kind, never losing sight of the matter of fact for his guide: it must also be most obediently under the influence of the judgment,

Another faculty of the mind is called the WILL:—it is that which prompts us to put our other faculties, bodily as well as mental, into action; and leads us to do, or to attempt to do, whatever we undertake:—it is

also a cause of our refraining, or endeavouring to refrain, from doing that which we should otherwise perform, either by the continuance of a former act of the will, by habit, or under the influence of some cause external to, or independent of, our own persons. The various appetites and passions are very much concerned in the production of the will; but they must not be confounded with it:—they may often be opposed to the will, and, when opposed to each other, make the will vacillating and uncertain. Thus, superstition or insanity may make a person will to fast; but his appetite for food is not lost, but, on the contrary, painful and excessive: yet it is often doubtful, in these cases, whether the appetite may remain controlled, or ultimately change the will. These faculties, except perhaps the imagination—respecting which it is obviously almost impossible to gain information—are, to a greater or less degree, possessed by the inferior animals as well as by man. That they have perception, is very evident, from the impulses to which it leads. No one can doubt their having memory, who has had an opportunity of knowing the length of time which the horse, the dog, and many other domestic animals, remember persons and places: in fact, in this kind of memory they often surpass their masters. With respect to judgment, there can be no doubt that some of the higher species of brutes possess this faculty within a limited extent; although, when we come to compare its power, and the limits of their judgment, with that which man is capable of exercising, we have some of the most striking evidence of that immense superiority of man, which places him as a distinct class, above, and remote from, the whole group of inferior animals. With respect to imagination, we

have reason to believe that some of the higher brutes are not without a modification of this faculty; by which they are enabled to plan and contrive, in cases in which what is called instinct can scarcely be admitted as the cause. That the inferior animals have a will, must be well known to all those persons who may have had their own wills thwarted by unruly and headstrong animals. Much revolting cruelty is often exercised by the ignorant or vicious, through mismanagement and violence, in their attempts to subdue, instead of direct, the wills of inferior animals. ([15]) In most of the inferior animals, the will is almost absolutely guided by their passions and appetites. Their passions and appetites appear to be subject to much less disorder and derangement than those of man. By their union, they appear to form the greater part or whole of instinct. The instinct of the lower animals, unlike the passions of man, is, in most instances, an unerring guide to these animals. Animals, however, may receive from man such an education, as may greatly pervert, or modify, their natural instincts.

To regulate the unruly passions of man, almost all philosophers, whether Christians or Pagans, have admitted a *moral principle;* which revolts at what is base, but approves what is good, and stimulates to the performance of it. The possession of this principle seems to be one of the special endowments of man, by which he is distinguished from the lower animals, most of whose best actions may be referred to the love of approbation, or the dread of punishment: at the same time, we can scarcely refrain from admitting, that some of their actions seem to be under the influence of what appears to be like a limited and rudimentary moral principle: thus some, with little or no discipline, are

remarkable for inviolable honesty, though surrounded by temptation, and without inspection. Dogs have continued to obey the commands of their master when he has been long absent, and in spite of the pinchings of hunger. Some animals have a strong dislike to contention and strife, and separate the combatants when they have the power to do so.

The mental faculties, like those of the body, are capable of cultivation and improvement, by due attention to their use; whilst the neglect or abuse of them as certainly leads to weakness and derangement, as we have seen to be the case with those of the body. Individual prosperity and happiness, and the welfare of society, are yet more closely connected with the cultivation and preservation of the mental powers, than with the preservation of the bodily health and vigour of individuals and communities. Though I shall not dwell long on this subject, and weary you with numerous remarks, yet I would wish, in a most especial manner, to press this subject on your serious and practical attention. It is one which the present state of the world, and of our country in particular, renders more than ever important. It does not call for theoretical and speculative study, but for a persevering and zealous attention to those points which must be most obvious to you all.

I have stated, that the different mental faculties are capable of great improvement, by exercise and cultivation. This is very strikingly the case with Perception. Those who are in the habit of frequently and carefully exercising this faculty, observe almost an infinite variety of circumstances, which others, having precisely the same opportunities for observation, completely overlook: the latter are *negligent observers;*

the former are called *attentive observers;* and the habit of disciplining the mind to the active and steady exercise of its perception is called *attention.* It is essential to all mental improvement; and, like our other habits, may be confirmed and strengthened by practice; and weakened, if allowed to relapse into disuse. I cannot too strongly enforce the importance or recommend to your zealous care the cultivation of this habit, on which every species of excellence, and even moderate proficiency at which you may aim, essentially depends. The improvement of the perceptive power is equally conspicuous, with respect to objects made known to us by the external senses, and those which are of a purely intellectual character; and the influence of habit is equally conspicuous in both.

I have already mentioned some facts, illustrative of the improvement of perception, where sight and some other external senses are concerned; and, in addition to them, I may notice the quickness and accuracy with which a good and practised artist detects flaws, imperfection, and want of finish in his work, which a person less practised, though having equally good eyes, would either overlook or be longer in discovering. The same kind of improved perception is observed among uncivilized nations, in the discovery of game; and also among botanists, and other natural historians, who are constantly looking out for the objects of their study. As instances of quickened perception of ideas of a purely intellectual character, influenced by the direction given to the attention, I may notice the readiness with which some persons perceive whatever tends to the ridiculous, and detect a pun, a double meaning, or a mistake of the kind called a *bull*, unnoticed by others. Some persons

have a vicious facility in detecting allusions of an impure or unseemly character: others acquire a delicate perception of those deviations from propriety in speech, which depend on violation of the rules of grammar. In this, and many similar instances of cultivated perception, the activity of other mental faculties, besides perception, is necessarily concerned.

The memory admits of a very wonderful degree of improvement. By constant practice and close attention, persons have brought their memory to such a state, that they have been able to repeat the whole of a long speech which they have once heard delivered. The speeches made in the British Parliament were at one time very ably reported in this manner. Some persons, by habit, recollect a great variety of numbers and names; and repeat them without destroying their order, although they may be placed indiscriminately, without any principle of arrangement. Though practice and attention are the essential and principal means by which the memory may be cultivated, it may receive help of a different kind; as, for example, when something well known, and consequently easily brought to the recollection, is united in the mind with that which is new and desired to be remembered. Thus, a person has been able to recollect in order a long list of words, having no connexion with each other, by imagining them, one after another, to be deposited at certain well-known spots, in the course of a walk which he conceived himself to be taking; and when repeating them, he has imagined himself collecting them, in the course of the same walk. A memory thus assisted, is called an *artificial memory*, and a variety of plans and expedients have been proposed to aid in its perfection. A string of beads,

called *wampum*, was employed by the American Indians, to enable them to recollect the subjects and order of their discourses.

The memory may be materially and permanently assisted by the frequent writing of that which is wished to be remembered. By this, the attention is fixed; and the eye, the ear, and the operation of writing, concur to make an impression on the memory. The memory may be stored with, and may retentively possess, that which it does not understand; as we see in the case of a lady's parrot. When any thing is thus remembered, it is said to be had *by rote*. This mode of using the memory is despicable and injurious, when employed as a counterfeit to real knowledge. When the mind is to be cultivated by the exercise of the memory, that which is remembered should be also comprehended; but, on the other hand, it is not enough for a fact or principle to be well understood at one time for it to be made permanently ours. It is no disparagement of the superior importance of comprehending the subject, to urge the necessity of cultivating the memory; which, as we have seen in the case of learning things by rote, may be an independent act of the mind. The comprehension of the subject doubtless greatly assists the memory; and should, if possible, be the first step in our attempts to impress any thing upon it: but in order that the subject should be indelibly fixed in the memory, it is necessary that it should be present to the mind for a period of time which may exceed that which our perceptions may require for its comprehension. If we cultivate the memory, especially in youth, we may shorten the time required, and ultimately reduce it to that which is necessary for comprehension. I have laid the more stress on this

subject, from the conviction that it forms an important element in the science of education.

The judgment is unquestionably very susceptible of improvement, when pains are taken with its cultivation. In seeking to improve the judgment, that which is perhaps the most essential, is, to let the mind proceed with sufficient slowness and deliberation, in order that the judgment may not be formed until our perception has taken knowledge of all the facts and circumstances from which the judgment is to proceed: in doing this, the attention must be well occupied, and the memory must bring the past into relation and comparison with the present. By practice, this process may be gone through with increasing rapidity, and without injuring the result, provided none of the elements and steps of the process are neglected. These, it is true, may be neglected in a judgment slowly formed; but this is not likely to be the case, except from carelessness or weakness in the individual, or from his being deceived as to facts. Too great haste in forming a judgment without sufficient materials, is, perhaps, next to absolutely criminal design, the most frequent and baneful source of the mistakes and errors committed by individuals and bodies of men. Thus, the popular demagogue, who for a time directs the opinions of the multitude, in vehement opposition to, or support of, particular men or measures, does so, in part, by means of the superior talent and address with which he places before their minds those facts, and those views or ideas connected with them, which favour the object which he wishes to carry: but he owes his success much more to the unfortunate, to the lamentable propensity, which so generally prevails, of forming a hasty judgment with imperfect and deficient materials. It is this

circumstance which, in all ages, has brought disgrace on the decisions of popular assemblies, by rendering them remarkable for their folly or their immorality. In the present day, this is a consideration peculiarly worthy of your attention: and let me caution you against the evil, as one of the greatest banes to the happiness, and one of the greatest enemies to the liberty of a people. Time does not allow of my quoting illustrations; or I might easily shew, that, by this weakness, people have been led, as it were blindfolded, into the evil which they thought to repel. If the importance of forming a sufficiently deliberate and sound judgment is most conspicuous on those occasions in which larger or smaller bodies are concerned, it is more frequently, closely, and keenly felt in the case of individuals and families. You must all of you daily witness, and probably some of you feel, the painful consequences of hasty and mistaken judgment. Let me therefore earnestly entreat you to bear in mind the importance of cultivating a sound judgment, by first becoming well possessed of all the facts and circumstances, and following out sufficiently far, the series of new combinations which are likely to result from them. I must add, however, that there is something more than this, which is often implied in the term 'sound' or 'good judgment.' This inestimable faculty seems to comprehend something more than merely the adequate perception of all the facts, and the power of estimating their combinations. There must also be the perception of the fitness of this or that combination. Here, then, the judgment must be combined and connected with the moral principle. ([16])

The imagination, by frequent exercise, acquires a great facility in producing ideas of that particular kind

in which it has previously been occupied. Although some persons, by the works of their imagination, have contributed largely to the gratification of others, and formed for themselves a reputation which has lived for centuries, yet I would wish my remarks in this place to have the effect of inducing you to repress, rather than encourage, except within certain limits, the growth of this faculty. The accumulation of matters of fact, and of useful principles in Arts and Science, is in the present day so considerable, that all may find quite enough of what is agreeable and useful, as well as necessary to engage their minds, without occupying them with the phantoms of the imagination, whether called up by themselves or others. There is a pernicious and criminal activity of the imagination, which is greatly promoted by habit, and which, with many persons, is insidiously strengthened;—I mean, that of readily inventing excuses for faults, both of commission and omission. These excuses, with which the imaginations of some persons can always furnish a supply, are the refuge of a mean and cowardly spirit. They destroy the proper reverence for truth and honesty, and that zeal in the performance of one's duty, which are essential to the steady practice of what is right and laudable.

It is undoubtedly a most valuable exercise of the imagination, which, in conjunction with other natural and acquired resources of the mind, enables the mechanic or manufacturer to devise improved plans for the performance of his work: but imagination, even in this useful application, may be injuriously active and luxuriant.(17) It is not every new plan or process which will, even if it be practicable, be found preferable to those which experience may have already sanc-

tioned. Far be it from me to repress the improvement in any art or productive process; and I hope that I may not be misunderstood, when I am merely intending to express a caution against that too luxuriant and imaginative invention, which is constantly scheming to desert those methods and processes which have stood the test of experience. Let the example of many individuals, whose extraordinary talents have been particularly exhibited in their powers of invention, by which they have been the means of enriching others, but who have thereby been ruined themselves, be a warning to all in whom this scheming propensity is excessive. Instances may occur, in which the unavoidable expenses of bringing an important and desirable improvement to completion may be more than the resources of the ingenious projector can sustain, and he may be ruined before remuneration commences; but, in most cases, a larger share of prudence might avert so unfortunate a result, without any detriment to the progress of invention.

Even the moral principle itself, like the mental faculties of which I have been speaking, admits of a high degree of cultivation. It is strengthened and rendered active by the constant practice and contemplation of what is excellent and virtuous; but it may be lamentably weakened, or even destroyed, in those who abandon what is good, to follow a base and criminal course of life. ([18])

The different mental faculties of which I have been speaking, appear, in different individuals, to display much greater strength in one kind of exercise than in another. If we look to the memory for an illustration of this remark, we may observe, that some persons, with little or no advantage of instruction in ciphering,

can recollect very high numbers, and add, multiply, divide, and subtract them; and recollect these results to an extent which another person, with every advantage of instruction and practice, would in vain attempt to rival;—and yet this educated arithmetician may possess an excellent memory, and be able to recollect a speech, a poem, or a fact, more easily and more accurately than the ciphering genius, by whom he is surpassed in the recollection of numbers. The consideration of facts like this has led some persons to suppose, that as in our bodies we have feet to walk with and hands to grasp, so the mind is a compound of separate powers for distinct purposes; and, as they conceive that these different powers are connected with different parts of the brain which are larger or smaller in proportion to the comparative force of the particular mental faculty connected with it, they believe that the natural capabilities, or talents of the mind, are indicated by the form of the head. Thus, a person with a fine and capacious forehead is supposed to be constituted for a philosopher; and another, who has considerable breadth to the outer side of the eyes, is regarded as made for an arithmetician; whilst a third, remarkable for the dimensions of his head, in another direction, is thought to be adapted for a musician. These observations constitute the basis of the system to which craniologists, or phrenologists, have given considerable extent and minuteness. They believe, and not without great appearance of truth, that memory, imagination, and judgment are not independent powers; but that the musician, whose talents attach him to sounds, will have memory, imagination, and judgment connected with them: the same will be the case with the arithmetician, with respect to numbers;

and the philosopher will be equally remarkable for the operations of his mind, with reference to causes and effects.

The mind, such as I have just described it, as composed of various faculties, being the noblest part of man, is that which it is our special duty to watch over, cultivate, and protect. Its cultivation, which is the most important branch of education, may, for our present purpose, be divided into three parts. The first, and unquestionably the most important section, is that which relates to the *moral principle*; since on the correctness and strength of this principle depend not only the propriety of our various actions in every department of this life, but also our hopes and prospects for the next. It relates not only to our feelings and actions towards our fellow-creatures, but also to our duty towards our Creator. In proportion as this section of the cultivation of the mind is carefully and successfully advanced, we become increasingly actuated by love, gratitude, and obedience to the Author of all our blessings.

I shall leave this important division of mental cultivation to those whose office it is to address you in your places of worship; but, before I dismiss the subject, I would not only caution you against the neglect of this kind of mental cultivation, without which the mind becomes like a desert, and the haunt of vicious and degrading passions, but also against a spurious and deceptive substitute for this cultivation; giving to words and actions, as noticed by superficial observers, a great appearance of strictness and sanctity, but which does not bear close examination. It is this spurious cultivation which produces hypocrisy and cant, the odious counterfeits of virtuous action, and of the genuine language of a well-regulated mind. ([19])

The second division relates to that EDUCATION which is required for the due performance of our respective businesses or occupations in life; and the third, to those collateral branches of knowledge, which, though not absolutely necessary for the performance of several kinds of work and the management of our affairs, nevertheless contribute to our satisfaction and enjoyment, and both enrich and healthfully exercise the mind. The education or improvement of our minds depends not only on our own attentive observations and reflection, but most materially on what may have been discovered or acquired by others, as well those who may have lived before us, or who may be now living in different countries, as those who are in immediate communication with us: hence, in the present day, there can be no limit to education, or the enriching cultivation of the mind.

It is very essential that the education of individuals should not only be industriously and zealously attended to, both by themselves and their instructors, but that the right direction should be given to it, with respect to the course of life and the occupation which the individual is to follow: this, as I have already stated, may be considered as the second branch of education. I am by no means disposed to undervalue its great importance, both to the individual himself, and to the community or country to which he belongs; but, at the same time, I must expressly protest against what I conceive to be a gross error, avowed and maintained by many of the higher class (though I trust their number is now greatly reduced)—and which is yet more extensively and perniciously, though silently, sanctioned by the working-classes themselves, in the expressive language of conduct—that their education need not,

and even ought not, to extend beyond that which their occupations or their station in life actually demand. These occupations, as you must be well aware, often call for very little exercise of the mental faculties; which must either degenerate into a state of lamentable weakness without other exercise, or, for want of direction, become engaged in what is actually pernicious. Whilst, then, it is not too much to expect that the operative of every description should bring to his work every practical requisite for its performance, I see no reason that he should not, in common with his wealthier fellow-citizen, have the comfort and pleasure of his period of rest and recreation promoted, by every species of allowable mental occupation which can be placed within his reach. There is no reason that such mental improvement should raise the individual above his work and station, except in those cases where he really possesses very superior abilities. It is only the rarity of this improvement which can occasion any danger of this kind: if it were general, some instances of superior genius, now lost to the community, would probably be brought into notice; but the mass would remain where they are, as respects their occupations, though their comfort and happiness would be greatly increased; when instead of being left to wallow in sensual gratifications, they might seek and find pleasures of an intellectual kind. ([20])

So far from any injurious consequences being likely to result from operatives of every class seeking a part, at least, of their amusement and gratification, during their hours of relaxation from work, in the cultivation and occupation of their minds, very great public advantage may be reasonably expected from it; especially if particular attention be paid by the artisans of

each particular description, to the acquirement of that knowledge which will make them acquainted with the principles and theories connected with their operations. If this were the case, important improvements would rapidly succeed to each other; since the capability of correctly devising expedients would be united with practical knowledge, and acquaintance with the circumstances in which they are required. ([21]) Whilst the evils and inconveniences of ill-devised methods and processes, whether old or new, would be quickly detected and exploded, the real merits of others would be better perceived and appreciated, and more generally adopted: in fact, it would tend more than any thing else to do away with that dogged obstinacy, which is so often associated with the ignorance and prejudice of those workmen who know nothing beyond the mere routine of those operations in which they have hitherto exercised themselves. I do not apply my remarks to any branch of trade in particular; since it is notoriously difficult in all to procure the execution of any piece of work which may be out of the common way; and the workman who will take in a new idea, and produce his work in accordance with it, is esteemed a singularly clever fellow. The great benefit which Mechanics' Institutions are calculated to produce, depends on the opportunity which they offer to workmen of every class, to acquire that kind of knowledge which I am now commending. The character and utility of these Institutions must mainly depend on the mode in which they are encouraged and supported by those for whose instruction and gratification they have been formed. It is not enough that the best attention of persons of superior attainments has been employed in devising and establishing them: it is

only by their being diligently and assiduously attended, through the zeal of the operatives themselves, that the character and utility of Mechanics' Institutions can be kept up. Well-qualified and good teachers will soon be tired of lecturing to empty benches, or to a negligent and inattentive audience. Inferior teachers must then be applied to; and the numbers attending will be still further reduced, unless they convert those opportunities which were designed for instruction into mere occasions of amusement. Lasting praise is due to Dr. Birkbeck, not merely for the contrivance of these Institutions, but for the time and attention which he has devoted to giving them that impulse which has brought them to their present state; but it is to the mechanics themselves that we must look for carrying forward, and rendering permanent, the work which he has so ably begun. To induce you to perform your part, I do not know that I can advance any thing more effectual than the example of the Doctor himself. The possibility of performing any thing really great, requires, amongst many elements, one which is most essential; namely, the due employment and economical distribution of time; by neglect of which, whole years may be lost in scattered and neglected minutes. Dr. Birkbeck, through life, has been one of the most industrious of men; and has thus been enabled to give to his country these valuable Institutions, the merits of which I am now urging, as the fruit of years secured by his industry, and which many in his situation are too apt, either to let slip unnoticed, or to devote to useless amusements. An envious section of the community may suppose, that to attend to the occupations of others, he has drawn largely on the time required for his own. It is right that they should be undeceived;

and know, if they will not imitate, the mode in which he has found time for what he has done.

I will not, however, leave you to the stimulus of a single example, in the pursuit of the course which it is your individual and united interest to take. As Englishmen, you doubtless feel something of a glowing satisfaction in the rank which your country holds amongst other nations. It may be that you feel a degree of pride, in the idea, that in some points, at least, she is surpassed by none; and some of you may apply the flattering unction to yourselves, in the belief that the dexterity of your hands, in part, contributes to this pre-eminence. Do not be mistaken. Other nations are not heedless either of their position or of ours; and we shall only be able to retain that which we now hold, by well-directed and indefatigable perseverance. In France, Mechanics' Institutes have now existed for several years; and the Lectures delivered in them have done credit to the philosophers of that enlightened country. I have repeatedly attended them; and I must now tell you what I heard at one of their opening Lectures. The audience was one of the most numerous, and most attentive amongst which I have ever had the pleasure of finding myself placed. The Lecturer was a man of great industry and talent: he had often visited this country; and is perhaps better acquainted with our various resources, and more accurately appreciates our powers, and the causes which sustain them, than any other man. It was gratifying to me, to hear so large a portion of his illustrations drawn from this country. A pin might almost have been heard to drop, whilst to an audience, consisting of those who were once regarded as our natural enemies, and whom he did not forget to remind

that they were still our rivals, he related the various advantages and resources which we derive from our skilful and enlightened mechanics and manufacturers. But when he held up the English operatives for the imitation of his countrymen, he either described a few bright and rare exceptions, or he drew the picture of what he conceived good mechanics and operatives ought to be—an ideal standard of perfection, to which he wished his countrymen as nearly as possible to approach. Though it might be gratifying to me to hear, in a foreign land, and from the mouth of a foreigner, the artisans of my country not merely described as eminently skilful, but as remarkable for their zealous and successful pursuit of sciences connected with their occupation—and even for sobriety, economy, and freedom from depravity—I confess that I came away from the Lecture mortified with the consciousness that the reality bore so little resemblance to the pleasing picture which he had drawn. I ardently wished that it might become the truth; and I now repeat to you what I then heard, from the same wish, and in the hope, that the ideal perfection of an English workman may be, at least, as stimulating to your exertions as to those of the operatives of France. ([22])

I cannot dismiss the subject of our invaluable Mechanics' Institutions without noticing an objection which is often urged against them; which I believe never has been, and which I hope never will be, a just one. It will be the fault and folly of their members, if they will ever allow it to be so. As I mentioned to you in my First Lecture, those who are unfriendly to your mental cultivation, object against Mechanics' Institutes, that they tend to make men less loyal to their sovereign, disaffected towards their government, and turbulent,

insubordinate, and refractory, as respects the directions and wishes of their employers. I am satisfied that the very reverse ought to be the case. The more you know and value science, and the more you are aware of the improvements to which it leads, the more you must value the continuance of social order, and dread those commotions, which not only stop its progress, but undo what has been already effected. If your understandings are enlightened, you may be aware of errors and evils which would formerly have escaped your notice; but at the same time, you become sensible of the means by which the redress of those evils may be peaceably but effectually sought; and the very knowledge that you are so enlightened is the best check which can be applied to those who might be disposed unduly to extend their authority. I cannot offer you a better proof, that the cultivation of the mental faculties is not unfriendly to loyalty, and to that degree of subordination which is essential to regularity, than is to be found in our Northern countrymen, the Scotch. Until lately, when their crowded manufacturing towns may furnish some exceptions, the children of the peasants in Scotland, even when they wanted many of the comforts and were sparingly supplied with the necessaries of life, still received a good and, not unfrequently, a liberal education. This has by no means rendered them above their work, and impatient of controul; but it has enabled them, though commencing by the lowest stations, progressively to rise; partly by their superior capabilities, and partly by their continued care, on the one hand to please, and on the other to avoid offending; until, in numerous instances, they have reached the highest post in the concerns, public or private, in which they have been

engaged. So far has their education been from rendering them turbulent and unmanageable, that they have even been reproached with the opposite character, and with bearing almost with servility, hardship and indignity, when their interest was concerned in their doing so. But it is needless to look to individual instances, where jealousy has perhaps led to defamation, instead of imitation. It is notorious, that the Scotch, as a body, and in a political character, long and quietly submitted to the grievance of a most faulty representation; and, that that party in our country the least friendly to political freedom has been particularly strong in that part of the island; and also, that the same party has drawn a large proportion of those in its employ, from that quarter.

Although, in the face of facts like these, it can never be justly urged that the education of the labouring classes necessarily leads to the production of disloyalty and disaffection, you ought nevertheless to bear in mind, that education, like every other good, may be perverted and misapplied. The knowledge which is gained, is a power which may be applied to evil purposes; and the mischief which is done may probably be in proportion to the amount of power which is misapplied. When you come together for the purpose of adding to the stock of your acquired knowledge, you may unfortunately meet with those who may endeavour to instil pernicious principles, or suggest vicious and disorderly practices; but if they succeed in seducing you, it is not because knowledge has weakened your regard for virtue, or strengthened your appetite for what is evil. On the contrary, if you attend to the hint which I have given, respecting the cultivation of the judgment, you will be more able than

others to detect the fallacy of the arguments addressed to you, and to turn aside from the allurements which may be set before you. It is not in Mechanics' Institutes, where the intellects may be strengthened, that the danger is to be dreaded, but in convivial meetings, in taverns and pot-houses, where the reason is drowned, and the passions are afloat, in abundance of intoxicating liquors.

If you wish to keep yourselves, and your valuable Institutions for the improvement of your minds, clear from the accusations or reproaches to which I have alluded, you must be very careful, both in the admission of new members, and in watching over the conduct of old ones. The errors of a few, committed through ignorance or thoughtless inadvertence—or, it may lamentably happen, in some instances, through perverseness and want of principle—may, without the care which I have recommended, be held up as specimens of your conduct as a body; and thus bring you under undeserved suspicion and censure. Remember, that it is much easier to stop and correct an evil at its commencement, than when it has been confirmed by the sanction of time. I am by no means recommending an inquisitorial prying into the conduct of your fellow-members and neighbours. The care which I would urge you to take, does not require this. It will be quite sufficient for one or two of your prudent and well-approved members, to make such inquiries as they may think necessary, before the admission of a member; and merely report the general result to their associates. Remember, that it is much easier not to admit, than, having admitted, to expel a member. You should likewise be no less careful in selecting the Lecturers whom you patronize, and the books which you admit into your Libraries.

Although, in the commencement of these Lectures, I did not think it necessary to define that which is generally understood by the term *Health*, I have now, in the Three Lectures which I have delivered to you, given an outline of those various functions, on the united due performance of which perfect health depends. You will at once perceive, that the combined perfection of all these functions falls to the lot of few, if any, among mankind; yet, that whilst we often have ourselves to blame for occasioning or allowing their disturbance, we may observe throughout, that there is a most admirable tendency to compensation in our frames, by which we are accommodated to the adverse circumstances in which we may be placed;—either the affected function being suited to circumstances, or another function being brought forward to supply its deficiency. You must have observed, that there is very great difference between individuals, with respect both to their bodily and mental powers; which cannot be referred to a difference of health, in respect to them. Some of these differences depend on the degree of cultivation afforded to these faculties, and, as far as this is concerned, very much depend upon ourselves; but there are other differences, no less important, dependent on constitutional peculiarities, which, though we may in degree correct and modify them, we cannot wholly surmount.

It is therefore impossible to establish one general standard of ability both to do and to suffer, which is to be regarded as constituting the state of perfect health: but if, in running through an inquiry respecting the various powers or functions, which I have briefly exhibited to you in the course of the preceding

Lectures, we should find soundness in them all, conjoined in one individual, we might say that he had the inestimable blessing of enjoying a sound mind in a sound body. Thus, his breathing must be easy, scarcely perceptible to himself or others. It must be little disturbed by continued exercise, or by the ordinary variations of heat and cold. After moderate fasting, he should feel the calls of appetite inducing him to partake with relish, but yet with moderation, of plain but nutritious food. When he has taken this food, its digestion should proceed with no other sensible effect than the invigoration and moderate excitement of mind and body. There must be no headache, no nausea, no heartburn and flatulence; no craving for the poisonous stimulus of spirits, to correct uneasy sensations; nor drowsiness, interrupting thought, and irresistibly leading to profound sleep. All the movements of the body must be performed without producing suffering, either at the time or afterwards. They should also be executed with precision, and in obedience to the will; and with a power proportioned to the size and age of the individual. Whilst he should be able, within the limits of his strength, to grasp, and hold, and move without vacillating, the weighty and the bulky, he should be able also to direct his touch to the smallest visible point; and to hold it, and operate upon it, without a tremor. His back and loins should sustain without effort the weight of his head and arms, and retain for themselves a position gracefully erect, when not engaged in movements which require a different attitude. His legs should well sustain the weight of the other parts, and perform with ease and alacrity every species of movement which may be required of them. His springy limbs should touch the ground

with elastic feet; and he should move onwards with that consciousness of enjoyment, which the poet supposes our first parent to have felt, when he first became sensible of his new existence :—

> "And sometimes went, and sometimes ran,
> As lively vigour led."——

His several senses of Touching, Tasting, Smelling, Seeing, and Hearing, should be delicate and accurate; and pleasure, rather than pain and uneasiness, should be experienced in the employment of them. His mental powers, which admit of so many degrees, may not indeed be able to cope with, and master, the highest and the mightiest objects with which the most talented of men have been successfully engaged; but, within the limits which they possess, they should perform their part with ease, accuracy, and steady constancy. Such an individual should feel all the desires and appetites of his nature, enlivening and animating his exertions, without allowing them to hurry him aside by their irregular impulses. He should be like some skilful charioteer, who guides two fiery horses, and is excited by their ardour, whilst his prowess restrains their impetuosity.

As his body resists the variations and inclemencies of the seasons, his mind should withstand the vicissitudes of fortune. Yet, warmed with the best affections of our nature, he may feel pain in his sympathy with those who suffer, and more especially with the weaker victims of oppression and persecution. He may be aroused by detestation of the base, unjust, overbearing, and cruel; but his wrath should not be spent in useless words, but rather urge him on in fearless and indefatigable resistance. Finally, his mind cannot be healthy, if it be not exercised with those subjects to

which I have alluded indeed, though I have left them to other teachers to express to you in detail. His hopes and his fears must not be limited to those objects which are visible and tangible, and which merely affect him in this life; but, equally removed from cold infidelity, from wild fanaticism, and from degrading superstition, he will feel at times a thrill of gratitude to the great Author and Sustainer of his being, and taste of joys with which no stranger can intermeddle.

Although it is not in the power of any one to say that he will obtain these united blessings, and realize the picture which I have sketched, nevertheless there are many of these advantages which are within the reach of all, if rightly and perseveringly sought after. It has been my part to endeavour to point out the mode in which you may seek those which appertain to our bodies. The hints which I have offered, in pointing to the preservation of health, must also have a tendency to prolong life; but, should accident or severe disease cut life short, and prevent them from exhibiting this result, I am bold to declare, that those who will submit to be regulated by them, will find themselves enabled to make the most of that term of life which it is permitted to them to live; and that, though short, it may abound in well-spent and happy hours.

ADDITIONS AND NOTES

TO

THE THIRD LECTURE.

NOTE (1.) P. 239.

THOSE who may wish to enter into the subject of muscular motion, and other functions of the living body, more minutely than has been compatible with the scope of these Lectures, may do well to peruse, not only the Number of the Library of Useful Knowledge already referred to, but also a recent work of a more extended character, by Dr. Southwood Smith.

NOTE (2.) P. 246.

I have been informed, by my friend James Backhouse, recently returned from South Africa, that he has seen Caffres employed in cutting an extensive trench, for purposes of irrigation; and that they exhibited so much strength and agility, that, with apparent ease, they threw out the earth with their spades from the depth of fourteen feet. They were acting under the superintendence of Lennox Stretch, an enlightened and intelligent Government Agent, engaged to reside with the Caffres. Under his auspices, they have fully proved their susceptibility of improvement, as well as their physical powers. Such are the people whom we have robbed of their territory; and reduced, by a most revolting system of lawless commandos, and the worst form of military aggressions! Better plans are happily now in operation; but there is still much room for improvement, to secure future well-being, to say nothing of retribution for past injuries.—See the *Parliamentary Report;* and the *Wrongs of the Caffre Nation*, by JUSTUS.

NOTE (3.) P. 250.

Walking.—" Walking is the best possible exercise. Habituate yourself to walk very far. The Europeans value themselves on having subdued the horse to the use of man; but I

doubt whether we have not lost more than we have gained by the use of this animal. No one has occasioned so much the degeneracy of the human body. An Indian goes on foot nearly as far in a day, for a long journey, as an enfeebled white does on his horse; and he will tire the best horses. A little walk of half an hour in the morning, when you first rise, is advisable: it shakes off sleep, and produces other good effects in the animal economy."—JEFFERSON; quoted in the *Liberia Herald*, Monrovia, May 20, 1833.

Walking is certainly a most important means both of preserving and of recovering health. Not only those whose occupations are sedentary, but even those who are on their feet during a considerable part of the day, if they are confined within doors, will do well systematically to devote a portion of each day to walk in the open air, although they may be put to some inconvenience to find the time and opportunity for doing so. The best time for walking, especially with delicate persons, is before dinner. If the opportunity cannot then be found, it would be right to choose some time in the afternoon. A walk of adequate length before breakfast is apt, with persons of delicate health, to induce lassitude and loss of appetite, and consequently to defeat the object for which it is taken. Though it is certainly better to walk by daylight than after sunset, an evening walk is better than none at all. I have known a patient, whose health was often disturbed, and who could obtain but little benefit from medicine, relieved from serious apprehensions regarding himself, and restored to perfect health, by habituating himself to a considerable amount of walking exercise, although his occupations obliged him to devote the evening to this purpose. Systematic walking forms a most important part of the directions, laid down by the most successful medical men, for the management of chronic diseases, and for persons convalescent from serious illness. A considerable part of the benefit attributed to change of air, and the use of mineral waters, is really due to the systematic exercise generally conjoined with these means. It is essential that the amount of walking should not be suddenly much increased; that it should never

be carried beyond the individual's strength to bear it; and that while sufficiently brisk to maintain circulation, it should not be so quick as greatly to disturb it. If these points are not attended to, over-walking, whether as to speed or distance, may, like running, occasion affections of the heart, varicose veins of the legs, and injury, rather than benefit, to digestion.

NOTE (4.) P. 251.

The injurious influence of continuance in a bad posture, and more especially that of having the body much bent forwards so as to compress the stomach and interfere with the expansion of the chest, is not only seen in the occupations which I have mentioned, and in which confinement to close rooms and factories may be supposed to have done as much as position in producing the symptoms complained of. Very similar effects are produced in those who work in the open air. I have observed striking illustrations of this remark in gardeners; and I have been induced to refer the remarkable difference which may be observed between the health of gardeners and farmers' labourers, to the unhealthy, bent position into which they are brought whilst employing their hands on the surface of the ground. It is probable that some advantage might be derived, were gardeners frequently to kneel on a pad provided for the purpose, instead of stooping. Stooping should be especially avoided after a meal; and those who can find no substitute for this position, would do well carefully to avoid over-distension of the stomach, either with fluids or solids. Excess in the latter, without reference to the quality of the beverage, is productive of much more inconvenience and injury than are generally ascribed to it.

NOTE (5.) P. 255.

"The Bill which should have put an end to the inhuman practice of employing Children to sweep Chimneys, was thrown out, on the third reading, in the House of Lords, (having passed the Commons without a dissentient voice,) by a speech from Lord Lauderdale, the force of which consisted in, literally, a Joe-Miller jest. He related, that an Irishman

used to sweep his chimney by letting the rope down, which was fastened round the legs of a goose, and then pulling the goose after it. A neighbour, to whom he recommended this as a convenient mode, objected to it upon the score of cruelty to the goose: upon which he replied, that a couple of ducks might do as well. Now, if the Bill before the House had been to enact that men should no longer sweep chimneys, but that boys should be used instead, the story would have been applicable. It was no otherwise applicable than as it related to chimney-sweeping: but it was a joke, and that sufficed. The lords laughed: his lordship had the satisfaction of throwing out the Bill, and the Home Negro Trade has continued from that time, now seven years till this day, and still continues. His lordship had his jest; and it is speaking within compass to say, that, in the course of those seven years, two thousand children have been *sacrificed* in consequence.

"The worst actions of Lord Lauderdale's worst ancestor admit of a better defence before God and man.

"Had his lordship perused the evidence which had been laid before the House of Commons when the Bill was brought in, upon which evidence the Bill was founded? Was he aware of the shocking barbarities connected with the trade, and inseparable from it? Did he know that children inevitably lacerate themselves in learning this dreadful occupation?—that they are frequently crippled by it?—frequently lose their lives in it by suffocation, or by slow fire?—that it induces a peculiar and dreadful disease?—that they who survive the accumulated hardships of a childhood, during which they are exposed to every kind of misery, and destitute of every kind of comfort, have, at the age of seventeen or eighteen, to seek their living how they can in some other employment; for it is only by children that this can be carried on? Did his lordship know, that girls as well as boys are thus abused?—that their sufferings begin at the age of six; sometimes a year earlier?—finally, that they are sold to this worst, and most inhuman of all slaveries, and sometimes stolen for the purpose of being sold to it?"—From *The Doctor* &c. 2 vols. 12mo. London, 1834; quoted in the *Quarterly Review*, No. 101. March 1834.

Since the First Edition of these Lectures was printed, an Act has been passed, in 1840, rendering it illegal to employ climbing-boys for the purpose of sweeping chimneys, and attaching the penalty of fine or imprisonment to the violation of this law. This important Act does not come into operation till the seventh month (July) in next year, 1842. Those who feel an interest in this subject, and desire the termination of this species of British slavery, must be pained at the very little attention which it is evident that the public give to this subject. The number of sweeping-boys who may constantly be observed in the streets, prove that the public, generally, are quite satisfied to let their chimneys be swept in the old-fashioned barbarous manner, as long as the law of the land will permit them to do so with impunity. Ladies have even been known to insist on having their chimneys swept by boys. They would doubtless shudder at the idea of such an employment for any children of their own; and their humanity is very much on a par with that of the woman who consented to the proposal of Solomon for the division of the living child. Those who desire to see the new Act fairly carried out, and to prevent any proposal for a renewed indulgence of the old system, on the ground of the inadequacy of machine-sweeping, would do well to pay attention to the very faulty machines with which a number of idle men may be seen professing to cleanse chimneys. Such apparatus, and such hands, cannot fail to bring the method into disrepute.

NOTE (6.) P. 260.

The unhappy lot of the milliners' and dressmakers' girls, under a system ruinous to health and morals, has, since the publication of the First Edition of these Lectures, been taken up by persons of benevolence and influence; whose exertions, if sustained, will, it is hoped, lead to a correction of the abuses complained of. I allude especially to Lord Ashley; who has not only employed his voice and his pen on the subject, but has taken particular pains to collect information relating to it, through official inspectors and medical men. This inquiry has confirmed not only the existence of the iniquitous system

briefly noticed in this Lecture, but also the kinds of mischief produced, and the great extent to which they prevail. In the course of this inquiry, it was stated, that, in anticipation of a Drawing Room, the milliners' girls frequently work all night; and that on other occasions it is not an uncommon practice to keep them till three o'clock in the morning: that when they reside on the premises of their employers, they not only suffer from long confinement to work and want of exercise, but from unhealthy crowding in confined lodging-rooms: that on the other hand, if they are lodged out of the house, they are exposed in the streets, at hours injurious alike to their health and their morals. The Saturday Magazine has taken up the subject; and it is to be hoped that that influential periodical will not abandon it, until an enlightened public opinion has put a stop to an evil, which it is ashamed to tolerate. It is doubtless, in itself, a good thing to encourage manufacture, and to give employment to the working classes; but it is no less impolitic than wicked to allow this plea to produce the evils here complained of. The tradesman cannot be substantially benefitted by sudden fits of transiently increased demand, which, having no legitimate basis, must interrupt and derange his regular business; and the miserable operatives must pay dearly in pocket and health for the pittance which they may receive for the few hours of extra labour.

Whilst noticing the case of the dressmakers' girls, we must not altogether overlook the case of those who occupy a somewhat corresponding position in the male sex. It can scarcely have escaped observation, that the working tailors are, as a body, a squalid, sickly, and feeble set of men. On this very ground, public attention is notoriously directed to them, but rather for ridicule than for pity. There is a manifest absurdity in this mode of treating the subject; since, whilst necessity and comfort impose a certain degree of attention to dress on every man; and fashion, love of display, and dandyism, call for a far greater amount from very many, the class of men who meet the demands so produced must be numerous and important. In the employment itself, there should

be nothing degrading. Laudable ingenuity may be well exercised in properly fitting the endless varieties in the human figure, so as to conjoin ease with the necessary protection and desired good appearance in every movement and attitude. Good workmanship, honesty, and punctuality, may be exhibited in the completion of the garment: and these qualities should obtain their just value and esteem in a tailor, as well as in any other operative. If their health suffer from their useful occupation, do not despise them, but let the evil be avoided or counteracted. A late distinguished writer on the injurious influence of various occupations has made the following important remarks respecting tailors:—

"Though all inhabitants of large towns suffer in a greater or less degree from the impurity of the atmosphere, yet it is obvious that those who are most crowded together will be chiefly affected, particularly if ventilation be imperfect. A serious addition to the evils of a confined atmosphere is the defect of muscular exercise. Certain classes of muscles are for twelve or fourteen hours a-day scarcely moved, and postures maintained injurious to the proper actions of the internal organs.

"Tailors are very unfortunately situated in this respect. Sitting all day in a confined atmosphere, and often in a room too crowded, with the legs crossed, and the spine bowed, they cannot have respiration, circulation, or digestion well performed. The employment, we must admit, produces few acute diseases. But disorders of the stomach and bowels are general, and often obstinate. Pulmonary consumption is also frequent. Some of the men state their liability to pains of the chest; but the majority make no complaint. It is nevertheless apparent, even from observing only the expression of countenance, the complexion, and the gait, that the functions of the stomach and the heart are greatly impaired, even in those who consider themselves well. We see no plump and rosy tailors; none of fine form and strong muscle. The spine is generally curved. The reduction in the circumference of the chest is not so much as we might expect. The average of our measurements presented 33 to 34 inches, while that of

other artisans is about 36. The capacity of the lungs, as evinced by measuring the air thrown out at an exspiration, is not less than common. The average of six individuals was seven pints two-thirds. The prejudicial influence of their employ is more insidious than urgent: it undermines, rather than destroys life. Apprenticed at an early age, tailors have their constitutions modified to their employment. But its native vigour, drawn off in youth to this adaptation of organs to external circumstances, gradually declines, and finally ceases before the natural termination of life. Of twenty-two of the workmen employed in Leeds, not one had attained the age of 60: two had passed 50: and of the rest, not more than two had reached 40. We heard of an instance or two of great age, but the individuals had lived chiefly in the country. The evils attendant on the employment are, in many cases, greatly aggravated by bad habits. Like other men whom circumstances have physically depressed, the tailor often seeks the baneful comfort of ale and ardent spirit. The time of relief from work is generally spent, not in invigorating the animal frame, but in aggravating his complaints, and converting functional into organic disease.

"Can we correct these evils?—The position of the tailor might be amended. He now sits cross-legged on a board; because in the ordinary sitting posture he could not hold a heavy piece of cloth high enough for his eyes to direct his needle. Let a hole be made in the board of the circumference of his body, and let his seat be placed below it. The eyes and the hands will then be sufficiently near his work; his spine will not be unnaturally bent; and his chest and abdomen will be free."—*Chambers's Edinburgh Journal*, No. 49.

Whether the position recommended by Thackary will be found to answer the operative tailors' purpose or not, I am unable to judge; but I am certain that much of the injurious influence from which working tailors suffer, might be prevented by proper care on the part of themselves and their employers. I have sometimes had occasion to go into a tailor's workshop, and I have never seen any class of workmen so crowded. Their position enables them to occupy very low

ceiled shops; and provided they have room to draw their thread, there is not much space required between them. It is probably on this account that they are satisfied with a less amount of atmospheric air to each individual than is allotted to other workmen. They take but little exercise to produce warmth; and consequently, instead of counteracting the evil arising from crowding, by superior ventilation, they are apt to keep their doors and windows closed, perhaps to prevent suffering from rheumatism, if they were opened. If, to save time, they take a part of their meals in the workshop, or gratify a vitiated taste for drink by allowing beer and ardent spirits to be brought to them, intemperate habits may easily be formed and encouraged, the pernicious consequences of which are greatly promoted by want of exercise and effective ventilation. Let the working tailors pay attention to the condition of their workshops, and avoid those which are close and crowded. Let them counteract the effects of position, by daily exercise; and recollect, that though their occupation is not a dirty one, the surface of the body requires daily ablution: and let them further observe, and act upon the principle, that temperance, desirable for all, is peculiarly necessary for individuals engaged in work like theirs, and consequently resist the somewhat peculiar temptations to drink to which they are exposed. If these points were attended to, tailors would soon cease to be distinguishable as a feeble and sickly class amongst the useful and necessary operatives of the country.

NOTE (7.) P. 271.

Although intensely cold regions, within or near the Arctic Circle, are, for various reasons, unfavourable to the multiplication and development of our species, experience has shewn, that where the necessaries of subsistence are supplied, and proper precautions are taken, these regions, as respects individuals, are not remarkably destructive of life:—on the contrary, it would seem that those very circumstances which occasion a certain degree of want of activity in the healthy functions may also tend to repress the symptoms of disease.

Hence there is a most remarkable contrast between the mortality of expeditions to tropical regions and those which enter or approach the frozen zones. In one of these expeditions, in which Sir Edward Parry was engaged, only one life out of the entire ship's crew was lost from disease: and in this instance, the man left England when symptoms of consumption had already commenced; but the progress of the disease did not appear to be at all accelerated by the inclemency of the climate to which he was exposed. Although Sir John Ross and his party passed a succession of winters on the shores of the Polar Sea, during a considerable part of which time they must have been in circumstances calculated to promote depression of spirits, and in this respect unfavourable to health, the company suffered a remarkably small diminution from illness. Captain Sir George Back's party, in search of Sir John Ross, which passed two winters near to the point of extreme cold, and under a temperature lower than that to which any other travellers had been permanently exposed, did not lose a single individual from disease.* Whilst these facts indicate that extreme cold has not necessarily a fatal tendency, it must also be stated, that, under Providence, the low degree of mortality in these instances must be greatly attributed to the excellent management enforced by those who had the direction of these expeditions. Other parties who have wintered in similar situations have suffered severely. Perhaps the most remarkable instance of this kind was that of some Russian sailors left on the Island of Spitzbergen. These poor men, who were placed under the most depressing circumstances, became the victims of scurvy, of which several died. Even in this case, it appeared, that not cold alone, but indolence, defective food, and in all probability the want of ventilation and cleanliness, were the real causes of the mortality which occurred. It is well to bear in mind, that these are causes which prove destructive in all climates; and that although their influence has been particularly conspicuous amongst sailors engaged in long voyages and cut off from fresh supplies, they nevertheless exert their influence upon land, and amongst individuals of every craft.

* See the Narrative of this Expedition, by R. King, M.R.C.S.

NOTE (8.) P. 281.

In speaking of war, I have mentioned some circumstances connected with the life of a soldier, as tending to promote the enjoyment of health; such as, his regular allowance of wholesome food, removed alike from want and excess; his regular exercise; his suitable clothing; and his accommodation as to dwelling. Though these are advantages, with reference to health, which the regulations of the army are designed to confer on the soldier—which, in urging the mere impolicy of war, I have not been disposed to conceal—I have subsequently learnt, that in these respects the life of a soldier is frequently not so well circumstanced as I had supposed, even when not engaged in foreign service. In various ways, the Commissaries fail duly to perform their contracts, as to the quality of food; and though great care, as well as professional skill, is devoted to the arrangements for the health and comfort of the men, it is impossible to make general rules applicable to all the individual cases. Hence there is often a large mortality amongst those who have recently joined the army. Marshall, who has carefully considered this subject, is of opinion that the influence of the mind is greatly concerned in producing this result. The following extract, from his observations in relation to this subject, is well worthy of attention:—

"The influence of the state of the mind on health is well exemplified in recruits for the army. According to Mr. Henry Marshall, regret for having enlisted, and separation from friends, makes them brood over the inconveniences attending their new mode of life; and their health suffers in consequence. These causes, combined with the fatigue of drill and the restraints of discipline, have so much influence, that "growing lads" frequently fall victims to them. The recruit, if not very robust, loses that active fortitude which is required to fit him to bear up against difficulties; and falls into a gloomy state of mind, that is soon followed by deteriorated bodily health: he loses his appetite, becomes emaciated, a slight cough supervenes, and, after frequent admission into the hospital, he at last dies of diseased lungs. This is an outline

of the history of many a young lad who enlists in the army."—MARSHALL, *On Enlisting and Discharging Soldiers*; quoted by COMBE.

It is probable that the melancholy fact which Marshall has here announced is to be ascribed to the circumstance, that the recruit often enters into his engagement precipitately, and when he is in a condition which renders him incapable of exercising his deliberate judgment. Many causes of excitement or vexation, approaching to despair, may lead a man of hasty temper to enlist in the army; but there can be no doubt that it is chiefly under the influence of strong drink that the vivid representations of the recruiting serjeant are viewed as peculiarly attractive. The recent very remarkable reformation amongst the Irish peasantry, as to the use of intoxicating liquors, seems to have placed this beyond a doubt; since it has been found that the recruiting officer now offers his invitations almost in vain, in those very districts in which he could formerly obtain with ease an ample supply of vigorous and athletic youths, ever ready to fight with an enemy abroad, or to contend with each other in a fray at home.

The enumeration of the evils of war will not be complete, without mentioning the fact, that the service of the soldier is only a variety of slavery. The soldier may be enlisted, not only before he is legally of age, but before he has actually attained to years of discretion; and when he comes to maturity, he may discover, that, by the collusion of his parents and his country, he has been deprived for life of the right of being master of himself. He is liable to the same degrading punishments as the slave; and, like the slave, he cannot obtain the right to freedom, but by redemption, which it may be out of his power, from the want of pecuniary or conscientious ability, to purchase.

NOTE (9.) P. 295.

Although I have, in the course of the Lecture, abstained from discussing the opinion which I hold, in common with the religious sect to which I belong, as well as with many individuals of other societies, that war of every description is altogether repugnant to Christianity—and though it would

swell these Notes too much were I to enter into a full exposition of the subject—I am disposed to introduce a few extracts from a document relating to it, which has been recently printed by the Society of Friends:—

"We have ever accepted the Holy Scriptures as of divine authority; and being taught therein to honour the Lord Jesus Christ as our Lawgiver and our King, we have felt it to be an incumbent duty to obey His precepts. Among these precepts, we have received, in their full and comprehensive import, those injunctions given forth by our Lord, in his Sermon on the Mount: 'Love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you and persecute you.' These commands of Christ are plain and unequivocal; and if we thus accept them, and are enabled, through His grace, to obey them without flinching and without compromise, we can take no part in war: for how can we destroy those whom we are taught to love, or injure those whom we are commanded to bless? How can we seek to kill those to whom we are required to do good, or treat with malevolence or cruelty those for whom we are enjoined to pray?

"No lesson is more clearly taught in the Gospel than the forgiveness of injuries. This duty is repeatedly enjoined by our Lord himself. It is even made the condition on which we are to ask for the pardon of our own offences. 'Forgive us our debts, as we forgive our debtors.' 'If ye forgive not men their trespasses, neither will your Father forgive your trespasses.'

* * * *

"If we follow the example of Him who went about doing good, and who prayed even for His murderers—'Father, forgive them! for they know not what they do,'—how can we, either directly or indirectly, do violence or injury to others? Neither will the Christian, who rightly estimates the example of his Lord, be disposed to elude or restrict it, or to weaken its force by any arguments of casuistry or expediency. He will not have one standard for his private, and another for his public duties. That which prescribes his conduct as a man will regulate it also as a subject and a citizen, and even as a ruler. His demeanour, in every relation of life, will proclaim

his undivided allegiance to the Prince of Peace, and will shew that he is wholly redeemed from the spirit and the practice of wars and fightings.

* * * *

"In our apprehension, it is highly displeasing in the sight of God for the inhabitants of a Christian country to pervert those talents, which ought to be devoted to His service, to the invention and exercise of means for the subjugation and oppression of less-enlightened countries. That naval and military armaments should have ever gone forth to any of those lands, spreading desolation, misery, and death among the unoffending inhabitants, we cannot but regard as a reproach to a people who profess to be followers of Him who was holy, harmless, undefiled, and separate from sinners.

"Even in times of outward tranquillity, military colleges and other establishments are maintained in nations professing the Gospel of Christ; in which men are trained for warriors, and designedly imbued with sentiments of human glory and ambition. For rational beings, possessing immortal souls, and all created by the same merciful Father, to be systematically instructed in the art of wounding and killing each other, and to exercise their skill to do this most effectually, is in itself so utterly opposed to the precepts of Christ, and therefore sinful, that nothing but the force of education, and long familiarity with the practice and the history of war, can have reconciled sincere professors of faith in Christ to the continuance of this practice.

* * * *

"We have with great satisfaction observed, that, in some instances of later times, disputes between nations of professing Christendom have been peaceably settled by referring them to the arbitration of other Powers. We earnestly desire that this amicable method of adjusting differences between Governments may become more and more general, until it shall be invariably adopted."

[*The Unlawfulness of all Wars and Fightings under the Gospel, given forth by the Society of Friends, at their Yearly Meeting held in London*, 1841. Darton & Harvey.

I have been induced to offer the preceding quotations, for the purpose of appending to them another consideration, which appears to me to be of greater practical importance than is generally supposed. There may be, and probably there are, many persons who have not the smallest intention of going either into the army or the navy, who, in the course of their business, have no direct, or even indirect, but manifest connection with any thing concerned in warlike arrangements—and who may even profess repugnance to be so implicated—who, notwithstanding, may be by no means clear of being in some way or other instrumental in exciting war; and who may possibly be less excusable than he who wears the uniform and wields the arms which make him conspicuous, as one who is ready actively to take a part in the wars offensive or defensive in which his country may engage. I allude to those, who, by their language and conduct, and by the influence which they exert, are the means of exciting and promoting those feelings of national suspicion, prejudice, and aversion, under the operation of which, occasions of offence become magnified into causes of war. Whilst those, who, having taken advantage of the opportunities which have been offered them to form reciprocal and delightful friendship with individuals of other countries, may become the means of uniting their respective nations in bonds which would be strong, in proportion as such ties, feeble in themselves, were multiplied; the individuals to whom I have alluded, produce the opposite effect; and are like wedges, which, inserted one after another, cleave the firmest oak. Though the most prominent and conspicuous of this class are the writers who seize upon every opportunity to place facts in an offensive light—and who reiterate the sentiments and conclusions which they draw from them, until they have, as it were, hammered conviction into their readers—I do not go so far as to say, that even these are the most to blame, or that there are any amongst them to whom I wish that these remarks may be considered as personally directed. They apply to writers of various parties, and to the journalists of other countries besides our own. I wish rather that the sentiment which

I have expressed could act practically on a different and larger class—I mean, the public themselves, for whom such writings are produced; because there exists amongst them a pernicious appetite, which it suits the pecuniary or the party interests of the writers to gratify. The leaders of any nation may have an inclination for war, for which they are themselves reprehensible; but they could scarcely engage in it, but for the prevalence of that public or national feeling, the cultivation of which it is my object to discourage—that feeling which gives rise to those untoward occurrences, which, from its preponderance, become the occasions of a war; and which magnifies them into national insults, which a war is required to wipe away—a feeling which may sometimes seem to force a Government, against its will, to have recourse to arms; and which furnishes an excuse to those rulers, who, delighting in war, are averse to lay them down, when once taken up. Such appears to me to be the practical course of reasoning, to which we ought to be led by the often-quoted observation of Cowper, that "war is a game, which, were their subjects wise, kings would but seldom play at." Those who make an open profession of their belief that war is unchristian, should also be the foremost to let their words and actions exert the pacific tendency which I have here endeavoured to enforce.

NOTE (10.) P. 295.

THE temporal advantages to be derived from the perfect carrying out of the Pacific principle, as alluded to in the extract quoted in the Lecture, are well worthy of general consideration. Those who are not blind to the innumerable advantages which are to be gained by honourable and well-conducted commerce, may easily perceive how these are frustrated and lost by the various influences which War exerts. The people against whom the war is waged, cease to be customers; and either supply themselves, or seek fresh markets. They are not merely lost as purchasers—they become destroyers. The actual damage done, is great to the victors, as well as to the vanquished. Whilst the former proudly boast that they have lost the less, they forget how much might have

been gained, had peace not been interrupted. Much injury and cruel suffering may be inflicted on the innocent, by an insolent enemy: but those evils are more general, and more weighty, which each nation inflicts upon its own people. How many hands are withdrawn from profitable labour, never to return! How many commercial enterprises are suspended and lost, by embargoes, blockades, and prohibitory laws! How much available capital, taken in taxes imposed to carry on a war, and continued after it has ceased, is abstracted from those fertilizing channels in which peace would distribute it, to be lost in the common gulf of destruction in which war plunges almost all that comes within its influence! How much certain evil is induced! how much real good is placed in jeopardy! and how very little profit is even pointed to, as within the reach of possible attainment! If the matter of dispute—whether a supposed wrong to be redressed, or a desired advantage to be gained—were fairly estimated at its pecuniary value, it would, in all probability, scarcely equal that of a few days of the self-imposed expenses of a war. The politic as well as the moral consideration of this view, which has been presented by an able individual*, would shew how much better it would be to obtain the desired benefit by purchase. Let the injury be repaired out of the national treasury, if the sufferer were not in the wrong; but, if he were so, let him endure the penalty of his folly or his crime, rather than cause the innocent to suffer in person and property, and convert a private fault into a national sin. The integrity of national honour might be safely left to reasonable adjustment by treaty. The nation which should systematically sanction and sustain its citizens in a course of manifest aggression and wrong, would bring retribution to itself, by numerous channels, which it can neither obstruct nor turn aside. May England never be placed, by the blindness of her Rulers, in this fatal predicament! Similar reasoning will apply, if, instead of pecuniary loss or injured privilege, some personal violence, or homicide, become the origin of a quarrel. Let the case be investigated; and let the aggressor be punished by the laws

* E. G. Wakefield.

of his country, and by the common censure of mankind. But for a civilized nation to wage war, and cause the inevitable death of thousands, on account of the unfortunate, or possibly the criminal, destruction of one life, appears to me to be no less the part of savage barbarity, than when hundreds of slaves and concubines are sacrificed at the funeral of an African Chief.

NOTE (11.) P. 311.

MORE attention, than is generally paid to the subject, is due to the mode in which Rest is taken. Though some persons can easily dispense with the removal of their clothes, and omit going to bed for the whole or greater part of many nights together, as the nature of their occupations demand or the temptations of imaginary pleasure may induce, there can be no doubt that the practice is injurious, and that the rest taken under these circumstances is inferior in quality, as well as defective in quantity. Great stress has therefore, with reason, been laid on the importance of fairly going to bed for repose, by persons in other respects indifferent to personal indulgence, and inured to severe campaigns and toilsome travel, amidst danger and privation.

The bed and the bed-room must not be forgotten. The bed should not be very soft; and it is particularly undesirable to fall into the easily-acquired habit of sleeping under such an amount of bed-clothes as must promote inordinate warmth and relaxation. On the other hand, a deficiency of bed-clothing is a serious evil; and if it do not prevent sleep, it renders it less refreshing, and occasions considerable risk. The danger, however, is far greater, when the bed is damp. It may seem needless to observe, that attention to this point is of great importance in schools and other public institutions, as well as in private families and the transiently-occupied chambers of travellers. Culpable neglect in this respect has been the cause of protracted disease, and even of death. I believe, that, as a general rule, it is conducive to health for each individual to occupy a separate bed. It is by no means indifferent how a bed is placed. It should not be situated in a draft or current of air, especially if it can affect

the head. It should not have the feet towards a window—a very common fault; by which the light is made to fall on the eyes, unprotected by the eyelids; the sight is injured; and the double inconvenience of disturbed sleep and drowsiness is very disagreeably felt in the morning. If proper precautions were taken with regard to the placing of the bed, curtains might be advantageously dispensed with, and the occupant would have the benefit of purer air.

In speaking of the subject of Rest, I ought in the preceding Lecture to have noticed the periodical reservation of a day devoted to this object, as provided for by the institution of the Sabbath. In reference to this, as well as to some other subjects, I purposely refrain from theological questions; and consequently shall not discuss the difference between the degree of observance of this day, as required under the Mosaic law, and under the Christian dispensation. We have, however, the highest authority for believing that the Sabbath was made for man: it must, therefore, be culpable to neglect, and still more, to misapply and abuse this, as well as any other blessing or provision for our well-being and happiness. I believe that this periodical reservation of a day of rest and relaxation is, physiologically speaking, necessary to the bodily health and vigour of those whose days are generally devoted to bodily and mental exertion: and in the case of those who have but little to do, and whose daily occupations are not calculated to bring the system into a state requiring a day of repose, the periodical invitation to the consideration of those subjects which should daily come before their attention, but which their habits of indolence may lead them to neglect, is peculiarly well calculated to prevent the mind's getting morally out of condition. The experience of ages has fully proved the reality of those advantages which I have briefly set forth in theory. In tracing the progress of depravity, whether in the criminal course of individuals or the disorder of society, we may find numerous instances, in which the abuse of the Sabbath has been one of the earliest stages in the series, bearing a decided influence on those which succeeded it. I believe it to be proper and necessary that this day of

rest should also be one of enjoyment; but what I wish to enter my special protest against, is the practice, which I fear too extensively prevails, of allowing the time set apart from useful, perhaps laudable avocations, to be devoted to frivolous or even criminal pursuits, and corrupting associations. I am no advocate for austerity; but I would seriously urge my countrymen, before whom these remarks may fall, strenuously to set themselves against this evil, for its correction and suppression.

"The manner in which a Sunday is spent in a great city, by the young men who are trained to trade and merchandize, is a matter of the highest consequence to their happiness. A young man often dates his greatest misfortune from *that day*, the institution of which was designed to increase the virtue and happiness of mankind!"—*Economical Library*, No.iv. p.31.

NOTE (12) P. 312.

In the very short notice of the Nerves, which is given in the Lecture, I merely mentioned the Nerves of Motion, as conveying the commands of the will and those of the senses, which transmit to the brain the impressions which they receive from without. Though a large portion of the nerves of the body belong to these two classes, it is proper to state, that there are also some nerves of motion which are wholly or partially independent of the will; and some nerves which appear to be destined to receive impressions, but which do not, under ordinary circumstances, produce a recognised sensation, by transmitting them to the brain. Thus the heart continues its contractions, from birth to death, without the will being able either to arrest it for a second, or directly to accelerate its movements. Although the muscles by which we breathe are not so independent of the will but that we may for a time stop or quicken their action, it is sufficiently obvious that these movements are generally performed independently of the will. The contractile power of the alimentary canal, by which the food is propelled during the greater part of its course, likewise acts without our design, and mostly without our consciousness. Had these movements been placed under the direction of the will, in the same manner as those

of our hands and feet, the consequence would have been fatal. Even during our waking-hours, the functions most essential to life would be interfered with by the operations of the intellect, and they would be altogether suspended the instant that sleep should take place. In short, animal life would be as certainly lost, as the elective right is by the citizen who forgets to register. This illustration, in which the wisdom of the Creator forms a striking contrast with the folly of man, deserves the attention of the people, as well as of those on whom the arrangement of these matters more immediately depends.

NOTE (13.) P. 324.

AMONGST the various causes which prove injurious to the sense of sight, there is none which deserves more attention than the influence of artificial light. Although, from the length of our winter evenings, it is unavoidably brought into operation during many hours, and upon all classes of society, the effects of this light appear to have hitherto received very little either of theoretical or of practical attention. The ingenuity of the mechanic and the chemist has been successfully employed to produce a strong, brilliant, and cheap light, for the private family, the artist, and the manufacturer; and also for the votaries of pleasure, who turn night into day: but few appear to have reflected upon the influence which this light may exert upon the sense of sight. An excellent little Treatise has lately been produced on the subject, by Dr. Hunter. It well deserves general perusal, for its practical suggestions, as well as for the clearness with which it exposes the nature of the evils against which it is necessary to guard. The strong light of the sun may injure the eyes, and impair the sense of sight, whether the eyes be turned too much towards the sun itself, or receive its impressions as reflected from some bright or glaring object. But artificial light may prove injurious, although not of a degree of brightness to arrest our notice. Instead of possessing the pure white, which in daylight results from the due combination of the primitive colours, red, yellow, and blue, it almost invariably has one of these colours in excess; and more especially the red and the yellow, which

experience has proved to be the most pernicious in their influence. Artificial light more effectually answers the purpose for which it is employed; and is at the same time the less injurious to the eye, in proportion as it approaches to the character of pure white. The light furnished by the commonest oil and tallow, and that which is produced by the gas obtained from the coals generally used for this purpose in the London Gas Works, is the most injurious artificial light, of which the force has as yet been investigated. Artificial light, when in fault, from the excess of red or yellow light, has the effect of impairing the sensibility of the eye, and consequently has a tendency to produce *gutta serena*, or *amaurosis*. A stronger degree of light than the eye can easily bear is required; since light which is not purely white is unfavourable to the distinct perception of the objects viewed by it. Both the red and yellow rays of light are more irritating to the eye than either purely white light or the blue rays. Artificial light is often made needlessly injurious, by the excess in which it is often called for, on account of its want of steadiness: it is likewise, carelessly, made prejudicial by the mode in which it is suffered to have access to the eye. Instead of being directed exclusively or especially to the objects to be seen by it, it is often suffered to fall more or less directly upon the eye. This not only endangers the sense of sight, but causes the objects viewed to be seen much less distinctly than they would be by a better arrangement. In employing artificial light, the grand objects to be attended to, so far as the protection of sight is concerned, are, to obtain the purest white light—to supply it steadily, and not more intensely than the perfect vision of the objects to be seen may require—to direct the light to the objects to be viewed by it, without permitting it to fall upon the eye, either directly, or by reflection from bright and glaring objects, which the eye is not required to see. These last points are to be obtained, by care in the position of the light, and by the due use of appropriate shades. The pernicious excess of red and yellow light may be somewhat counteracted by various ingenious expedients for reflecting blue light, or intercepting portions of the red and yellow.

Contrivances of this kind, and the principles on which a whiter light may be obtained, are pointed out in the publication to which I have referred. Artificial light is attended with other evils, to which I have not as yet adverted. For all ordinary purposes, artificial light is obtained by combustion. This combustion produces heat as well as light; and as this heat is often disregarded, and allowed to become excessive, it proves injurious to the eyes, and to the health generally. Combustion not only overheats the air: it also chemically, and in many instances mechanically, contaminates it. The minute floating particles are inhaled; as well as the hydrogen, carburetted hydrogen, and carbonic acid, invisibly diffused in the atmosphere of the apartment, and which, even when present to a very small extent, have a decidedly injurious tendency.

NOTE (14.) PAGE 325.

Although deafness, to a greater or less extent, is one of the most common infirmities connected with our external senses, very little attention is paid to the means for protecting the organ of hearing from the variety of injurious influences by which it is assailed. This may partly be ascribed to the great difficulties inherent in the subject; in part, to the great variety of evils to be counteracted; and, in part, to the readiness with which we become indifferent to evils of long standing and in constant operation. In a manufacturing country like this, there are numerous branches of business which habitually produce loud, sharp, discordant, and otherwise injurious sounds. The almost universal introduction of the force of steam, in conjunction with many great and important advantages, has not only added loud and inconvenient noise to many branches of manufacture, but has rendered it an incessant accompaniment to our travelling, both by land and by water. Sound has many properties, resembling those of light; amongst which, we may remember, that it is susceptible of being transmitted, reflected, concentrated, or dispersed. It may be heightened by combination; or there may be such a concurrence of the causes tending to produce sound, as may diminish, or even annihilate, rather than increase, the result.

All these properties of sound might probably be brought to bear, in order to render the undesirable production of sound less injurious, or less offensive. Were this object to receive the attention it deserves, there would doubtless be abundance of ingenuity and scientific knowledge beneficially attracted to it. Much might be gained, by attending to those conditions which serve to deaden sound, and by guarding against those which increase its injurious or disagreeable influence by reverberation or echo.

In connection with the sense of hearing, there is another consideration, which I must not omit to bring forward. Whilst the production of various odours, inseparably connected with the carrying on of various important branches of art and manufacture, is made the subject of legal interference, and treated as a nuisance, the useless and wanton encroachment on individual liberty, in the production of sound, is altogether disregarded. Perfect stillness is often desirable, and, occasionally, of vital importance. After the bustle and din of active life, it must to many be as essential to enjoyment as any kind of noise can be to others: yet how is this silence to be obtained, when unnumbered street-musicians are permitted to be encouraged by some persons, for the sake of a perfectly useless and often pernicious gratification, in total disregard of all around them, to whom the notes of the various instruments may be absolutely tormenting. Why should not the indulgence of those who are musically inclined be confined to their own apartments, and to the public buildings devoted to this species of personal gratification; seeing that other nuisances are restrained by the interference of the law?

Since deafness, to a greater or less degree, is so common an infirmity, the means of rendering assistance to those who are inconvenienced by it are by no means unimportant. The various advertisements and puffs in which assistance of the kind is offered, shew that the public is not indifferent to the subject: nevertheless, very little of the right kind of attention is paid to it, either by the sufferers themselves, or by those who profess to minister to their wants. A well-directed combination of experimental and scientific inquiry might greatly

improve the instruments employed to aid those who are dull of hearing. It would, in all probability, be discovered, that different kinds of deafness might be best relieved by instruments of various shapes; and instead of an empirical application, their use might be directed with tolerable certainty. If greater attention were paid to the communication of sound, in the construction of apartments, and more especially to the form of places of assembly for various purposes, many persons who are now cut off from social enjoyment, and from the instruction of a sermon, a lecture, or other public discourse, might participate in the benefit and gratification which others receive through the sense of hearing. When visiting the ruins of a Greek theatre, I was particularly struck by the admirable manner in which sound was transmitted, from the part formerly occupied by the stage, to the distant seats; where words uttered in a low voice, and even the rattling of a piece of paper, were distinctly audible.

NOTE (15.) P. 332.

THE cruelty which the inferior animals receive from the hands of man, who is placed over them as their protector as well as their lord, may be regarded as originating in two causes. Sometimes it appears to be inflicted under the savage influence of a debased and cruel mind; and the perpetrator seems to want not the will, but the power, to commit similar acts on his fellow-creatures, if they attempt to interfere with him. In other cases, the cruelty is not so much in itself the object, as the means by which a certain end is to be obtained. It is this species of cruelty which we may reasonably hope to see either abolished, or to a great degree reduced, by the diffusion of more correct knowledge respecting the modes in which inferior animals are to be trained and governed. The term *breaking*, which is generally applied to the education of the lower animals, is in itself a proof of the erroneous principle upon which it is conducted. The animal is to be taught to devote a portion of its natural powers to the service or gratification of man: in doing which, it may not merely have to surrender its own will—it may even be required to act in

opposition to its instincts. The breaker has the double task of making his wishes known to the animal; and of causing it to give up its own will, in order to execute them. In attempting to do this by means of severity, it is clear that he must often be led to inflict pain, without there being any possibility of the animal understanding the reason for which it is inflicted. The desired object may, therefore, not be obtained by it; and the breaker, as he is called, having his patience tried, is led to inflict further suffering, under the influence of passion, as well as of error. Hence the poor creature is often punished, not only beyond its deserts, but when the fault does not rest with it, but rather depends on the imperfectly-communicated will of the breaker. The repetition of this treatment not only fails to teach the animal its intended lesson, but injures its temper; and makes it acquire habits, which, being inconvenient or injurious, are termed *vices*, whilst they are, in reality, *the effects of bad education*. The illustration of these remarks are almost innumerable amongst dogs and horses—the animals which man, in an especial manner, has undertaken to instruct. The astonishing results which are at times obtained with these and other animals, by a wiser as well as more humane system of education, shew how much may be gained by this reform. In connection with this subject, I would strongly recommend the judicious remarks of my friend Bracy Clark, not only as given in his *Essay on the Vices of Horses*, but dispersed throughout his valuable publications. It is this reform which the Society for the Suppression of Cruelty to Animals should seek to obtain, in order to give a practical character to its benevolent intentions. The public would not merely be relieved from the pain which their feelings are compelled to endure from daily exhibitions of wanton cruelty, but they would be great gainers, by the improved services of the inferior animals, were their education entrusted to intelligent persons acting upon correct principles.

NOTE (16.) P. 338.

I do not know that I can offer a better illustration of the importance of forming a cautious and correct judgment,

founded on sufficient data, and of resisting the specious and delusive representations and arguments of those whose talents are calculated to lead the popular opinion, under the impulse of excited feeling, than by offering a few remarks on the nature and tendency of Trades' Unions, which have recently exerted so extensive an influence over the labouring and operative classes of the community. Before I proceed, I must declare, in the most positive and unequivocal manner, that it is by no means my object to advocate or apologise for any species of oppression, of which the operative or any other section of the community may have reason to complain; or that I would attribute a criminal design to a large majority who have inconsiderately united themselves to factions whose tendency it is, not only to disturb the good order of society, and destroy the good feeling which should unite together the inhabitants of our country, but irreparably to sap the foundation of our national prosperity. It will be necessary, in the first place, to consider the grievance complained of; then the measures taken for the purpose of removing or correcting it; and lastly, the tendency which these measures really possess. The evil I understand to be, that the workmen or operatives of one or more descriptions, and to a greater or less extent, feel that they are either inadequately paid for their exertions, or are required to perform them during a portion of time which they feel to be oppressive, or in a manner which is displeasing to them. I will suppose, for the sake of argument, that the charge has unhappily been correct. It must at once be admitted, that the sufferers are pinched in two very serious and sensible quarters; and if they fail to obtain relief, may well be supposed to be under a degree of excitement incompatible with the exercise of cool and deliberate reflection: they probably do not inquire, or cannot learn how matters may stand with those who employ them; and whom, in the time of their own suffering, they regard as their unprincipled and avaricious oppressors: whereas it may really be the case, that the state of business in the branch of manufacture in which they are engaged may be pressing on the principals as well as on the operatives. The representations

of the complaining party excite the sympathy, and perhaps the apprehension, of other work-people of the same craft; and with a view to relieve the complainants, and to afford to each other mutual protection, a Trades' Union is formed, for the purpose of keeping up or raising the price of work, or diminishing the hours of labour, and to compel the refusing employers to come to the terms which it is desired to extort. A large number, not only of the original complainers, but of others, who, until this excitement had been created, appeared to be living comfortably—and not only providing for the present, but, by praiseworthy and rigid economy, laying up for the future—by united consent, throw themselves out of work. They conclude that the work on which they are engaged must be done; and that if they can but have the means and patience necessary to keep them to their resolution, their object must be gained, and the arrears of work performed at their own price. To enable them, therefore, to carry on this plan, the destitute operatives must be supported; and subscriptions are therefore raised, which serve to drain the resources of those operatives, whose past economy had enabled them to lay up a trifle to increase their own comforts, or promote the advancement of their offspring. I shall defer my remarks on the effect of this for the present, in order to notice another expedient to which the Union finds itself obliged to have recourse. It is manifest, that if, whilst some workmen are adhering to their resolution of suspending their labours, others continue their occupations, the strike, as it is called, may be continued for an almost indefinite period, without producing any other effect than that of impoverishing the Unionists, and perhaps permanently throwing them out of work; since new hands may have acquired the art, and enjoy and deserve a better character as men. To obviate this effect, laws are instituted amongst themselves, and penalties imposed, both to restrain old workmen who may not conform their conduct to the dictates of their brethren as respects the strike, and to prevent the introduction of new hands to execute the work which they have refused to perform. It is obvious that here a double species of tyranny is exercised, the effect of which

must be inquired into: but I must first observe, that I am not now directing attention to those resolutions which have been formed, or to those acts which have been perpetrated by some associations, and which are so obviously base and atrocious as to disgrace any civilized country. In justice to the Unionists in general, I must give them credit for totally disapproving of those resolutions and acts. I allude rather to regulations which have been drawn up, and to measures which have been agreed upon, by those, who, I am willing to believe, have no desire to disturb the good order of society, but who wish to vindicate their supposed rights, although they take means to do so without due consideration of their real tendency. It will be well now to examine how far the controul of Unions of this description is founded on principles consistent with that individual liberty which all classes of society do well to be jealously careful to maintain. In my opinion, they are decidedly subversive of it, and calculated to introduce in its place that form of usurped authority which exists under what is called an oligarchy; that is to say, a government in the hands of a few, and which in practice has been found worse than monarchical despotism. Those who join themselves to a Union, do so, in all probability, without considering this important feature in its character. The evil, supposed or real, has been represented to them in a manner which excites their indignation: and led by a common impulse, they allow themselves, with satisfaction, to be directed and governed by those who have displayed their ability in representing the evil. They are no longer their own masters, or the servants of those from whom they receive their wages—a service which, be it remembered, is voluntary, and in which they are a party to the adjustment of the terms; but they are in reality the slaves to the heads of the Union, and may be made to suffer by their indiscretion and want of judgment, as well as by their absolute criminality. They are taxed by them, and drained of their past earnings, without having controul over the funds to which they contribute: they are restricted in the arrangements which they may desire to make for the employment of their exertions to support themselves

and their families, and may therefore have their earnings suspended: they may be compelled to break off their intercourse with those with whom they have been long and satisfactorily connected. Even the regulation of their own families may be taken out of their hands, so far as to deprive them of the liberty of deciding how their sons are to be brought up. The case of these Unionists reminds me of the Horse in the fable, who, incensed against the Stag, which had intruded himself upon his pasture, allowed a man to put a bit in his mouth and a saddle on his back, under the pretext of taking revenge on the stag; and discovered, when it was too late, that he had exchanged a transient evil for a tyranny which was to last his life. But the tyranny of the Unions is not confined, in its influence, to those who have had the imbecillity to become their voluntary subjects. Those operatives, who may have preferred to retain their independence, become the victims of its attacks; and, even when personal violence is not resorted to, they are subjected to the punishments inflicted by a correctional police, whose authority they do not own, and which is opposed to the constitution and established authority of the country. As a matter of course, they make war upon masters in the trade; since this is the avowed object of their formation. I have therefore nothing to remark respecting it, till I come to point out the impolicy of this warfare, as respects the Unionists themselves. Such are the errors in principle, which appear to me to be inherent in the constitution of the Trades' Unions.

Although I have watched the operations of these oligarchies in different trades, I have drawn my principal reasons from the printed documents of the Printers' Compositors' Union; and consequently from those of a class who may justly be regarded as amongst the best informed of the class of operatives, whose measures have, I believe, been altogether clear of acts of violence by which some Unions have disgraced themselves. These documents are evidently drawn up by men who can think, and who can express their sentiments with force and clearness: but even in these documents, I find full proof of conclusions drawn without a comprehensive view of the

subject, and of the flattering and delusive language by which the operatives are induced to join and adhere in their Unions.

I have next to shew that the Trades' Unions, in addition to the evils which I have pointed out, have a tendency adverse to the interests of the trades and manufacturers, whose operatives have had recourse to them for imaginary protection. I shall first notice the tendency of a fixed and uniform price of labour, supposing the operatives successful in carrying their point in this respect. It is obvious, that in all manual operations there are numerous gradations of skill and dexterity, which cannot fail to be differently appreciated in the labour market. A fixed and uniform price stands directly opposed to this natural and reasonable valuation of labour. It must have the effect of damping the ardour of those who seek to excel in their work; unless the Unions, in opposition to their avowed principles, allow the rule as to a fixed and uniform price to become a dead letter, whenever an advance in wages, however partial, is concerned. It must also damp the desire to improve in those workmen who are of moderate and inferior abilities; since they must feel, that whether they work ill or well, they are sure of their price, so long as there is any work to be done. It requires no gift of prophecy to see, that there is here an inevitable tendency, sooner or later, to lower instead of elevate the standard of art; and in the mean time, the advantage of the good which the Unionists may imagine that they have gained by their triumph must slip from their hands, and leave, in its place, an evil, which it will not be so easy to get rid of. There must be fluctuations in all kinds of production; and in times of depression, the inferior hands, who, at the wages they have received, have been the least productive to their employers, will be thrown out of work. They cannot relieve themselves by consenting to receive the reduced wages, at which they might still induce some masters to give them work: they are therefore thrown upon the funds of the Union, and become a tax upon the superior workmen, who will thus find themselves deprived of much of the advantage which their talents or application might have procured them. At the same time, the country generally is injured;

for this must always be the case when the time of operatives is unemployed, and capital reduced by unproductive consumption. The evil does not stop here; for the principle of a fixed price, if adhered to under the circumstances now supposed, must have a direct tendency to prevent the calamity of deficient employment from curing itself, and rather cause it to go on progressively increasing; since reduced prices increase the number of purchasers; and the increase of purchasers, where affairs of this kind are allowed to find their own level, has the tendency to raise or keep up the price. On the other hand, high prices, artificially maintained, drive away purchasers, who will take a final leave, and flock to those markets where the evil does not exist. Masters and men are injured, tools and materials lie unemployed; and are either impaired by time, or sold at a loss, in order that the wreck of the capital invested in them may find its way to a spot where a better order of things exists. The injury thus inflicted, does not fall on those only who have been instrumental in producing it; but many innocent individuals share in the suffering, inasmuch as those who had been in the habit of supplying the masters and operatives in question will lose the market for their various commodities. It sometimes happens, that the combination of workmen for the purpose of refraining from work, when they cannot succeed in dictating terms to their employers, terminates in ultimate injury to themselves, without bringing upon their employers the evils which they had designed for them. Under the stimulus of strikes of this kind, various ingenious contrivances have been devised, by which the work rejected by the operatives has been performed in a new mode, which has altogether superseded their art, and thrown them permanently out of an employment by which they had been gaining unusually high wages. Facts in illustration of this remark may be found in Professor Babbage's interesting work on Manufactures. It is not sufficient to consider the evils which may result from a compulsory uniformity of price. It may be shewn, that prices or wages varying with the abilities of the workmen, and with the state of the market, are not less favourable to

the interest of trades and manufactures, and of those engaged in them, than they are consistent with reason and common sense. The inferior or inexperienced hand, who, when he cannot find employment at the full price, is allowed to make the best bargain which he can at an inferior one, instead of becoming a tax upon his more skilful or more fortunate brethren of the same craft, supplies an inferior customer, who either could not or would not become a consumer to the same extent, if such an opportunity were not offered him. If this consumer is advancing in the world, the purchase, by fostering his desires for comforts or necessaries, is preparing him to become the customer of those who ask and deserve a higher price. But if the customer be declining in the world, the reverses of fortune will be allowed to fall more lightly upon him, and the trade will retain a customer, whom it would otherwise lose. In the mean time, the artisan, besides keeping himself from being a burden to others, has the opportunity, not only of keeping up the little skill which he may possess, but of cultivating it to a degree which may enable him to rise higher in his profession. This principle is most conspicuously seen amongst those classes of persons who are attached to the Fine Arts and liberal professions; and is found to enable mediocrity to obtain subsistence, as well as to encourage and reward those whose talents and perseverance have conducted them to excellence. I am not aware that there is any disposition on the part of either of these classes to form an association on the principles of a Trade Union; and I am very sure that such a measure would not only arrest their progress, but ensure their decline. The same principle, though not so conspicuous, is no less true in the case of every variety of trade and manufacture. Fluctuations in the productiveness of the seasons, as well as political events at home and abroad, must inevitably affect the interests of every branch of trade and manufacture, from the wealthiest principal, down to the poorest hand which he may employ. The legitimate means of counteracting the evil, as respects all parties concerned, are to be found in economy, prudent forethought, and a due acquaintance with the existing state of

things bearing on the affected trade. Patience, perseverance, and ingenuity will be the immediate fruits; and prosperity returning with interest, will be the price they will obtain. On the other hand, remember that Unions in principle, as well as in practice, foster idleness, consume the savings of the past, and diminish the production of the future. If they do not drive production to other quarters, and thus injure existing markets, they tend to change the mode of operation, in a manner which is principally injurious to the operatives. When I reflect on these evils, which the Unions are inevitably calculated to bring upon our manufactures and commerce; on the misery which they must spread through the land; on the advantage which they give to our foreign rivals, by whom we are already closely pressed; I cannot but mourn for those whose want of judgment has allowed them to be seduced into these combinations; and regard those who with the means of obtaining correct information, and with a power to form a correct judgment, have sought popularity by encouraging such Unions, as far worse traitors to their country, than those who may be found in arms against her in the regiments and fleets of a foreign enemy.

Whilst I thus express my firm conviction as to the pernicious tendency of those combinations which are called Trades' Unions, I am equally confident that a union of another description would be no less virtuous and profitable than those of which I have been speaking are immoral and destructive—I mean, a union of purpose, to prevent the production of spurious, bad, and falsified commodities, by which the credit of our country's manufactures is most criminally and seriously injured. A union of purpose for this object would require no dangerous organization, which might become oppressive to individuals, and menacing to the tranquillity of the country. It requires only a silent and strict adherence to the universal principles of justice and truth, and obedience to the dictates of conscience, not rendered insensible by vicious habits and associations. The commands of a master to execute a piece of work of bad quality and deceptive appearance, or to adulterate raw or manufactured materials, ought, whatever may

be the immediate consequence to the workmen, to meet with a positive refusal. If this refusal were made in proper terms, the master might be convinced of his error; and a firm adherence to this resolution would effectually prevent his committing it, and tend to restore and raise the credit of our country's productions. The manufacture and sale of adulterated, counterfeit, and inferior articles, to be sent to foreign markets as British, is as criminal as forging and uttering counterfeits of the coin of the realm, and does a more serious and permanent injury to the interests of our country. I speak advisedly, when I say, that the evil of which I now complain, prevails in various articles of our staple manufactures. Our hardware, which long has stood, and still might stand pre-eminent, is, from the cause which I have just mentioned, justly despised in some foreign markets. A British axe, in the woods of America, is rejected as useless; whilst those made in the country are sought after and highly valued. The uncivilized Negro on the coast of Africa makes the same complaint; and it is not until his ingenuity has enabled him, in some degree, to modify and improve the temper, that the British axe is of any use to him. Our saws and other tools are also liable to a similar condemnation; and our woollen and cotton goods, for which we have obtained so high a reputation, have had their character impaired by the same criminal practices, which have given specious and attractive appearance to bad or worthless materials. It is high time for an effectual stop to be put to this growing evil. If this be not done, principals and operatives will find their craft cut up; and the excellence of British manufactures will become a mere matter of history, like the *purple of Tyre*. It is not only in the deception of our foreign customers that these detestable arts have been employed. Bad and spurious articles not unfrequently come into the hands of our countrymen; and the crime of selling them has assumed a traitorous character, when the supply of our armies has been concerned: in proof of which, I offer the following extract from *Napier's History of the Peninsular War*:—

"But the worst obstacle was caused by the disgraceful

badness of the cutting-tools furnished from the Storekeeper-General's office in England: the profits of the contractor seemed to be the only thing respected: the engineers eagerly sought for French implements, because those provided by England were useless."—*Napier's History of the Peninsular War* (*Observations on the Siege of Ciudad Rodrigo*), p. 387.

Although it has been my particular wish, in composing these Lectures, to refrain from giving them any thing of a party or sectarian character, which might render them obnoxious to any class, either in Religion or Politics, I cannot easily quit the subject of the application of the judgment, without offering a few remarks respecting the careful and deliberate employment of it in those cases in which, in the present extended state of the elective privilege, the operatives, as well as the higher classes, have a vote to give, and an influence to exert; which, under the direction of the judgment, might be as useful and salutary, as they are injurious and disgraceful, under the impulse of high excitement, party feeling, and base incentives.

Although this recommendation may be applied to all cases connected with general or political measures, or with the appointment of individuals to any post which is obtained by election, yet I admit, that it is to the election of Members of Parliament that I principally direct my remarks; since, on the one hand, it is on such occasions that our common interest in our country's well-being should call all to the best exercise of their enlightened judgment; and, on the other hand, there are no other occasions on which the judgment appears to be so little regarded, and so many bad passions are called into activity, in order to exert that influence which reason only should possess.

The following Rules may assist in forming and strengthening the judgment, with reference to this subject:—

First, Do not neglect to take those steps which are necessary to render your votes available.

Secondly, When the time of election arrives, commit your-

selves to no party; but deliberately weigh the character and pretensions of the candidates, and form your opinion on the ground of past actions, rather than be influenced by fine speeches, fair promises, or any flattering offers for the advantage of your private or local interests.

Thirdly, Consider well whether your vote will be required. If the individuals of whom you approve have their success secured, your attendance at the hustings will only waste your time, and needlessly add to the bustle and expense of the occasion; but if those against whom you have reasonable grounds of objection appear likely to be successful, let no private considerations withhold you from devoting the small amount of time and trouble required for this service to your country; but give your vote and exert your influence without delay; remembering, that he gives twice who gives quickly.

Fourthly, If you have come to the judgment that your vote and interest are required, make and keep a firm resolution to perform the duty in which you are engaged in the shortest time, and with the least possible expense to yourselves or others; as it is a gross mistake to suppose that the money spent on these occasions, beyond what is absolutely necessary, has any other than a pernicious effect, both on individuals and on the community.

Fifthly, In making your choice of candidates, accept of no qualifications as a substitute for moral worth and integrity. If a man be depraved and vicious in private life, or if he have shewn himself incapable of honestly conducting his private affairs, what reasonable grounds have you to hope that good can accrue to his country from any part which he may take in her government? and what mischiefs may you not fear from his example and influence, if you place him in an elevated and conspicuous position?

Sixthly, Although moral worth is to be held indispensable, you may fatally err if you regard this as the only requisite; for an individual possessing every title to our respect for his virtuous conduct may nevertheless be weak in judgment, or very deficient in that knowledge and those acquirements

which are necessary to qualify him to represent you in Parliament*.

If you will regulate your conduct in the case of elections of Members of Parliament upon these principles, you may rest perfectly easy during the intervals which pass between one election and another; in the conviction, that your best interests, as citizens, are in safe keeping; and there will be few, if any, occasions in which it will be desirable to hold political meetings, or to have recourse to any other methods, which are now so often thought necessary to make known the sentiments of the public. The disuse of these methods would not imply indifference and apathy; for every representative would feel the persuasion, that his public conduct was subjected to more minute examination, and to a more accurate and effectual judgment, than that which he may now expect from the declamations of a political meeting, or from the

---

* I am unwilling to reprint these observations respecting the exercise of the judgment in the case of Elections of every description, without adding a few words on the subject of freedom of choice. We are accustomed to hear much said respecting the employment of improper influences, either in the way of inducement or intimidation. I am not disposed to undertake the defence of those who employ these means; but it seems more particularly to belong to the present occasion, to call attention to the fact, that an equal and more degrading fault rests with those who suffer themselves to be acted upon by such influences; inasmuch, their weakness in this respect offers the temptation to take advantage of it. Those who give way to this weakness, do not merely exhibit a species of cowardice discreditable to themselves and to the class to which they may belong, but they are guilty of grievously injuring the other members of the same class. He who acts in violation of his conscience, or of his deliberately-formed judgment, in order to gain or to retain custom or other personal advantage, inflicts a serious evil on those who are more scrupulous or more inflexible than himself; and possibly drives them into similar weakness, not only by his example, but by the direct consequences of his fall. Party jealousies

show of hands which follows them. In the mean time, party feeling, that great bane to public tranquillity, and the source of so many private disagreements, would very much subside, without lapsing into apathetic indifference. There might, it is true, be less said of changes under the title of *reform;* or of the support and sanction of unpardonable abuses, under the name of *conservativeness;* yet what is truly good would continue, and be more firmly established, and abuses would be effectually and judiciously remedied, by a reform, which would inevitably go forward, notwithstanding the weakness of one party, the wickedness of another, or the imbecillity of a third. But let it be remembered, by one and all, that such a reform does not imply a mere change in the mode by which a certain number of individuals are raised into an influential position; but a thorough amendment, both in the electing and the elected, in the governed and the governing, in the payers of taxes, as well as those who dispose of them when collected.

---

jealousies and feuds, the most violent and the most lasting in their character, either originate in, or are maintained by, causes of this kind. A firm and conscientious adherence to principle does not necessarily involve any thing like a want of that respectful conduct which is due to those of a superior station. It may occasion temporary displeasure; but it will also ensure enduring respect, even from those who may hold different opinions regarding persons or principles. A few firm individuals amongst a subservient majority would probably be made to suffer; but in proportion as their example operates on others, it must become evident that good and faithful servants, valuable tenants duly paying their rent and improving the estates which they cultivate, skilful artists, and able professional men, are too valuable to be turned off for the sake of an opinion. The important truth would be felt, that the employer and the employed are mutually necessary to, and dependent on, each other; and possibly the grounds of difference of opinion would be re-examined by both parties, with a care and attention which would render the truth apparent, and produce cordial co-operation, in the place of subservient desertion of principle, or outrageous opposition.

It is not necessary that I should here go further into a subject, which by some may be considered foreign to my province: yet I would take this occasion to express a few words, as a check to the injurious influence of party spirit, without any particular reference to elections. It appears to me that there are few things so absurd and impolitic, as well as so injurious to the best feelings of our nature, and, at the same time, so completely uncalled for, as the allowing differences of opinion on those subjects which are most wont to excite party spirit to become the grounds of personal enmity on the one hand, or, singly, to be the motives of social intercourse on the other. Individuals may differ on these points, whose dispositions and habits, with respect to many others, are so congenial as to fit them for the strictest friendship; whilst others, agreeing on party questions and principles, may have so many points of disagreement with respect to other matters, as to be mutually very disagreeable to each other. I know that there are those who, in theory, are the advocates of unqualified submission to monarchical and aristocratical authority—by whom the voice of the people is regarded as sedition—who, on principle, would approve of compulsory conformity, in opposition to liberty of conscience; but who, in practice, are specimens of toleration and benevolence. There are those also who may eloquently set forth the justice and beauty of civil and religious liberty, who, in practice, are overbearing and intolerant, and dissatisfied with any thing short of undivided controul and absolute authority, within the circle of their own influence. Admire and imitate the *example* of the former, whilst you reject their *principles* as dangerous; but adopt and adhere to the *principles* advocated by the latter, whilst you carefully shun their inconsistent and self-condemned *practice*.

If you can thus free yourselves from the influence of party feeling, you will be in a much more favourable condition to exercise your cool and deliberate judgment on various matters, with which this feeling is now unhappily mixed up; and it may be hoped that your judgments respecting them may be sound and stable, instead of being uncertain, incon-

sistent, and versatile. Public measures and public men would, in an especial manner, be judged of and treated as they ought to be, by individuals arrived at years of discretion; and not in a manner which bears the closest resemblance to the freaks of spoiled children, who one hour are highly pleased with a new toy, which, in the next, they break to pieces. We need not look to the history of the Grecian Republics for instances of great men, at one time almost idolized as benefactors or saviours of their country, and, shortly after, the victims of its intolerance and persecution. The leaders of parties professing the most opposite opinions have experienced the same kind of versatile treatment, even in this country, notwithstanding its pretensions to advancement in civilization and superior intelligence. Neither the yells nor missiles of the mob, nor the peevish and inconsistent invectives of *time*-serving and unprincipled scribblers, whose meanness and cowardice find shelter from present punishment and future infamy in the concealment of their names, can materially affect the character which posterity will ever attribute to great talents and great achievements; but they will mark, in History, the country and the period of their occurrence, and testify how much of barbarism and profligacy there remained amongst us.

I cannot omit recommending another subject to the reflection and improved judgment of the Labouring Classes, although it may be at the risk of being condemned as having quitted my own post. Notwithstanding the interesting and highly-important facts and observations contained in the writings of various authors,—and more especially in two little volumes which ought to be read by all classes; I mean, "Results of Machinery," and "An Essay on Labour and Capital,"—both of these subjects appear to be too little understood. Of the former I shall say nothing; but the latter appears to me to bear an indirect, but a most important relation to the bodily and mental health of the community, as well as to every

other species of happiness in which it is concerned. Moreover there is, if I am not mistaken, no little danger, that some who seek to flatter the working-classes by speeches and expressions, which they imagine will give them pleasure, will very seriously mislead them on these points. In ardent and sincere desire for the happiness and well-being of the operatives, I am confident that I am not behind their most zealous flatterers; and my remarks, which proceed from no prejudice against them, will, I trust, be more salutary, if less gratifying, than those of some who appear to desire an unworthy influence over them. The great and justly-increased importance which the class of operatives have acquired and are acquiring, not only by their altered political position, but by the increased means of information and the various resources now within their reach, render it a matter of vital interest to the happiness and well-being of the country, that their views should be correct, and their sentiments and principles sound.

There can be no doubt that labour is the grand producer of capital; and it is, consequently, just and reasonable that the operatives should keep this in mind, when they are considering the relation which they bear to other classes of the community, and the influence which they are exerting upon them. They will, however, commit a very serious error, if they suppose that these two species of property, labour and capital, may be confounded with each other. There are works to be performed, for which capital is indispensable, and for which labour, to the most unlimited extent, could not be regarded as a substitute. Operatives will, therefore, not only be injuring others, but themselves, if they entertain erroneous notions respecting capital; and these erroneous views will be immoral and dishonest, if they are carried to the extent which appears to be the case with some operatives, who seem to consider that capital, because it is the result of their labour, ought to be subject to their controul. When the operative has performed his work, and received the price of his labour, he has no more right in that which he has produced, than the baker would have to the bread which he has

sold, and which the operative is about to put into his mouth. The product of the operative's labour may be consumed, like the bread of the baker, by the person who has paid for it; or it may remain with him, and add to the amount of his possessions—in other words, to his capital. He may employ other operatives to work upon it, and give it new properties and increased value; and these second operators, if they have been paid for their work, will have no more right in the new article than their predecessors. This kind of process may go on to an unlimited extent, and in an endless variety of ways; in all of which, labour is converted into capital;—the value of which, it is true, may be measured by an amount of money, which is, in fact, one form of capital, and that which is often very conveniently exchanged for other forms. But money must not, any more than labour, be confounded with capital in its most extensive sense. The knowledge which an individual may acquire, is as much a species of capital as the sums of money which another individual may have in his iron-chest or at his banker's. The man who possesses sums of money, may with them hire the time and talents of the well-informed man, and thus make an exchange of capital. The operatives may also want the services of the well-informed man, and may give him a portion of their labour; but their time not being worth so much as his, must be given for a longer period. Thus the operative and the wealthy man have both the means of procuring, although it may be to a very different amount, the use of a kind of property very different from that possessed by themselves: but neither would be correct in saying that their possession was a substitute for that which they receive; for if the well-informed man did not exist, neither the gold of the one, nor the labour of the other, could supply his place. This example of capital in the form of knowledge, is perhaps as striking and intelligible as any which I could offer; but the principle is equally applicable to every other species of capital. If you see the full extent to which this reasoning may be carried, you will clearly perceive that labour and capital are not strictly convertible as substitutes the one for the other; and that,

although capital is the result of labour, yet that labour without capital would often be crippled and unproductive. You will, therefore, also perceive how much reason there is in regarding the strict observance of the rights of property, as the first step towards social order and civilization. If a person cannot retain the secure possession of, and controul over that which he acquires, he will have no inducement to acquire: every one would live, as it were, from hand to mouth. There might, it is true, be many vigorous bodies capable of the performance of labour; but there would be no accumulation of capital, and, consequently, this labouring force would be of little value. The largest number of able-bodied men which your imaginations can conceive, all ready to exert their most strenuous efforts, would not be equivalent to a small troop of workmen, each possessing a little capital in his acquired skill and his utensils; directed by able engineers, possessing a larger share of capital in their science and instruments; and having a still larger amount of capital to work with in the materials which previous labour has collected and prepared. You will find the state of things which I have last described, in those countries in which the right of property is respected; and you will find the former, where capital is undervalued or insecure. It is of the utmost importance that the labouring classes, especially when pressed by poverty, should duly consider the importance, even for their own interest, of rigidly respecting the rights of property; since, if it be consumed, or driven to other spots, they must themselves be the lasting sufferers. Property may be rendered insecure in various ways. It is by no means necessary that the highwayman should take the purse of his richer neighbour—that banditti should seize on waggon-loads of merchandize—that burglars should break into houses and carry off gold, silver, and notes—or that incendiaries should destroy the well-harvested fruits of the field. The most serious evils resulting from the insecurity of capital may be more certainly brought about by means far less formidable in their appearance—means, which the higher, middle, and lower classes, are too often directing against the prosperity and happiness of their country. The

titled aristocrat, who on the credit of his rank and station contracts enormous debts which he never means to pay, and involves his unfortunate creditors in ruin, whilst he leaves immense entailed wealth to his heir, is as great a rogue as his baronial ancestor, who invaded the estates of his neighbours, and, taking *black-mail*, drove their cattle to his own fortress; or as the Arab chief, who attacks a caravan crossing his deserts, and carries it off in triumph to his concubines. He who, in the middle ranks of society, supports a fictitious credit by accommodation bills, or by the sale of goods for which he never pays, is quite as dishonest as the thief, the highwayman, and the burglar; and is still more injurious to the interests of society. And he who, imposing on the benevolence of the public, contrives to possess himself of the property of others by fictitious or exaggerated tales of misery, and who lives by begging, when he might work, is little or no better than those with whom I have placed him, in the same group. Those who, by their conduct, destroy or impair the great productive resources of the country, whether agricultural, manufacturing, or commercial, as effectually injure their country, as if they were foreign armies laying waste fields ripe for harvest.

In this enumeration of the evils by which the capital of a country may be injured, I am aware that I have mentioned some which scarcely fall within the scope of my subject. I have done so, to convince you that I am not disposed to palliate and find excuses for the vices of one class, whilst I am dwelling upon those of another. I would fain hope, that if the rich have corrupted the poor, the reformed poor, and middle classes, may so far return good for evil, as by their virtuous example to bring about an improvement in those above them in rank and station.

There are various ways in which the operative class are, directly and indirectly, benefitted by the capital employed in the branches of business in which they are engaged; and they will do well to bear this in mind, and watch over its security, as if it were their own. The ingenious artisan or mechanic finds means, with the consent of his employers, of making and

attempting improvements which he might never have conceived, if their capital in machinery, and other forms, had not been placed before him; or which, could he have conceived them, he never could have had the opportunity of putting to proof. Numerous instances have occurred, in which individuals have raised themselves to reputation and wealth by this very lawful advantage which they have found in the capital of others. Instances are perhaps still more numerous, in which individuals, without extraordinary genius or talent, but simply by the force of good sense, honesty, and industry, have progressively raised themselves from poverty to wealth, whilst discharging their duty towards the property of others. Many operations of a mercantile or manufacturing character, or large works destined to add to the prosperity or comfort of the country, and which give active employment to a large number of persons, could not be carried on without capital; which not only supplies the materials, but also wages and subsistence during a long period—it may be of several years—in which the work is producing nothing. A large proportion of the productive and labouring hands in the country are thus supplied with the means of subsistence, through the influence of capital, who would be thrown out of work, if they could be employed in no other labour than that which is immediately productive. A little reflection will convince you of the great extent to which the supply of the necessaries and comforts of life to all classes is to be attributed to the security of the rights of property, and to the opportunity which this security has afforded to individuals of talent, industry, and good management, to become possessed of property, or, in other words, to establish a capital. The conviction of the importance of the security of property, which these considerations should induce, will not prevent a painful feeling from being excited, by the contemplation of the very great inequality in the distribution of property, and of the great evils which attend those who are placed at either extremes, with respect to it. But at the same time, you will be convinced, that an equal distribution of wealth can neither be hoped for nor desired; and that the arbitrary measures,

which by some have been contemplated, to bring it about, would be as ruinous and unsuccessful, as the idea is unjust and foolish. If all the property in the country could, in one day, be equally divided amongst the entire population, this equality would not continue for twenty-four hours; and the disturbance, ruin, and misery, which the attempt to bring about such a division would occasion, would not be counterbalanced by the smallest amount of advantage. The instances of individuals possessed of little or nothing, who have suddenly received considerable sums of money, which, instead of turning to their own advantage, they have dissipated with the utmost rapidity, in foolish and profligate expenses, are numerous; whilst it is extremely difficult to find an example, in which the opposite result has followed. How often has the miser's hoard been completely fooled away in a short space of time by his heir, who has rather been intoxicated and ruined, than in any respect benefitted by the fortune to which he has succeeded! Even those sums, which are the well-earned fruits of an individual's own hard service, if they are not collected by his own economy and care, are too apt to share the fate of ill-gotten or foolishly-bestowed wealth. No instances of this kind are more striking, or more notorious, than those of sailors, who receive their arrears of wages after a long voyage. The due consideration of these facts leads to two very important principles. The first, that it is foolish, as well as wicked, to envy the property which others possess by an undoubted right; and to seek to wrest it from them, in order to bestow it on those who have little or nothing. The second, that it is essential that all should duly feel the advantage of the careful, prudent, and economical expenditure of small sums, and of early acquiring the habit of spending less than they earn. The earlier this principle is acted upon, the easier and more effectual it will be; whilst the opposite is equally true, that if a person neglect the opportunity of saving, when the amount which he can lay up is small, he will lose the opportunity, as well as the disposition, to do so with a larger sum. Every sum, however small, which an individual lays up in conformity with the principle which

I am now urging, is like a snow-ball, around which successive additions accumulate and add to its bulk. These additions must either consist of what is rescued from consumption in the new productions, to which the combined operation of labour and capital gives rise, and therefore constitute a real addition to the amount of capital in the country; or they must be derived from the stores possessed by others, and therefore merely consist of a transfer of property. But in either case, the tendency is, to produce an equalization in the distribution of property, by the most effectual and advantageous means. The good order as well as happiness of the poorer classes of society would be so greatly promoted by carrying this principle into general practice, that I cannot help regretting my inability to enforce its advantages with the extensively persuasive influence which it merits; and with this feeling, I would call on all to co-operate, in endeavouring to promote the end in view. The institution of Savings' Banks, and numerous other opportunities of satisfactory investment, favour the plan which I am recommending, and invite to its adoption. One convincing proof of the injurious tendency of Trades' Unions has been exhibited in the general removal of sums invested in Savings' Banks. The aggregate of this effect through the country must have been the transfer of a large amount of stock from the operatives to wealthier capitalists. The plan which I am now urging would soon recover the position which has been lost, and, before long, would place you in one still more advantageous. I will not attempt to discuss the comparative merits of Savings' Banks and Benefit Societies; but I cannot help observing, that the latter are not a substitute for the former; and that the utmost attention and care are necessary, to prevent them from becoming incentives to needless expense and intemperance. Let it not be supposed, from what I have said, that I am advocating a propensity to miserly hoarding, to sordid avarice, or to the inordinate love of money. The reckless neglect of economy, where it is most wanted, may be corrected, without falling into those evils.

"A slight knowledge of human nature will shew," says

Mr. Colquhoun, "that when a man gets on a little in the world, he is desirous of getting on a little further." Such is the growth of prevalent habits, that it has been said, if a journeyman lays by five shillings, his fortune is made. Mr. William Hall, who has bestowed much attention on the state of the labouring poor, declares he never knew an instance of one who had saved money coming to the parish. And he adds, moreover: "Those individuals who save money are better workmen: if they do not work better, they behave better, and are more respectable; and I would sooner have in my trade a hundred men who save money, than two hundred men who would spend every shilling they get. In proportion as individuals save a little money, they husband that little; and there is a superior tone given to their morals, and they behave better for knowing they have a little stake in society."—*Chambers's Magazine.*

The lamentable want of economy, which is so generally conspicuous amongst the operative class in this country, and which, notwithstanding the real grievances of which they may have just cause to complain, is, after all, the most abundant source of the misery and destitution under which at times they have to labour to the injury of their bodily health and moral condition, is to be traced to various causes, and may find its remedy in various means. It would be adding insult to those miseries which should receive sympathy and assistance, were we to attribute the want of economy, here complained of, to intentional criminality on the part of the class generally. It is rather to be referred to defective habits, acquired by early association, and adhered to through the same influence, almost as a flock of sheep are seen following each other in one direction. In times of prosperity, when employment is abundant and wages are good, each man tempts his fellow; and the surplus of their pay, beyond that which is required for the necessities of themselves and their families, is too often consumed at the time, in worse than useless gratifications. A part may possibly be devoted, by the more conscientious, to discharge some old score, which previous want of economy, and the occurrence of bad times, may have com-

pelled them to run up, to the serious impediment of their future progress. The occasional striking and beautiful exceptions, which are at times exhibited amongst the operative class, whilst they shew what might be done, are rendered unavailing, as examples, by the powerful influence to which I have adverted. To produce a great and desirable reform, with respect to this, as well as other prevailing evils, requires united effort. It must take hold of a group of men, and not rest with scattered individuals. The proof of the practicability of such a change, and the results to which it would lead, may be seen in some well-conducted establishments, in which judicious plans of economy, and provision against sickness and death, have been beneficially introduced amongst the body of workmen*. Equally valuable proofs of the possibility of economy are to be found amongst the happy fruits of exertions in the cause of temperance, which, as far as they are successful, operate directly against the most serious impediment to economy. In other countries, in which a barren soil or an inclement climate renders the resources of nature extremely slender, and in which there are no arts and manufactures to lend their powerful assistance, there are periods in which the earth yields its fruits, and others in which little or nothing can be obtained: but as these fluctuations depend on the periodical revolution of the seasons, the poor inhabitants are too wise to consume the fruits of their scanty harvests in temporary indulgences, but learn to store up the produce of their labour against the time of need, which they can anticipate with unerring certainty. The English operative, on the contrary, whose income would be a fortune to the ill-fed, ill-housed peasant of the barren district, is also subjected to fluctuations in the supplies which his skilful hands enable him to obtain; but he knows not when hard times are approaching, to throw himself and his companions out of work, or when sickness or death may affect him alone, and arrest his individual exertions. It is in vain that he knows the

* The manufactories of Galloway, and of Warner and Co., in London, and of Ransomes and May, at Ipswich, afford examples of this character.

danger to which he is exposed: he flatters himself that it is distant; and indulges himself in that neglect of economy which is the ruin of many and the injury of all. It is not enough for the evils, arising from want of economy, to be pointed out, and acknowledged. The various modes by which an opposite system can be carried out, require also to be properly understood. For want of this knowledge, the produce of years of industry, carefully collected, in order to be made the means of increasing prosperity, or of providing against a time when the infirmities of age may suspend labour, have, in many instances, been completely lost; and the lamentable consequences may be regarded, by others, as furnishing an argument against the advantage of economy. Sometimes the little capital, so carefully collected, is embarked in a business which the servant or the operative imagines he can conduct with profit; but which he finds, on trial, he is unable to manage, and from which he cannot extricate himself until he has become a bankrupt. Perhaps he trusts his all in the hands of some neighbour of reputed wealth; who gives him a good interest for a few years; and then, to the surprise of every one, proves not to be worth a shilling. Perhaps he pays his weekly contributions to a Benefit Society, which is managed by his own companions, whose fairness he may have no reason to doubt, and who will, he believes, supply him with personal care, as well as sums of money, in case of disease or accident. The treasurer of such a Society may go off with the funds committed to his care: or, without the smallest intention of dishonesty in any one connected with the Association, it may become bankrupt, from some fundamental error, through which the expenses and the income have not been properly adjusted.

The plan of union for mutual assistance forms so important a part of the best measures by which the truly economical application of a mechanic's income is to be made, that it deserves special attention; and without attempting fully to elucidate the subject, I do not think that I shall be out of place in offering a few remarks in relation to it. There are undoubted advantages in a Savings' Bank, which enables every

individual to have the full benefit of his own savings, however small; since they are making interest so long as they remain untouched; and are at his disposal, whenever he needs them to meet his wants, or has the opportunity of applying them to greater advantage: but the readiness with which a sum may be withdrawn from the Savings' Bank may tempt the possessor to take it out without a justifiable cause; and at the same time, the bank offers none of those advantages which a plan of combination may be made to confer on the deserving and industrious, in case of sickness or other unforeseen adversity. A fruitful and inevitable cause of failure, with many of the co-operative societies, results from ignorance and consequent mis-application of the principles upon which the quotas respectively paid should be made to correspond with the amount of advantage to be secured to the contributors. To make this application properly, requires a very great accumulation of facts regarding the probability of life at different ages, and also of the probability of those accidents against which the members of the Association are designing to protect themselves. Upon these accumulated facts, calculations have to be made, which, in their intricacy and extent, may, in some respects, be compared with those which are necessary for the prediction of an eclipse or the return of a comet. But whilst none but an accomplished mathematician would think of producing an Almanack in which these astronomical predictions should be given, almost any set of men, who withdraw from a tap-room to the comparatively quiet parlour of an inn, seem to think themselves qualified, with the assistance of the landlord's arithmetic, to devise the plan of a Benefit Society. As a natural consequence, they fall into fatal errors: the most striking and obvious of which, as far as my observation goes, are the want of adaptation of fees to the ages of the contributors, and the neglect of proper attention to the state of health of those who join the Association. Hence the young and healthy go on contributing to the relief of the sick and the aged; and, for a while, no inconvenience is felt, but, on the contrary, much comfort and assistance is afforded. The treasurer may report a balance in hand, and even an increasing balance; but it is

bearing no just proportion to that which will be required, at the period which must necessarily arrive, when the young and the active, who are now contributors, must, in their, turn put in their claims. It may be said, that a rising generation will come in and pay for them, as they have paid for others. It will be no proof of the march of intellect, if they do. If they have learnt to calculate at all, they may soon be convinced that they would be joining a bankrupt concern—that their quotas would merely go to put off the evil day, at which failure is inevitable. The case is very different with those Associations which are formed on accurate principles, and have been conducted in a correct and judicious manner. Let the balance be struck when it may, each member will find his own risk at the time represented in the capital of the institution; so that another institution need not hesitate to take upon themselves the balance and outstanding risks, together with the future payments. Many of the District Benefit Societies are liable to objections, from the smallness of the number of their members; since, though the quotas may be fixed upon the best principles, it may very possibly happen that a disproportionate number of deaths or cases of sickness may occur, in consequence of the numbers not being adequate to furnish a correct average. The more you investigate this subject, the more you will understand its great practical advantages, and the various kinds of assistance which an industrious and economical man may derive from an Association for mutual assurance, of the description to which I am now referring. There are, doubtless, several of these, of long standing and unquestionable security: but I know of none, which, in the combination of so many advantages, and in receiving such small sums as to render it availing to those whose incomes are very limited, surpasses the NATIONAL PROVIDENT INSTITUTION.

Relief during sickness, in the shape of medicine and weekly allowances, does not come within the scope of the National Provident Institution. Such Associations must necessarily have a more local character; but, for their security, they require to be governed upon the same principles of equitably adjusted

co-operation. I have personally witnessed, with admiration, the practical working of some of the Benefit Societies which the working class of Jews have long established amongst themselves; and though I am not prepared to state that they have adopted such calculations as to entitle this part of their plans to imitation without further examination, I may safely hold up as exemplary the personal attentions of the active members and office-bearers in those societies with which I became acquainted.

"When you do any thing from a clear judgment that it ought to be done, never shun the being seen to do it, even though the world should make wrong suppositions about it: for if you do not act right, shun the action itself; but if you do, why are you afraid of those who censure you wrongly?"—*Economical Library*, No. iv. p. 23.

"Whatever rules you have deliberately proposed to yourself for the conduct of life, abide by them, as so many laws, and as if you would be guilty of impiety in transgressing any of them."—*Economical Library*, No. iv. p. 26.

"Endeavour to be as perfect as you can in the particular calling you adopt: possess all the arts and mysteries thereunto belonging, and be assiduous in every part thereof;—industry being the natural means of acquiring wealth, honour, and reputation; as idleness is of poverty, shame, and disgrace.

"Lay a good foundation in regard to principle. Be just and honest in your dealings; not wilfully overreach nor deceive your neighbour: keep always in your eye the golden rule, of 'Doing as you would be done unto.' Have a strict regard to discharging all legal debts: do not evade your creditors by any shuffling arts, by giving notes only to defer payment; but, if you have it in your power, discharge all debts when they become due.

"Above all, when you are straitened for want of money, be cautious of taking it up at a high interest."—*Economical Library*, No. iv. p. 24.

"Our Rulers will best promote the improvement of the people, by leaving capital to find its most lucrative course, commodities their fair price, industry and intelligence their

natural reward, idleness and folly their consequent punishment;—by maintaining peace, by defending property, by diminishing the price of law, and observing strict economy in every department of the State."—*Economical Library*, No. iv. p. 34.

NOTE (17.) PAGE 339.

"Instances may occur, from accidental and fortuitous circumstances, in which the able, the vigorous, and the healthy, may very properly be the objects of temporary assistance; but it is scarcely less deplorable for the country at large, than for the sufferers themselves, when a number of such individuals are for any length of time unemployed. The working-classes are obviously a most important part of the wealth of a nation. Every day that a workman passes unemployed must be a loss to the community, proportioned to the value of an equal portion of his time devoted to labour. When thousands of workmen are out of employ for several weeks together, the total loss to the country would be very considerable, even were no expense incurred in maintaining them during the interval. But the sums so expended, are necessarily and irrecoverably lost to the national stock, having left behind them nothing to represent their value. I readily admit, that we cannot contemplate the employment of these sums without feeling a pleasure derived from the knowledge, that, whilst they afforded relief and comfort to the distressed, they evinced the noble and generous and benevolent feelings of the more fortunate members of society. But greater benefits would be enjoyed by the former, and equal philanthropy and more operative patriotism would be displayed by the latter, if the capital devoted to this branch of charity were so laid out, as, by giving employment to those capable of labour, it might, in part at least, remain under a new form, and in combination with so much value as may have been rescued from the lost time of the operatives.

"Why should not charity, as well as avarice and ambition, turn over her capital, instead of being limited in her exertions, and restricted to unproductive consumption? That this course is so seldom pursued, argues its difficulty, not its

impracticability. I can scarcely conceive a more legitimate and praiseworthy object for the ingenuity of the lovers of their country, than the contrivance of suitable plans for the profitable employment of operatives, when thrown out of their ordinary work.

"When the gentlemen of Paris, from the most studied and intricate fashion in the dressing of their hair, suddenly passed into the simplest crop, and deprived the hair-dressers of their means of subsistence, De Prony acted the part of a true philanthropist, when he conceived the idea of giving them occupation in the construction of extensive Tables of Logarithms.

"Whilst want of occupation must lead to poverty and distress, and promote depression of mind and the prevalence of disease, active employment has the opposite tendency. It was therefore counsel worthy of the Oracle, when the Romans, visited with pestilence, were ordered to draw off the waters of the Lake of Nemi."—*Hints on the Cholera, &c. by Dr. Hodgkin*, p. 22.

NOTE (18). P. 340.

ALTHOUGH I have said but a few words respecting the importance of cultivating the moral principle, and guarding it against the dangers of its being weakened or destroyed by deviations from the path of virtue, it is impossible for me too strongly to express its intimate connections with the health both of body and mind. I must still refer to other writers, and other teachers, for the development of this most comprehensive subject: nevertheless, there is one point which I will not omit to notice; since I believe it to be but seldom alluded to, and at the same time to bear a close relation to various points which I have touched upon, either in the Lectures or Notes. I have often observed, with surprise and regret, that whilst the principles of justice, which should regulate the transactions of individuals with each other, are understood, though not always acted on, there appears to be a mistaken theory, as well as practice, with reference to bodies of men.

It has often been said, that corporations—in which term I

apprehend various associations of individuals are to be comprehended—have no bowels, or, in other words, no conscience. This may be true, to some extent; since such bodies will sometimes sanction proceedings which the individual members would scarcely sanction on their own separate personal responsibility, and of which they would not willingly receive the entire demerit. The point which I am desirous to notice, relates to the other side of the question; which, though not embodied in an aphorism, and seldom noticed, is quite as important;—I allude to the fact, that when the justice of a question, in which a body of men on the one side, and one or more individuals on the other, are to be considered, popular opinion, through the influence of the defect in moral principle to which I am now referring, is strongly disposed to sanction a deviation from impartial justice in favour of individuals, upon the plea that it is taking the part of the weak against the strong. No absolute violation of justice can be really sanctioned or palliated by this delusive plea. The examples, which I adduce merely by way of illustration, will serve to shew that the course pursued is impolitic as well as immoral. I have been informed, in the case of the loss of vessels at sea—and I have myself noticed in the case of assured lives—that undoubted evidence of fraud on the part of individuals is rarely allowed to be sufficient to protect the assuring bodies against the injury which such dishonesty inflicts. The mischief which this course produces is manifold, and of an extent which it is impossible to calculate or estimate. It gives a sort of licence to fraud, which cannot fail to multiply under the protection afforded it. As those, whose defect of moral principle allows them to cheat a Company under favour of the impunity which they find, may soon be led to practise their fraud on individuals also, it is obvious that the public, as well as Associations, become the sufferers. Again: the sanctioned fraudulent losses, by swelling the aggregate amount of the risk to be run, necessarily raise the rate of premiums to be paid by honest individuals, who thus are made to suffer for the guilty. The evil thus diffuses itself into society, and escapes unnoticed; just as unwholesome water is taken almost

unconsciously, through the extreme delusion of the poison which it contains. Lastly, the defrauded bodies themselves, from the circumstance of their having justice denied them, are likely to seek security by such means as their united strength may supply; and may therefore at times be tempted to fall into the fault imputed to them, by not letting their acts be governed by the dictates of conscience.

NOTE (19.) PAGE 342.

Although, in order to avoid coming into collision with any religious sect, I have, in the preceding Lectures, studiously abstained from entering into subjects of a theological character, I am inclined here to offer one recommendation;—on which, I confess, I wish we could all act! I desire that we, who make profession of Christianity, instead of laying the principal stress on particular dogmas, respecting which persons of equal sincerity entertain shades of difference in their opinions—and, instead of making them the subject of controversies and discussions which have a tendency to encourage unfriendly feelings—might more constantly and zealously endeavour to observe the sacred precepts, and follow the perfect example of the Divine Author of our Religion. This, I am persuaded, would be the best and most effectual corrective, both to the lamentable depravity and to the uncharitable orthodoxy of the present day; and would promote, in the highest degree, the comfort and happiness of individuals, and of the community also.

NOTE (20.) P. 344.

THE advantages which the working-classes would derive from seeking pleasures of an intellectual rather than of a sensual character, during the hours which the intervals of toil should afford to all, suggest some considerations which might properly engage the attention of English Mechanics. Whilst in the pursuit of sensual gratifications, the working-classes are, by their scanty resources, precluded from participating in the same pleasures in which their wealthy countrymen indulge, they consequently gratify the particular

appetite to which they abandon themselves by means of an inferior quality. The case is very different with respect to intellectual pleasures; notwithstanding which, the operative and poorer class appear generally disposed to seek, by preference, an inferior quality in these gratifications also. He whose habitation consists of one or two apartments, who is clothed in a most economical manner, and whose hands are soiled and hardened by his laborious and productive labour —who dines off one dish, and who, if his tea and sugar be excepted, may rarely taste imported luxuries—may indulge his intellectual tastes, through a cheap edition or second-hand volume, with the very same materials with his wealthier neighbour, who may turn over the hot-pressed pages of the most costly edition seated in the easiest chair and residing in the most splendid mansion. Indeed, the ability and perseverance with which individuals in the humbler walks of life have pursued intellectual pleasures, when their appetites have been excited in this direction, would seem to shew that their gratification is more intense than that which the wealthy derive from the same sources, but from which they are liable to be diverted by the variety of other temptations which surround them. The defect which is here pointed out with regret, is rather the result of accident than necessity, seeing that ignorance and the neglect of intellectual pleasures are not the necessary attendants of poverty. In some very poor districts, the love of learning has prevailed; and men of extensive reading, and even of high classical or mathematical attainments, have been found in very humble cottages. It is my firm persuasion, that the agricultural and operative class in this country form no conception of the pure pleasures from which they cut themselves off, and of the insurmountable barriers which they place in the way both of their own advancement in station and of their beneficial intercourse with the other degrees in society, by their almost total neglect of those intellectual gratifications which they might enjoy in common with every other class. I shall not attempt to point out the sources to which each individual might resort, according to the bent of his particular genius and taste; but, as I

am anxious to be understood, some illustration appears necessary. Although careful statistical returns make it appear that there is a lamentable number of our countrymen of both sexes who are unable even to read, it may safely be assumed that the majority, even of the working-class, are not so ignorant. It is evident that they can read; and a particular class of literary productions is supplied for their use. The character of this class of publications has doubtless been somewhat improved; yet it is impossible to pass through our streets without being convinced, by the evidence of our eyes and ears, that the commodities offered in the intellectual market for the operative class is the very reverse of what they ought to be, for the purpose of elevating their minds, and enabling them to partake of the pleasures and enjoyments easily within their reach. The simple fact, that a labouring man who may be well read in one or two, not to say most of our esteemed British Classics, is regarded as a sort of prodigy, both confirms the correctness of these observations, and furnishes a practical comment on their importance.

NOTE (21.) P. 345.

THOUGH I would strongly urge the operative and productive classes of my countrymen to strive to participate in the pleasures and advantages of a greater extent and higher degree of general education than that with which they are usually satisfied, I lay particular stress on their special cultivation of those branches which relate to their own business and occupation. It is really lamentable to find a workman in ignorance respecting the very materials with which he is engaged; and of which he knows scarcely any thing beyond its name, and the particular properties which it may possess, in relation to his own immediate operations upon it. How often is the mechanic wholly uninformed respecting its natural history, its chemical properties, the quarter of the globe whence it is brought; or the social condition of those who have prepared it for his hands, and who may be suffering under degradation and misery; which should excite his sympathy, as well as induce him to regard his own lot with more complacency, by the contrast!

If the workman be ill acquainted with the objects on which he operates, he is, in most cases, equally ignorant of the principles of the art which he is exercising upon them: and, as a natural consequence, the objects of art so produced are rendered less useful and less agreeable than they otherwise might be. For example, how few house-painters have made any study of the subject of colours, and are at all acquainted with the principles which should regulate their harmonious combination. When any thing has been done well in this respect, it has generally been through the influence of an instinctive good taste; which is shocked at the faulty combinations which an irregular fancy may attempt for the sake of variety, which is too often confounded with happy invention. Sir Walter Scott perceived this prevailing deficiency in the useful class of painters; and turned the attention of a talented young man, of their number, to the consideration of the subject:—the excellent little work of Hay was one of the results of this suggestion. The lucrative business, and consequent fortune of the author, as well as some general improvement in the style of painting, have been the fruits of this happy direction of an operative's studies. To take an illustration from another branch of art, by which our safety as well as our pleasure is affected, let us consider the case of the common blacksmith. He may make his horse-shoe of good iron; he may forge it carefully; and, as far as good workmanship is concerned, cut the horse's foot very prettily, fix his nails firmly, and leave the whole foot carefully rasped; so that the observer would say that he has performed his task expertly. Notwithstanding this, serious and probably very fatal errors have been committed, through ignorance of the structure and economy of the foot; and the poor animal first goes uncomfortably, and then unsafely, to the injury of his rider's person and his owner's pocket. The possession of a little further information, in connection with his particular department, would have enabled the shoeing-smith to have applied his mechanical dexterity to advantage, instead of injury, and with a diminution, rather than an increase, of his own trouble. He would have left untouched the frog, with which the knife should never

meddle. He would have applied the nails in such a manner, that they should not deprive the foot of its elastic properties; and he would have carefully refrained from obtaining a little temporary neatness by applying his rasp to the removal of the delicate epidermis with which nature has protected the surface of the hoof. I must be allowed here again to refer to the important researches and publications of my friend Bracy Clark.

In every department of our numerous arts and manufactures, the operatives might turn a store of sound information, in relation to their particular branches, to more or less practical advantage; and the necessary consequence would be, that their productions would be more highly esteemed, both at home and abroad. The mechanics themselves would take a higher standing amongst their countrymen: and, should they incline to emigrate, they would possess in themselves an amount of availing capital; of which shipwreck, and other disasters, could not deprive them, so long as life, health, and strength remained.

NOTE (22.) P. 348.

HAVING noticed some of the evils attendant on the Factory system as it is too often carried out in this country, and pointed out some of the modes by which important improvements might be introduced, I cannot omit to offer, by way of illustrating those remarks, some account of the factories in Lowell, in the United States.

The manufacturing town of Lowell, in the United States of North America, is not far from Boston. It is as remarkable for the rapidity of its growth, as for the success in all respects with which it has been conducted. I am indebted for the following particulars to two very intelligent friends, who are personally acquainted with the place.

"The predominant characteristic of all that I saw," observes one of these gentlemen, "was extreme neatness in every thing: the borders of the canal which gave water to this extensive workshop; the footways and pavements of the streets; the exterior of the houses, down to the smallest habitation; above

all, the dress and healthful and contented appearance of all the operatives, among whom are 7500 girls, between thirteen and twenty-five years of age. Several of the female operatives officiated as clerks: I saw them with their pens, making the necessary entries in their books. Not a solitary instance of ill health or bodily debility met my eye.

"What I heard, surprised me quite as much as what I saw. Besides their board, these girls received eight dollars per month, on an average, as wages—a sum equivalent to from 32 to 36 shillings sterling each.

"Their education had been so far attended to, that there were among them a sufficient number to support, by their contributions, a periodical of considerable merit;—and this not only by their purses, but by their pens; for I understood that they were the sole contributors of the matter which composed it."—This periodical, which is called the "Lowell Offering," has been favourably noticed in the Athenæum.

The operatives are chiefly daughters of small farmers of the surrounding country, attracted by the handsome wages paid for their labour. Owing to the meritorious and remarkably successful efforts of the proprietors to preserve purity of morals, no opprobrium is attached to employment in the factory. This is so far from being the case, that, after a few years of industry, the young women generally retire with a snug portion, marry, and settle respectably. Although fifteen years ago there was not a dwelling where the town of Lowell now stands, the population already amounts to upwards of 15,000. This scene of useful labour, and manifest comfort and enjoyment, has been produced by a capital of about ten millions of dollars, which has yielded an annual income of ten per cent. to its owners.

You may be inclined to suppose that the gratifying points in this picture are to be referred to local circumstances; that the town of Lowell may be so retired, that temptation does not assail the operatives there employed; and that because the United States are a new country, with a scanty population compared with its extent of territory, and possessed of certain political institutions differing from our own, that a

degree of happiness and success are attainable there which it is useless to hope for or seek in this country. Far be it from me to depreciate any of the real advantages which America doubtless possesses. On the contrary, I rejoice in the belief that she will long and increasingly enjoy them: but you will greatly err in supposing that the happy state of things which exists at Lowell is the necessary attendant of a manufactory in America, or that a different state of things must necessarily exist in this country. The temptations to evil, and the opportunities for doing and receiving good, are not so limited to place. The high standard of conduct which is maintained at Lowell may be traced to the moral and religious education which the work-people receive before they come to the factory; to the self-respect which they are early led to cultivate; to the expectations of friends, who watch their course with anxiety; to the good example of companions similarly cared for with themselves; and to the great personal and practical attention which the heads of the establishment constantly devote to the welfare of those in their employ. You will perceive that there are none of these important elements which might not be secured in England as well as America; though it must be admitted, that the prevalence of a very different system has led to such an amount of varied depravity, that additional care and stronger counteracting influences may for a time be requisite to oppose the influence of bad example and incessant temptation. Do not suppose that the master-manufacturers in England are altogether indifferent to the subject. Although the state of our manufacturing districts proves how generally inadequate their attention is, exceptions are to be found which it would be unjust not to admit. Before Robert Owen allowed his talents, his active benevolence, and his pecuniary resources, to be turned aside to visionary, irreligious, and impracticable schemes, there existed at New Lanark, under his fostering and paternal superintendence, an extensive and flourishing manufactory, the faithful description of which might compete with that of Lowell. In the midst of the most active productive industry, the children were receiving a guarded, systematic, and

excellent education; the young people, after having, not prematurely, entered the factories, were encouraged and aided to pursue their individual improvement in various branches; whilst the heads of families, and other middle-aged operatives, enjoyed great facilities for the exercise and improvement of their intellectual powers, as well as for their religious instruction. The personal appearance of all classes bore conspicuous evidence of the excellence of the system under which they lived. G. Wood, of Bradford, has not only signalized himself by his strenuous opposition to the early and excessive working of children, which is destroying in the bud the future hopes of our country; but he also set an important practical example, in the management of his own factory, so long as he was connected with one. At Stockport, the firm of Christy and Co. take a lively interest in the welfare of their work-people;—amongst the practical fruit of which there is one important point, which I am glad to notice, with a hope that the example may be followed. Baths have been established on the premises; they are well appointed; and the young people are encouraged to take advantage of them, under careful superintendence.

LECT. IV.

ON SUCCESSIVE GENERATIONS, AND THE EDUCATION OF YOUTH.

In my last Lecture, and in the three which preceded it, I presented you with a summary view of the different functions, Bodily and Mental; the united due performance of which constitutes Health, or that state in which a sound mind animates a sound body. I endeavoured to explain the principles upon which these several functions should be regulated; so as to counteract those injurious tendencies to which our artificial modes of life give rise—principles, the general influence of which is, to prolong life; and which, even when the effect is overruled by circumstances, must nevertheless promote the usefulness and satisfaction, and consequently the happiness, of the permitted period of our existence, whether long or short.

These precepts relating to the conduct of the passing generation, even when the most implicitly and the most successfully adhered to, would soon be left without any to follow them. Were it possible to restore patriarchal length of life, the earth would nevertheless be left without inhabitants, but for the provision of successive generations, whereby the race of man is rendered as permanent and enduring, as the individuals which compose it are frail and mortal.

As lovers of our country, and well-wishers to the human race, we cannot but feel a lively interest in what relates to the well-being and prosperity of those who are to succeed us. This interest, however, belongs, in an especial degree, to those who either stand in the important relation of parents, or are likely to do so. It is to such, to whom, through you, I am anxious to direct the principal part of this evening's Lecture.

It would ill become me, on an occasion like the present, to attempt to withdraw the veil of mystery which is wrapped about the wondrous fact of the reproduction, not merely of human, but of all animal life; although, even with this, there are connected many points of no trifling importance to the well-being of the future race. ([1])

It may almost suffice, for our present purpose, simply to advert to the fact, that it has pleased Providence in different ways to increase the happiness of some of the individuals of one generation, by the provision which is made for the existence of their posterity.

The Christian code of morality is sufficiently clear and explicit, in pointing out our duties in reference to this subject, to need no addition.

Whilst its precepts are reverenced by the pious, and enforced by religious teachers, for the sake of their first and great object—the promotion of virtue; it would be well if others could be induced to strengthen their resolutions to observe them, as the rule of their conduct, by the conviction of the truth, that they are founded on the justest reason, the truest wisdom, and the soundest policy.

It is notorious, that there is a most lamentable occasion for the moral reform at which I have hinted.

Until this is happily in a greater or less degree brought about, there will not only be iniquity for the preacher to denounce, and for justice to punish, but also misery, sickness, and death, not to be lost sight of by those who are interested in the preservation of the public health. Nor can I on the present occasion, when precluded from entering so fully into the subject as its importance demands, altogether withhold a few remarks respecting it; though I shrink with hesitation from the task. The motives, to which I trust to bear me out, are, ardent desires for the diminution of bodily and mental misery, by the promotion of virtue.

Passing over much that might be said, I shall call your attention to two heads:—First, I have to offer an appeal, which I could wish to be generally heard, in behalf of the weaker sex. In a civilized country like our own, it is often contended, that the lot of females is particularly good; in fact, that it constitutes one of the distinctive features of civilization. When this is recollected, and when it is likewise remembered, that in every age of the world, and in every region of the globe, in which the mind has had the means of commemorating the feelings which have impressed it, the sacred and the profane, the grave as well as the gay, the philosopher and the poet, the historian and the traveller, have not failed to commend and eulogize the female character; not only directly, as crowning the happiness of prosperity or lightening the burden of adversity, but also indirectly, by holding up, under its figure and likeness, those ideal forms of virtues which they wished to represent as amiable and attractive. When these facts are called to mind, it might well be supposed that I might spare an appeal, which an internal voice must make to all. But, no! Many and

able advocates are wanted on behalf of the last and best, but most abused, earthly gift of God to man. It has been my unavoidable lot to catch a glimpse behind the scene, which hides from the giddy, and the thoughtless and unwary, the ills to which they may be fatally approaching; and I should be as culpable in concealing the evil report, as the spies were, formerly, in garbling the good one. Could I set before you, in all the horrors of reality, a picture of those whose years have scarcely allowed them to taste of the enjoyment of ripening youth—that age so specially calculated for happiness, innocent cheerfulness, and pleasure, but, who, friendless and abused, and sinking under the misery of sickness and despair, are hastening to the shortened period of this life, with blasted hopes to the next—could I throw open before you the charnel-houses filled with their untimely remains, who is there who would not exclaim with the Prophet of old, "Oh that my head were waters, and mine eyes a fountain of tears, that I might weep night and day for the slain of the daughters of my people!"? Let their short history be inquired into; and it will probably be found, that, in many instances, they had once been the joy and hope of affectionate relations and friends; that with imprudence, calculated to ruin these hopes, they had been perilously exposed; that having for a time firmly resisted the attacks of the enemy, their constancy and resolution not being reinforced by judicious counsel, but weakened by pernicious example, they had been taken by stratagem, or assault, in a moment of unwatchfulness, which deprived them of their friends, and left them the unpitied victims of misfortune; whilst those who had been the cause of their fall, escaped, with apparent impunity. So, in some rock-built

Grecian fortress, courage and patriotism have long maintained the unequal struggle with surrounding Turks; till, in an evil hour, the traitorous sentinel has let in the barbarous rout, to put virtue and valour to the sword, and devote youth and beauty to servile chains and brutal lust; whilst surrounding nations looked on, unpitying and unmoved. I would appeal to my generous and noble-spirited countrymen, to redress the injustice which executes so unequal a sentence on the weaker sex; not in relaxing that severity by which public opinion imposes wholesome restraints upon them, but rather by extending it for their protection to our own. The standard of morality would be raised higher; greater numbers will gather round it—and they would less readily desert it. I need not comment on the salutary consequences which would follow.

That the corruption of the best things is most corrupt, is well illustrated in the case of the wretched objects whose pictures I have set before you. Degraded and corrupted themselves, they become the means of corrupting others; and inflict, often misplaced, but fearful vengeance, on the sex which had deserted its duty of protecting them.

This brings me to my Second head, under which I shall be very brief.—Could the warning voice be heard where it is called for, I might tell, as an eye-witness, of hopeful youths, who have paid the forfeit of their reason, or their life, as the punishment of their first desertion of chastity. But I forbear; being more anxious to point out the means which would co-operate in promoting obedience to the authority of religion and virtue. One of the most important of these secondary means, is the right occupation of the time not taken

up by the necessary attention to business. It has been said, that the devil tempts all but the idle, but that they tempt him. Idleness softens the body and weakens the mind, and in an especial manner conduces to those evil communications which corrupt good manners. I would here again lay particular stress on the due employment of those vigorous exercises, which, as I have stated in a former Lecture, not only greatly promote the health and activity of the body, but, even in heathen countries, have been found conducive to morality.

Another ally to the cause of virtue would, I am sure, be found, in having constantly before one, for steady pursuit, some laudable object, strongly exciting to the industrious acquirement and economical expenditure of money. As the last, but not least powerful of the means which I shall mention, is the prospect, whether near or distant, which some may have in view, of a virtuous alliance, to be formed when circumstances may ensue to render it expedient. The steady and persevering industry, the strict economy and constant temperance in all things, to which such a prospect ought to stimulate, would, I am bold to say, if universally prevalent, do more to counteract pauperism, with its attendant miseries, of want and sickness, which oppress our country, than all the contributions of the wealthy, whether in the form of poors'-rates, subscriptions, donations, legacies, asylums, hospitals, or dispensaries.

I shall now turn your attention, from a painful and difficult subject, to one equally interesting, and much more pleasing: I mean, the promotion of the bodily health of the rising generation, in whom must rest the future hopes of their country.

Allow me, before I proceed, to make a few remarks on the observation, that nations grow old, like individuals; although their population is constantly recruited by the accession of the young. We must, to a great degree, admit the fact; but it does not, like the decrepitude of individual old age, depend on inevitable necessity. (2) It ought rather to be regarded as an accidental evil, which nations bring upon themselves, by the corruption of their institutions and manners; and more especially, of those which relate to the education and training of youth. It is to the care bestowed on the public or private education of their youth, that some of the most remarkable states have been indebted for their prosperity, or for the lustre which the number of their distinguished characters has thrown upon them. (3)

If we wish that our country should, in succeeding ages, continue to be inhabited by a race whose manly vigour may not be inferior to that for which their forefathers have, I believe, with reason been distinguished, some care must be devoted to the formation of their bodies, in order to counteract the evils which attend a far-advanced state of civilization. For this purpose, attention should be paid to those principles which I have already laid down, for the regulation of air, clothing, diet, and exercise. They should in infancy have as much as possible of the free and open air. It will be in vain to raise a population of able-bodied and muscular men, if infancy is stunted in its growth by confinement in small and dirty apartments, or if they continually breathe the air of filthy, dark, and confined streets. Let this be a stimulus to you, to procure, if possible, attention to the practical hints which I have offered for the removal

of the local evils of the district around us, and of others of a similar kind.

With respect to diet, it should be derived from some of the simple and nutritious articles which I mentioned in my Second Lecture. It may, with great advantage both to health and economy, be in a great measure derived from the vegetable kingdom; and it is of very great importance that it should be sound in quality, though plain and even somewhat coarse, rather than out of condition, but of finer and more delicate appearance. It would be well, if, by commencing with the young, the poor could be induced to abandon the pernicious propensity to employ, with a great sacrifice of economy, and often of health, articles of food which, in appearance at least, resemble those which are consumed by their richer neighbours.

There is a very common error, which it is important to correct in the nursing of children: I mean that of giving them the breast too often, and for too many months. It is essential that children should from the first be accustomed to take their mother's milk with the same regularity which, in after-life, should be adopted with more substantial food. They may, however, be allowed to take the breast somewhat more frequently. Four times during the day, and twice during the night, should be the extreme limit; and with this, if their mother's milk be good and in sufficient quantity, they will, during the first four or five months, require little or nothing besides. When they do take other food, it should be very simple, only moderately sweetened, and be given at regular times. With respect to the time of weaning, this must be somewhat influenced by the state of the health, both of mother and child. Where both are sickly, and the milk

appears decidedly to disagree, the weaning can hardly be too early; but, in general, it will not be necessary that it should take place before the child is nine or ten months old. It ought rarely, if ever, to be deferred till after the child is a year old; yet it may happen that a vigorous mother, who has a copious supply of good milk, may continue to give it to her infant for one, two, or even three months longer, without producing the serious evils which, in other cases, proceed from such continued suckling: yet even those more fortunate mothers will be likely to find the difficulty of weaning increased, and their own strength in some degree impaired, by the delay. It is scarcely possible to conceive more sickly and wretched specimens of infancy than those which I have seen, when a sickly ill-fed mother has allowed her child, of nearly two years old, to depend almost solely on herself, constantly plying it with the nipple; from which it drew a poor and watery fluid, which scarcely kept life from extinction, and seriously offended both stomach and bowels. The effect of such a course must almost inevitably be felt, should the child be reared, throughout every succeeding portion of its life. Where the evil has not been allowed to advance so far, the striking improvement obtained by immediate weaning, and recourse to a suitable and regular diet, leaves no room to doubt the cause of the child's want of health. Considerable difference of opinion has existed amongst those who have considered the subject, as to the time when meat should be given to children, and the extent to which it is to be carried: this difference may in part be accounted for, by the inquiry having been conducted with children of opposite constitutions, and placed in different circumstances. The stout and

hearty child, who inherits a good constitution, who is brought up in the country, and is always breathing a good air, will, in all probability, have a good appetite and good digestion, which will lead him to take a hearty meal, in which meat would form a needless, if not an injurious part. The less robust child, who lives in the confined air of a town, whose health would be deranged if it took a copious meal, will generally find tender juicy meat and gravy the most useful part of his diet. I believe that, in some cases, the use of meat is objected to from an idea that it is likely to promote the disturbance of the head, chest, or bowels, to which some delicate children are very liable ; but with care, I believe that the contrary effect would be produced, and that the use of small meals, of some of which meat and gravy were to form a part, would bring about a healthful state of the child's constitution, in which such attacks would be less likely to take place. Although the disorders of children are often attributed to worms, without there being sufficient reason for this opinion, yet there can be no doubt that children in some districts are more affected with them than adults. This is probably owing to their being more exposed to an unwholesome diet of fruit and vegetables of bad quality. I would therefore recommend, in reference to the diet of children who appear to be liable to worms, a careful attention to the hints which I have given, in the Second Lecture, on the use of salt and vegetables.

Strict attention to cleanliness in the persons of children is scarcely less necessary for the promotion of their health, than care respecting fresh air and wholesome food. There are many eruptions, and other loathsome affections, to which children are

liable, which this care would wholly obviate or greatly mitigate.

Another point of equal importance, in bringing up children, is, to afford them protection from cold. We often see them very inadequately cared for in this respect; and an idea seems to prevail, that they can resist cold better than adults, and are invigorated by exposure to it. Precisely the reverse is the fact. Dr. Edwards, to whose researches concerning the influence of heat and cold I have already referred, has clearly shewn, that very young animals have much less power of producing warmth, and consequently of resisting cold, than those which are older. His experiments were made with young animals of different species; and he found that the inferior power of producing warmth corresponded with the low degree of developement at which the young were produced. Thus, kittens and puppies, which are produced with their eyes closed, and are altogether unable to shift for themselves, produce less warmth than young guinea-pigs, which are produced with their eyes open, and with power to run about: and those young birds which, like pigeons and sparrows, are hatched with naked skins, and are unable to leave their nests, in which they require the warmth of their parents to be almost constantly applied to them, have much less power of producing warmth for themselves than the young of chickens and other birds, which are hatched covered with down, and with power to run about and select their own food. Yet even these last shew how much they are inferior in this respect to their mother, from whose wings they seek protection during the whole of the night, as well as at intervals during the day. Now, although it would not be proper to make

young children the subject of experiments which might endanger their health, or even life, yet we may fairly conclude, that the principle which applies to the young of inferior animals, whether they are above or below them in the degree of maturity at which they are produced, will be applicable to children, who, in this respect, hold an intermediate position. We have, moreover, the evidence of a very careful investigation, conducted on a most extensive scale, in many of the departments of France, which places beyond a doubt the importance of attending to this principle in the management of children. It appears that the proportion of deaths within a very limited period after birth, compared with the total number of births, is much greater in winter than in summer; and that this difference of proportion is much greater in the northern and cold departments, than in the southern and warmer. It was strongly suspected that this larger proportion of mortality was occasioned by the exposure to cold to which the infants in France are liable, from their being carried to the mayor of the district for registration within a few hours after their birth; and this suspicion acquired confirmation, from the discovery of the fact, that the mortality was greater in children born amongst a population widely scattered, than where they happened to be collected in the neighbourhood of the mayor.

I believe I need make no further remark, with respect to the management of children in the very early periods of infancy, than to offer a caution against the habitual or frequent use of medicine. The practice of giving poppy-syrup, and other composing medicine, to make them pass a convenient portion of time in sleep, and of administering other medicines

to correct the state of their bowels—which ought, as far as possible, to be regulated by diet—cannot fail to render the child sickly, and impair the vigour of the future man, should the child survive to adult age. There are evils in the management of infants, which, though I believe them to be generally exploded in this country, may possibly still exist in some districts; such as, swathing the body, by which the movements of its growing limbs are prevented, and due attention to cleanliness rendered almost impossible. Another, is that of tightly confining the head; by which it is not only kept unduly hot, but a distorted form is given to its pliant mass, which can scarcely fail to exercise an injurious influence upon the intelligence in after-life. A practice of thus modifying the head prevails in some uncivilized countries; and we regard it with horror, as one of the features of their barbarism, without appearing to be conscious, that an evil, the same in kind, though less in degree, prevails even in civilized countries. (4)

As children advance from the period of helpless infancy, and begin to enjoy the use of their limbs, and to exhibit proofs of improved perception and expanding intelligence, they require, not only a continuance of the care which I have recommended, with respect to fresh air, diet, clothing, and cleanliness; but they must be watched, that no untoward circumstances may interfere with the natural and healthful developement of their limbs, and that their wills and tempers may not be irreparably vitiated by mismanagement. Many children have had their forms completely spoiled, and have grown up bandy-legged and waddling cripples, by being placed too early, and for too long a time, upon their feet, when their legs

were incapable of sustaining the weight of their bodies. It is of great importance to guard against the commencement of this mischief; since it has a strong tendency to go on increasing, and early and continued care for its removal often proves sadly ineffectual. The injury thus done to a child is not merely that of producing an unsightly figure, instead of the graceful form which nature had designed; but it interferes with his future usefulness, by making him unfit for some occupations, and consequently renders his prospects in life less promising than they might be. His temper may be spoiled by habitual harshness and severity; or he may be rendered self-willed and obstinate, by foolish and ill-managed indulgence, in continually allowing him to have his own way, and letting him have any thing within his reach, which he may choose to cry for. Such a practice will ensure parents much trouble and difficulty; and almost inevitably prepare abundance of vexation and disappointment for the child, whom, by their mismanagement, they may correctly enough be said to have *spoiled.* (5)

In noticing the management of children, at the age which I have just been considering, and for a few years succeeding it, I must not omit to mention the advantages which may be derived from the comparatively recent institution of Infant Schools, designed for children of this age. These Institutions are of great utility, not only to the children, but also to their parents. The children are removed from many risks, from fire, water, falls, and a great variety of accidents to which they are often exposed; in which exposure they very often endanger, as well as inconvenience others. They are sheltered from variations and incle-

mencies of the seasons; they are accustomed to habits of order and regularity, without having to undergo any irksome and painful discipline; and are thus gradually, and almost imperceptibly, prepared for the more-continued application, which, at a future period, will be essential to the success of all endeavours to bring them forward in any branch of education whatever. Their minds in the mean time, if the school be well managed, are stored with abundance of useful but scattered materials, which will facilitate their comprehension of those subjects which will afterwards become the objects of their more regular education. Their memories, by this early discipline, are greatly improved, and are enabled to acquire more readily, and to retain more accurately, than they could do if this early culture had been neglected. If the school-room and play-grounds devoted to an Infant School have been arranged with sufficient care to ensure good ventilation and sufficient protection from the weather, damp air, and wet ground, they will have the good effect of ensuring to the children advantages which their parents' dwellings are too often unable to afford. They will also derive benefit from the stimulus which will be given to their parents, to attend to the cleanliness of their persons; and the chances of their getting dirty will be greatly diminished. (6)

Infant Schools may be of great advantage even to children who are too old to become scholars in them, and who, but for the existence of Infant Schools, would probably be kept at home to take care of the young children. By thus being engaged in a task which they are unable properly to perform, their persons become distorted; and their minds are allowed to remain without cultivation, as they are deprived of

the opportunity of attending the schools designed for children of their age.

The assistance and benefits rendered to parents, but especially to mothers, by the institution of Infant Schools, is very similar to that which I have just described, as afforded to those children who, though too old to receive instruction in Infant Schools, are nevertheless by them set at liberty to attend schools of another description. The mother, who is relieved from the incessant care of watching her young children, may perform many duties to her own household, which she might otherwise be compelled wholly, or in a great degree, to neglect. Her apartments may be kept in better order; and consequently more likely to yield enjoyment to her husband, when returned from the fatigues of his daily occupation: and his temptation to visit the public-house will consequently be diminished and counteracted. She will have more time to attend to the dress of herself and her family; and, by keeping their clothes clean and well mended, will be able to secure a neat and respectable appearance, which will be some safeguard for the preservation of respectable character: she will also be set at liberty, to seek her provisions and other necessaries at good markets, and, if occasion require, to devote a portion of her time to earn, by her exertions, some addition to the income of the family. Though all these advantages may unquestionably be rendered by Infant Schools, it is right that, in pointing them out, I should add a caution against the danger of the leisure which they produce to mothers being devoted to mischievous gossiping, and other idle and pernicious habits, instead of being applied to the beneficial purposes which I have noticed.

As children advance beyond the age which admits of their attendance at an infant school, their education, as respects their mental cultivation, and the formation of their moral character and industrious habits, becomes increasingly important. In fact, it is one of the points of the greatest moment, amongst those which I have to press upon you in the course of these Lectures. If this point be neglected by parents, it will be in vain that schools are founded and supported by benevolent and patriotic individuals—that good systems are introduced into schools, and good masters obtained to conduct them. In spite of all this care, if parents will not co-operate, the rising generation will spring up a disgrace to their country, a burden to society, dissolute and vicious, and consequently unhappy themselves. They will procure no comfort and satisfaction to their parents in old age; but, on the contrary, bring down their grey hairs with sorrow to the grave. (7) If parents would exchange the negligence which I have described, for a prudent forethought respecting the prospects of their offspring, they would perceive that the obtaining for them the advantages of a good education is one of their first and highest duties; and they would feel, that the present sacrifice, not only of comforts but also of necessaries, would be well repaid by the attainment of this object. In Scotland, where the inhabitants are justly esteemed for their well-directed forethought, and for the success of their persevering exertions, the advantages of education are duly appreciated by the poorest peasants; and even those who dwell in the poorest huts, which are scattered over some of its barren wastes, where they can scarcely procure for themselves any other subsistence than a scanty supply of oatmeal, potatoes, and

milk, do not hesitate to pinch themselves, in order to take from their pittance the means of giving a good education to their sons. Their sons, thus furnished with a sound education, are prepared to offer their services in the best markets; and their cultivated talents and vigorous constitutions, and ability to endure fatigue and hardship, procure for their services the preference to those of persons who may have been born where their services are offered, but whose neglected education deprives them of the power of competing with the Scotchman, whom they envy when they cannot rival, and whose example unhappily fails to arouse emulation. I once knew a Scotchman—who had raised himself to easy, if not to affluent circumstances, by his persevering attention to business—who told me, that when a little child, he was sent every day several miles barefooted, even when snow was on the ground, to a school, in which he said he was well grounded in the rudiments of his education. How very different is the conduct of parents of poor children in this country, from that of the parents of this successful Scotchman! Here we may find children better clothed, and having more attention paid to the indulgence of their appetites, whose education appears to be neglected, as a matter of no importance. They are often employed in earning a few pence for the family; and thus they throw away that invaluable time which should be devoted to the cultivation of their minds, by which they might, at a future day, be enabled to earn, save, and employ more pounds than they can now gain pence by their youthful exertions. Such a course is not only very injurious to the ultimate condition of the children, whilst it seems to add a trifle towards their present comforts; but is really impolitic,

and adverse to the interests of their parents, since it brings a vast number of little hands into the labour-market, to find employment at low wages. The obvious tendency of this must be, to reduce the price of labour paid to adults, and probably to throw many of them out of employ; and thus to promote two evils, of which the operative classes are always ready to complain; namely, low wages, and excessive competition for work.

The education of the children of operatives, and other persons in poor circumstances, ought undoubtedly to be such as will best fit them for those avocations in which persons who are in poor or low circumstances must expect to be engaged. Though it may and ought to be such as to give them the opportunity, if they possess the requisite talents and merits, gradually to raise themselves to a higher station, it ought not in itself, and singly, to raise them above that in which the condition of their parents may have placed them. Were it to do so, their education, instead of being a blessing, would become a curse to themselves, and an injury to society. William Penn says: "He that understands not his employment, whatever else he knows, must be unfit for it, and the public suffers by his inexpertness." There is much which the poor may learn, without injury to them as mechanics and servants. The poor as well as the rich should know, that knowledge is power—that it is a useful and permanent power, which will remain in force when youth and bodily strength are lost. It is a kind of fortune, which, whether great or small, cannot be taken away whilst the senses remain. With a good education, a virtuous person, however poor, is fit for the best company, and may take advantage of the good

opportunities which may sometimes very unexpectedly present themselves.

Parents should themselves take an interest in the education and intellectual advancement of their children; and not leave it wholly to the exertions of their richer neighbours, even where these may be disposed to pay great and benevolent attention to it. Whilst this kind of care and attention may be regarded as casual, and liable to considerable variation—so that in some situations it may be truly liberal and abundant, and in others lamentably scanty and deficient—the care of parents being altogether in obedience to the dictates of nature, would, if they performed the part required of them, be always proportioned to the necessities of the case; and many causes would operate, calculated to render the education of children successful, which would probably be wanting, when all is left to the care of well-disposed and even zealous neighbours.

The mechanics in the dock-yard of Devonport have set a bright example in this respect. By their own exertions, they have raised funds for the construction of spacious and well-contrived rooms, both for boys and girls, and obtained masters and mistresses of good abilities, and well prepared to undertake the management of them. They have, moreover, appointed, from amongst themselves, a Committee to superintend the operation and maintenance of these schools: and I have pleasure in stating, from personal observation, that the appearance and progress of the scholars afforded a gratifying confirmation of the expediency of this truly commendable example, which has been set by those intelligent operatives. ([8]) The individual sacrifice required to support these schools, subsequently

to the expense of their first construction, has not been very considerable; and has probably not been felt a burden, seeing that it is divided among a great number of persons, and is paid in small sums, and by instalments. Who is there, when he has seriously considered the great advantage which might be obtained, were the example of the operatives of Devonport to be generally followed, who would not willingly give up all his gin, and the greater part of his porter, in order to have the means of giving to his sons and daughters that education, and those qualifications, which would render them a solace and comfort to his old age?

Parents of the working-class may exhibit their zeal and interest for the advancement of their children, in a very useful and important manner, even where there is no occasion for them to imitate the example of those who are engaged in the dock-yard of Devonport. Thus, where schools are already established, they may daily ascertain the progress their children are making, by questioning them on their return from school. They may enforce punctual and regular attendance; and they may, and ought, to uphold the authority of the master; who will himself be stimulated and encouraged to keep up his exertions for the advancement of his pupils, when he finds that they do not flag in their attention—that they make such progress as does credit to his exertions—and that these exertions are duly appreciated by the parents of his scholars.

It is not every kind of knowledge, or every branch of instruction, which is equally useful or desirable for all. Some branches, which are taught in the present day in some of our schools, are altogether useless, and are, at best, only ornamental. I allude more particularly

to some of the objects of instruction in girls' schools; such as, ornamental needle-work, flower-painting, and music. If these were introduced into the schools designed for poor girls, they would unquestionably afford sufficient ground for objections, which have been too often, and very unjustly, urged against those schools in which education is altogether plain and useful. Yet, I am sorry to say that I have observed a disposition to introduce some of these pursuits into the course of instruction adopted with poor girls. This, I admit, has been done rather to gratify the caprice of the parents, than in conformity with the system professed in the establishment of the school, or to please the mistress engaged to superintend it. It may therefore not be amiss for me to point out the injury which this mistaken instruction is calculated to produce. The pursuits alluded to tend to shorten the time, already in most cases too limited, which the children of the poor are at liberty to devote to the acquisition of useful knowledge. They are of the nature of a pastime, rather than of a study; and are not only of no use in the cultivation of the mental powers, but unsettle the mind, and tend to unfit it for deriving advantage from those pursuits which are really useful: they introduce or encourage pernicious tastes, which cannot be gratified without expense, and which therefore lead to a misapplication of the little money of which the individuals may become possessed: they give, to those who learn them, notions which do not belong to, or accord with, the sphere of life in which they may be placed; but at the same time they can have no power to raise them into a different sphere: they consequently become very serious causes of danger, betraying them into temptation and ruin.

There are but few dangers of this kind in the education given to boys in the humbler walks of life: they may, however, be allowed to waste their time in various kinds of penmanship, which are of no use in improving their hand-writing for the practical purposes of business; and although, in comparatively few parts of this country, mathematical knowledge is much cultivated in elementary schools, yet it sometimes happens that boys are hurried on to the higher parts of arithmetic, and to the drawing of geometrical figures, without being duly grounded in the preliminary steps.

Some branches of instruction are so necessary and important, that they may be held as indispensable to the education of all. The first of these is READING, the utility of which is too self-evident to require any minute and detailed description. It is the key to a great deal of rich treasure. By reading, we may often, without a teacher, learn much which others have found out, said, or done. It is the means by which we receive almost every kind of information, which is not communicated to us by others by word of mouth. By reading, we are made acquainted with the state and desires of those at a distance; and unlock those stores of information and interest which have been produced by the wisest and best who have lived before us. Without a knowledge of reading, we should be continually liable to err in performing some of the commonest occupations; since, by means of it, we are enabled to distinguish many objects by the names written upon them, which otherwise might be confounded through the similarity of their appearance. The gardener may distinguish the seeds of several varieties of the same species of plants. The shop-

keeper knows, without examination, the contents of his several drawers and packages; and the porter and letter-carrier are not bewildered in the delivery of the packages and letters committed to their care, however numerous they may be. In fine, whether serving or served, whether bent on the pursuit of pleasure or devoted to the discharge of duty, the individual who can read has an almost immeasurable advantage over those who are unable to do so. It is obviously essential that those who read should read correctly; and it is scarcely less important to attend to the manner of reading. Great pains should therefore be taken to guard against children's acquiring the habit of reading indistinctly, with too great rapidity, or with a tone. They should not merely attend to periods and commas, but also learn to manage their voices well.

The next branch of education, which may be regarded as essential, is the art of WRITING; the advantage, I might say the necessity, of which becomes obvious, as the self-evident consequence of the acknowledged utility of reading; since, if there were no committing to writing there could be no reading. Yet, with very many persons, the power of reading what others may have written is almost immeasurably more necessary and important, than the power of committing their own ideas to writing for the use of others. The power of committing words and ideas to a written character of some kind or other would probably be the natural consequence of having learnt to read, and without any special instruction; but it would probably be performed with much difficulty, and in an uncouth manner, by those only who felt the strongest necessity or the greatest inclination to do so. Instruction in writing removes this difficulty, and

enables us to commit, not words only, but the longest speeches, to a character which is produced with ease and rapidity, and which may be read without difficulty. Writing does not merely enable us to communicate our ideas to others without the utterance of sounds, and in spite of distance of time and place: it enables the same individual to recall the ideas which he may have formed or received at one time, with perfect accuracy at another. In this way it becomes a great assistance and relief to memory: but it has been said, that memory gets out of order, and becomes weak and treacherous, when it is accustomed to receive this kind of assistance. There is some truth in this observation; but the certainty of being able to recall facts and ideas, with indisputable accuracy, may be considered as more than outweighing the evil complained of, and which, after all, is a consequence which, though very likely to follow, is by no means inevitable. Writing may, however, be made the means of cultivating and confirming the memory. What is written with attention to the subject as well as to the shape of the letters, will make a stronger impression than what is simply read; and what is thus written, two or three times in succession, will, in all probability, be permanently fixed on the memory. Some of the greatest scholars have employed this method, and given full proof of its advantages.

In teaching the art of writing, both the master and his pupils should be impressed with the importance of constantly keeping in view the two main objects, legibility and expedition; and that the former quality is to be acquired first. Flourishes and fantastical shapes should be carefully discouraged, as there are very few occasions in which they are really orna-

mental. They never can look well, unless they are produced in a style which can only be acquired, after much practice, by persons of taste. The acquisition of a good and legible hand is greatly assisted by teaching the principles upon which the letters should be formed and combined. When this is attended to, a very valuable portion of time may be rescued from a child's school-hours, and applied to much more important instruction than the learning to write, as a merely imitative art. (9)

The ability to write is of comparatively little use, without facility of SPELLING. It is therefore very important that children should be early accustomed to spell correctly. If they are neglected in this respect, they will, in all probability, feel the inconvenience of this error throughout their lives; and notwithstanding the success which may attend their industry in business, or other pursuits, they will ever be liable to the mortification of betraying the defect of their early education.

An observation of the same kind applies to the combination of words for the construction of sentences. GRAMMAR, which teaches the art of doing this correctly, is therefore a very useful, if not essential branch of a common education.

Besides the great convenience which writing affords, in enabling us to communicate our wishes and feelings to those who are absent from us, it is almost essential to the prosperity and even safety of our affairs; since it is next to impossible for money-matters to be kept in any degree of order without it. A similar remark is, perhaps, yet more forcibly true with respect to ARITHMETIC. As money is so necessary an article in the concerns of life, it is very important that all

persons, not excepting even those whose means are the most limited, and whose dealings are on the smallest scale, should keep their accounts correctly. For this purpose, arithmetic is indispensable. Readiness and accuracy in calculation are often safeguards against the danger of being cheated through design or accident. It is not, however, with reference to money-matters alone that arithmetic is essentially necessary. Every thing which is susceptible of being measured by number, size, or weight, may be made the subject of arithmetical calculation; and these calculations, by their magnitude, variety, and complication, may be such as to require the exertion of the greatest intellectual powers. In the cultivation of the mental faculties of children, arithmetic may be regarded as the first step in the sublime science of mathematics. Although I feel persuaded that a taste for the study of the higher departments of mathematics is far from being sufficiently general in this country, it would be foreign to my present purpose to press the subject here. It is much more important that I should urge the universal advantage which might be derived from giving children, by early and repeated practice, facility in working the four first rules in arithmetic; and from accustoming them to perform the operation wholly mentally, that is, without the aid of figures.

There are many things with which it is quite necessary that the mind should be stored, though they may not be so closely connected with the management of our worldly affairs as those which I have now mentioned. Of these, the first to be noticed, because it is of the highest importance, is a good knowledge of the Old and the New Testament. The sacred truths which they record, and the precepts which they inculcate, cannot

be imparted in any other words so appropriate and so impressive as those of Scripture itself. Without an acquaintance with the Bible, most of the sermons which are delivered, and many excellent books which have been written, can only be imperfectly understood.

The golden rule, that "we should do to others as we would that they should do to us," contains in itself the sum and principle of genuine and unaffected politeness. It seems so full, that no addition could be made to it. In carrying this principle into practice, assistance may be derived from various hints and rules, with respect to some points of manner and conduct. The usages of artificial society, and the feelings which the conventional habits, sanctioned by custom, have introduced, require a kind of education, to enable individuals to act, under various circumstances, with ease to themselves, and satisfaction to others. It is the due attention to this kind of education which constitutes what is called *good breeding*. The want of it either produces a painful feeling, in those who are brought into intercourse with the classes of society superior to that in which they may themselves have habitually moved; or, if they are insensible to this feeling, their conduct may assume a character which may be regarded as gross or uncouth, and expose them to misapprehension, and consequently to censures which they may not strictly deserve. At the same time, it may be observed, that the artificial usages of what is called polished society have had, in all times and places, a strong tendency to introduce a frivolous minuteness into the forms which it prescribes; and more stress is often laid on these empty, and perhaps ridiculous forms, than on the genuine conduct dictated

by a virtuous, well-regulated, and benevolent heart. The counterfeit character of some of these conventional forms of politeness is perhaps rendered most evident, when we reflect on the opinion which is formed of them in those countries in which usage has not sanctioned them. Take for example, the ceremonies required in China, to be performed by those who approach the emperor, or the highest officers under him. The Mussulman shews his deference to his superiors, by turning his back and scrupulously keeping his head covered. On some occasions he uncovers his feet, as a token of homage. In some countries, the uncovering of a bald head would be considered quite indecent; whilst with us, persons may catch their death from cold, rather than allow their heads to be covered *. I have no disposition to defend these absurdities; but I would strongly urge the parents of the operative class to pay increased attention to what may be understood by the good-breeding of their children. In an especial manner, let them instil into their minds the importance of reflecting how their conduct and actions may affect the comforts of those about them. This course, without introducing any approach to degrading servility, would tend to remove many petty inconveniences with which the poorer class too often allow their more fortunate neighbours to be wantonly annoyed, and by which they incur for themselves the reproach of being gross and uncivil. It is obvious that such conduct must create a mutual

* In Naples, I have known a soldier to be placed on guard, to exact the removal of their hats from persons approaching the bust or statue of an artist or royal personage: and I was deprived of the pleasure of seeing the rich Museum in the intellectual city of Berlin, because the like token of homage was required to be paid to antique bronzes and marbles.

feeling of dislike and repulsion, extremely unfavourable to the good order of society.

I shall now enumerate some points of education, which though less important than those which I have now described, are nevertheless very suitable to be introduced into the instruction of children of all classes, when time and opportunity allow. They should receive some idea of the earth on which we live: for this purpose, they should be taught the leading facts of Geography. In a country like ours, in which navigation and commerce are of such general importance, there can be few in any class of society who have not relations or friends dispersed over different parts of the globe, in whose voyages and travels a lively interest must be felt; and whom it must be gratifying to trace and follow in imagination through their wanderings; as well as to comprehend, when, on their return, they speak of the continents and islands, the cities and towns, which they have visited. Moreover, in the present day, emigration to distant colonies becomes a subject of more general interest than at any former period: and whilst the poorest families are laudably contemplating to seek a more promising field in which to employ their exertions, it is right that they should have a just idea of the situation and distance of the region to which they may be directing their wishes and hopes.

The productions of almost every climate and country are brought home to us for our use or enjoyment; and it must be interesting to all, and useful to many, to possess a knowledge of these various productions, whether they be derived from the animal, the mineral, or the vegetable kingdoms. This kind of knowledge is comprehended in the very extensive science of *Natural*

History, which is subdivided into several branches, each of which, in its minutest details, would furnish matter sufficient to occupy the longest life of the most industrious of men: the general outlines may, however, be easily understood and acquired by all. One branch of natural history, called *Zoology*, teaches the kinds and natures of animals; whether beasts, who give suck to their young; birds, reptiles, fishes, insects, or worms: even sponges and coral belong to this branch of natural history. Another, called *Botany*, treats of the species of plants or vegetables, from the mightest oaks and cedars, down to the smallest pot-herb; and even the mould which sprouts upon our bread, when it has been kept too long. The earth itself, on which plants grow, and man and other animals live, contains many objects of interesting research, the knowledge of which belongs to the science of *Mineralogy*: all the metals and earths, the most precious stones, and the most durable granite, as well as every variety of soil, come under the attention of the Mineralogist.

The workmen of every craft operate on materials which form the subjects of one or the other of these branches of natural history; and is it not desirable that they should know something more than the outside appearance of the materials with which they are constantly occupied? Many of the productions with which natural history makes us acquainted, set forth in an eminent degree the wondrous works of Him who is perfect in knowledge; and are therefore peculiarly calculated to excite our humble admiration. The very air which we breathe, and which supports the clouds over our heads, exhibits a great variety of interesting or awful phenomena. Some of these,

which terrify and amaze the ignorant, afford matter of curious research to those who are better informed; such as, the northern-lights, mock suns, and meteors or falling stars. Others have repaid the attention which has been given to them, by the assistance which they render to commerce. Thus, the prevailing winds in different parts of the globe are now so well understood, that our navigators rely upon them with perfect confidence, and give them the name of trade-winds. The science which treats of these phenomena, and which has already explained the causes of many of them, is called *Meteorology*. To this science also are referred the accounts of whirlwinds, tornadoes, water-spouts, and meteoric stones.

When we look at the sun, and the moon, and the stars, and sometimes at comets when they appear, we see that there is something besides the earth on which we live, and we naturally feel curious to know something about these bodies. It is desirable that this curiosity should be gratified by something better than the idle notions of the vulgar; and for this purpose children should be taught a little Astronomy, the rudiments of which are not difficult, but very interesting. This will teach them the cause of summer and winter, of day and of night; and let them know why we see sometimes an eclipse of the sun, and sometimes of the moon; also, why we sometimes have a new moon, and sometimes a full moon.

It is not only with what is now existing upon the earth and beneath its surface, and with what is known about the heavenly bodies, that we should seek to have the rising generation made in some degree familiar. They should be led to take an interest in

knowing what has happened in former times. This branch of study is called History. Some of the oldest and most interesting, as well as most important history, is contained in the Bible, and on this account is called Sacred History; but the history of many countries has been preserved by the Greeks, Romans, and others; and the history which they have handed down to us is called Profane History, by way of distinction, and not because it is particularly vicious or immoral. On the contrary, much of it is highly valuable, and sometimes very usefully confirms or explains Sacred History.

All history of events which happened before the year of our Lord 1453 is considered as belonging to Ancient History; and all that relates to what has happened since, is called Modern History. The year 1453 is chosen as the time when the one begins and the other ends; because in it the Turks took Constantinople, and, by so doing, finished the Eastern, Greek, or last division of the Roman Empire. History is sometimes called after the country of which it treats; as, Grecian History, Roman History, English History, &c. It is very desirable for every one to be especially acquainted with the history of his own country.

The history of the lives of particular persons is called Biography. This is a very interesting and useful kind of history. It affords us examples, which, if properly studied and reflected upon, may guide, and animate, and encourage us in the pursuit of what is good, desirable, and praiseworthy, and warn us against what is bad, dangerous, or even of doubtful advantage. The lives of so many good, wise, and illustrious persons of both sexes, and of every age and station, have either been written in our own language, or

translated into it from other languages; that there never need be any lack of valuable reading of this description, nor any excuse for having recourse to novels and romances; which are a kind of imaginary biography, sought after by the idle and the giddy, because they require no exertion of the mind, and therefore do not improve it; or, because they relate marvellous or incredible stories, which actual life can seldom if ever realize, and which, to say the best of them, can be of no use, in the way of example, to those who read them; or, because they represent the passions and vices of men with less of what is hateful and disgusting than belongs to them, and, at times, even in an amiable and attractive form. They first deprive vice of its hideous and repulsive appearance; next, render its form familiar; and lastly, unless the evil be turned aside, bring it home, as a fatal associate.

Much of the knowledge at which I have been pointing, is calculated to interest, enlarge, and improve the mind—to afford the means of rational amusement, from reading, contemplation, or study, when we are alone; and to render us more comfortable in ourselves, and more agreeable and useful to others, when we are in company. To many, they may prove useful attractions from less innocent amusement; such as, plays, cards, dances, fairs, and the like.

Some of the branches of knowledge which I have been recommending, bear directly on our prosperity; and may be continually had recourse to, either to facilitate or increase our means of acquiring property, or to enable us to employ that which we may have, to the greatest advantage and economy.

It is not sufficient to teach children the mere rudi-

ments of knowledge, even if we strive to do this to the extent which I have just sketched. It is essential that they should early be brought to reflect upon what they learn; that they should be taught to look to the principles with which these rudiments are connected; that they should be directed to look to tendencies and consequences; not merely with respect to their school lessons, but the same course should be followed with respect to their words and actions, and the various circumstances which may occur within their observation. It is this essential part of education in which parents are the most concerned; and in which, though they may be assisted by an able and conscientious schoolmaster, there is much which they alone can perform. It is, however, very important, in acting upon this principle, not to press the minds of children too much; lest, in seeking to avoid the error of negligence on the one hand, there should be, on the other, the no less serious error of producing disgust and aversion, or an untimely development of the mental faculties, which would be very likely to injure the bodily powers, and possibly cramp those of the mind also, and prevent them from ever attaining the strength which they might otherwise acquire. The object is, not to make them men in minds whilst children in age, but to insure the development of their moral and intellectual faculties, in correspondence with that of those of their bodies; so that they may grow up a useful, thinking, and reflecting generation; displaying all the advantages which in my last Lecture I pointed out, as resulting from the cultivation of a sound judgment.

Even the sports and amusements of children are well worthy of careful attention. They may be made

the means of doing good, both to their bodies and minds; or they may expose the one to accident and injury, and promote the growth of unamiable passions in the other. On the one hand, care must be taken that the professed amusements of children are not deprived of that freedom and absence of restraint—of that unbending of mind and body—which is quite essential to their taking the full benefit of their play-hours; but, whilst they ought not to feel that their nominal play is a real task, all dangerous amusements should be prohibited. I cannot avoid taking this occasion to repeat the expression of my regret, that the building mania of the present day deprives the children and young people, in our cities and towns, of the advantages of those clear and open spaces which formerly used to be enlivened by the cheerfulness and activity of youth, enjoying their various kinds of healthful exercise. Instead of this, we now see the children driven into the streets, and in hourly danger of being run over by every kind of conveyance, and exposing the lives of the passengers as well as their own. Sometimes a kite is flown in a horse's face, by which he may be made to take fright and rush into all sorts of mischief; or a hoop is trundled under his legs, by which the safest animal may be thrown down, and himself, or his rider, or driver destroyed or seriously injured. The inventors and manufacturers of toys are in some instances scarcely less than criminal, in the dangerous character which they give to some of the amusements of children. The detestable invention of iron hoops is one of the most striking instances of this kind.

Whilst, in children, the development of the body and its powers requires the care which I have recom-

mended, and their intellectual faculties demand regular and well-timed cultivation, their moral feelings and dispositions require, if possible, still more care, if we really desire them to grow up, not only able men in body and mind, but useful and amiable members of society, seeking and keeping peace with all around them. They should be early accustomed to self-restraint, and to the patient endurance of crosses and disappointments. For this purpose, they should be reasoned with, as their understandings will allow; but they should never be subjected to constraint, or crossed and disappointed in a way which may lead them to suppose that it is done in a vindictive spirit, or for the purpose of annoying them. Even the just punishment and censure of their faults, which it would be mistaken kindness to withhold, should be accompanied with reasoning and persuasion, and on no account exhibit the souring character of severity. The child will then regard his punishment as the direct consequence of his own acts; and will not feel disrespect, or even diminished affection, for the person whom his own conduct has compelled to inflict unwilling punishment upon him. Children should, as early as possible, be trained to a strict adherence to truth and honesty. They should be taught to distinguish, both in their nature and consequences, between faults which are really vicious, and those which may be regarded as merely thoughtless mistakes and blunders, or the result of ignorance, but have had nothing criminal in their design. In short, they should be taught that most essential and important lesson, of valuing, and endeavouring to preserve a clear conscience.

It is a point of great consequence to keep children, as far as possible, from fear. It is foolish, as well as

wicked, to excite their terror and apprehensions by threats never to be realized—by relations of magnified danger—or by the narration of monstrous and preternatural stories. Such stories may make them terrified in the dark, and frightened at a shadow, but will have no influence in arming them with that prudent circumspection and forethought which are a protection against real danger. These they may best acquire by their own growing experience, aided by seasonable caution; as they are not too closely confined on the one hand, or left exposed to dangerous hazards on the other.

If children were thus taught (as Racine has said) to fear God, but to have no other fear, we might hope that a greater number of our countrymen would grow up, possessing the cool courage and dauntless intrepidity of the primitive Christians; although they might not exhibit the romantic spirit (in some cases the fool-hardiness) of the soldier, who rushes at the cannon's mouth.

As young persons grow up to years of discretion, it is highly expedient that they should be correctly informed respecting the important principles of Civil Economy. Let me not be misunderstood, as recommending that they should be introduced into the dangerous paths of political discussion and party spirit. On the contrary, I would wish them, as a safeguard against these evils, to be taught what man owes to his fellows in society, and what he has a right to expect from society in return. That they may know, and justly value their privileges, and watch with unsleeping jealousy over the preservation of their integrity—that they may be far from mistaking freedom for the unrestrained and lawless permission

to disturb the good order of society with impunity—and may know that "the great end of government is to maintain power in reverence with the people, and to protect the people from the abuse of power—that the people may be free by their just obedience, and the magistrates honourable by their wise administration." —I have borrowed these sentiments from the great founder of Pennsylvania; and I think that they may be subscribed to by all, as eternal principles for the regulation of civil society.

If, in the education of your sons, you vigorously and successfully put in practice the principles which I have laid down — if you happily induce them diligently to pursue after Wisdom—they will find, that "length of days is in her right hand; and in her left, riches and honour — that all her ways are ways of pleasantness, and all her paths are peace."

What I have advanced with respect to the advantages of education is equally true with respect to women as to men; since, if they do not all take a part in gaining the means of subsistence for their families, they often have the greatest share in the direction of the outlay. A housewife who manages to make 100*l.* go as far as another does 150*l.*, does, at least, as great a service to her family as if she had earned 50*l.* She perhaps does much more. Indeed, it is almost impossible to say how much a good mistress of a family may do for her family in money matters, as well as in other respects; not merely by her good management, but by her good example also. I could mention several instances in proof of this; but I believe that there are many more, of extravagant and expensive wives having ruined their husbands.

It is very necessary for women to improve and well

store their minds, for another reason. They have in general to give the first lessons to their children; and on the nature and value of these lessons, the success and happiness of their children in after-life will much depend. Many great and good men have had foolish and bad sons; but virtuous and clever mothers have, I believe, more often had satisfaction, comfort, and honour from their children. This is a most important consideration, with respect to the future prospects for our country. Even those females who are neither mothers nor mistresses of families are much the better for the cultivation of their minds. From what I have already said, it may be seen that they may thereby obtain a more comfortable and respectable living, and have a greater number of more useful and rational modes of amusing and enjoying themselves. They may sometimes be the means of improving those about them, both by their example and also by what they may say, without being out of their places, even though their condition may be humble.

It is cause for serious regret, that deficient as the means of education in many places unhappily are even for boys, those for girls are very much more so. There is lamentable proof of this in the statistical returns of Schools. In many places where there are one or more schools for boys, there are none for girls; and where there are girls' schools, the number of scholars is almost always much less than in the boys' schools. This is a gross evil, to which an effectual remedy should be promptly applied.

In infancy, and in the early part of childhood, both the physical and moral education should be very nearly the same for both sexes; but it is to be feared that, in very many instances, the bodily vigour of

females is permanently injured by the adoption of a different system; and it can scarcely be questioned, that a similar error in their moral education has very generally tended to induce a degree of pusillanimity, the caricature of the natural timidity of the seo.

The intellects of girls are considered to be quicker than those of boys, and they appear to be earlier developed. There is, moreover, abundant proof, that the minds of females are competent to cope with the most difficult subjects, and to acquire and apply every species of knowledge. Why then should the education of girls, especially amongst the poorer class, be allowed to remain so greatly behind that of boys? Writers, as well as speakers, are ever ready to praise and flatter the female sex, and to round a sentence or to polish a verse which may pay them a compliment, either singly or collectively; but, comparatively, few have come forward to vindicate those intellectual rights which are indisputably theirs, and which are of vital importance to the right exercise of their influence upon society. Let it be your effort to counteract this evil; and strive that your daughters may have the benefits of an education, as comprehensive and enlightening as that which I have recommended for your sons. Then, indeed, might they realize the bright descriptions which poets have conceived; and in due time you might bestow them, virtuous and intelligent, and fitted to become valuable mothers, upon sons such as I have described; and you would find your reward in communicating happiness, in which you would yourselves richly participate.

Here I may conclude my Fourth and last Lecture; and I trust, that however imperfectly I may have

performed the task which I undertook, you will at least admit that I have discharged my promise of bringing before you a most important subject. If I have been fortunate enough to convince your judgments of the utility and the reasonableness of the suggestions which I have offered, let me entreat you to summon your strongest resolutions to enable you to carry them into practice, and to employ the effectual influence of persuasion and example, in inducing those around you to adopt the same course.

I commenced these Lectures by comparing life to a flame; and the precepts inculcated in them are designed to make that flame bright, and steady and lasting: nor will my feeble lamp have altogether burnt in vain, if I have in any degree been instrumental in inducing you to obey the command of our Saviour, when He said, "Let your light so shine before men, that they may see your good works, and glorify your Father who is in heaven."

ADDITIONS AND NOTES

TO

THE FOURTH LECTURE.

NOTE (1.) PAGE 422.

IT is probably an effect of the highly artificial state of civilized society to induce some degree of premature development, which gives occasion to peculiar temptations and dangers at an earlier age than is generally suspected. Hence deservedly esteemed authorities on the subject of education are in the right, in recommending parents early, yet discreetly, to impart information, rather than maintain a studied secrecy, which stimulates curiosity. Such a course, instead of promoting those evil communications which corrupt good morals, would prove the most effectual preventive check to them, and obviate a considerable amount of bodily disease of various kinds, insanity, and mental suffering.

NOTE (2.) P. 427.

ALTHOUGH we may reject the idea, that nations must of necessity, like individuals, grow old and die, we ought not to lose sight of the fact, that they are prone to mortality, and, that whilst constituted of elements which, from their incessant renewal with fresh life, seem calculated for indefinite existence, numerous instances have shewn that they may cease to exist, and be known only in history. They may have died by the hands of a foreign enemy: but they have, perhaps, more often been destroyed by a sort of *felo-de-se;* or rather, their sons have proved assassins of their country, inflicting deep wounds in their vitals, or poisoned wounds in less-important parts. It is the duty of those who are really well-wishers to their country, to contemplate these facts, and to let them serve as salutary warnings. At the very time when these pages are passing through the press, the state of

the country is such as to force these considerations upon the reflection of every Englishman. In allowing myself thus to allude to a subject in some degree foreign to the immediate object of this little work, I wish to be distinctly understood as disclaiming any party motives in doing so. On the contrary, my observations point to a sort of neutral territory, which may be the common ground of all ranks and parties. I have seen Venice: and although the rich collections of painting and sculpture, and the profusion of precious works of art, of various descriptions, afford an almost inexhaustible fund of interest and amusement to the traveller—who, during the stay which he may make in Venice, will probably find more of excellent accommodation, more personal comfort, luxury, and safety, than he could have enjoyed there in the brightest days of the Venetian Republic—there is, nevertheless, in the present appearance of this remarkable city, a cause of melancholy, which none of the gratifications which it presents can counteract. We see numerous finely-situated and noble palaces, in the intermediate state between the splendour which they must have exhibited when occupied by the wealthy and powerful citizens for whom they were constructed, and that state of utter desolation with which we connect the idea of picturesque ruin. Here and there we see them giving way to the effects of time; simply, because no one has an interest in interposing the most trifling repair, to keep in order apartments which there are none to tenant. It is not for me here to discuss the various causes which have concurred to change the condition and bring on the melancholy fate of this once-important city; but it is extremely probable that the union of greater wisdom and greater virtue in her ruling citizens might have preserved to her a more lengthened prosperity than she has been permitted to enjoy. Other cities and states teach the same lesson; but there is perhaps none besides her which, like a death-bed scene, tells it in so striking a manner. If we turn, with the instruction which such a lesson affords, to the consideration of our own condition, we shall at once perceive, that the surest means which can ward off such an event from our own dear country are those only by which

the virtue, security, rights, and prosperity of all classes of her citizens may be preserved, without infringing on the enjoyment of similar advantages by the people of any other nation, whether near or distant. If we would scorn to accept of any enjoyment, the means of which had been fraudulently abstracted from the possession of a neighbour or friend, the same feeling should deter us from seeking the advantage of one class in society at the expense of another, or that of the country itself, by the sacrifices which another may be compelled reluctantly to make in her favour. Such benefits can only be transient, and rather apparent than real. Though no legislative enactments can preserve that individual conscientious integrity and honourable principle which should characterize those who are engaged in production, manufacture, or commerce, in order to ensure that high estimation amongst foreigners by which continued prosperity can alone be sustained, it is very possible for our national arrangements to be of an unjust character, and such as to counteract the effect which industrious probity, on the part of individuals, would be likely to produce. It must be impossible, systematically, to give unequal advantages to particular classes in the country, without exerting an ultimate tendency to injure both the favoured and the oppressed. The like consequences must also follow, if our measures possess any thing of an unjust or oppressive character towards other countries. To a country, which, like our own, is arrived at a highly-artificial state—which requires for its continuance the productive activity of a large majority of its own inhabitants, and the most extensive friendly and commercial relations with those of other countries—these principles of action are of the highest importance; and any deviation from them may occasion a decline, from which it may be impossible to recover, and which, by its continuance, may conduct us to that fate to which Venice has yielded. If any class in the country be favoured by unequal laws, they may for a time rejoice in apparent prosperity; but the sufferings of other classes will ultimately affect them; and their palaces, like those of the Venetians, will first cease to be maintained in their accustomed splendour, and ultimately be suffered to go to ruin,

16

as well as the dwellings of the other classes who have been more directly injured for their intended benefit. To the possessors of many large estates, this argument may be enforced by a strong practical illustration. Their property may partly be situated in the country, and partly in towns; and they must soon feel, that if for a time they gain high rents from their farming tenantry, through the influence of restrictive laws, the distress of merchants and manufacturers must proportionably tend to decrease the value of their town property. Whilst we continue an essentially commercial and manufacturing country, we may supply other countries, with reciprocal benefit to them and to ourselves. They receive our goods, better, and at a lower price, than they can provide them for themselves; and consequently, those operations which may be more particularly theirs, proceed with increased facility. If we determine to exclude their produce in return, they will find a difficulty in taking ours; and will be forced by us, and in opposition to our manifest interest, to become both manufacturers and merchants. We must thus create rivals, who may be likely one day to surpass us. If a country does not produce or possess gold or silver, with which to pay us, let us be satisfied to take that which she can offer with the greatest facility; and if it be necessary to exchange it for other commodities, let us regard it as our legitimate employment to make the exchange for ourselves, and thereby participate in the benefits of the transaction. The activity which would naturally be imparted both to manufacture and commerce would maintain that state of the home-market which would in every respect be most advantageous to the owner and the occupier of land; whose various burdens, whether occasioned by the expenses of Government, or the support of a poor and unemployed population, would be diminished, both by the increase of revenue from foreign trade, and by the diffusion of occupation and wealth amongst the poorer classes. There is one view of the subject, of a perfectly physical character; which, as far as I am aware, has not been noticed in reference to this question—I allude to the actually increased productive power of the earth, arising from the amount of animal matter returned to it in various forms of manure. The most

extensive statistical inquiry has shewn, that feeding stock in a farming country may, within certain limits, increase the amount of crops, so that the animals may almost be said to be produced as an increase of profits. It is obvious that land may also be benefitted by manure furnished by animals fed with provender produced by another estate, another county, or even another country; of which we see an instance in the use of oil-cake. Without enumerating numerous sources of valuable manure, it will be remembered, that the stables in our towns and cities supply a vast quantity; and that these are not merely maintained by foreign commerce, but that the very materials on which the animals are fed, are offered to us by foreign countries, and may ultimately become a tribute to the prosperity of our own agriculturists. The fact, that manure itself, in various shapes, is imported from the Continent of Europe, from South America, and the Falkland Islands, is a convincing proof that the ploughed lands of England may receive accessions of fertility through the influence of that very commerce which their short-sighted owners and cultivators desire to see subjected to fatal restrictions.

When there exists an active degree of prosperity amongst a numerous population, there is necessarily created a large demand for a great variety of articles, which cannot be supplied in perfection from a distance: consequently, the home-producer enjoys an advantage dependent on his position, the consciousness of which should make him feel at ease, when the idea of foreign competition is suggested. It is needless for me to examine the numerous illustrations of this principle which might be adduced; but the obvious case of kitchen-gardeners may be mentioned, to render what I have just stated generally intelligible. It was at one time dreaded by kitchen-gardeners, in the neighbourhood of large towns, that the increased facilities for transfer would bring distant productions into fatal competition with theirs. No apprehensions of the kind would appear to be better founded; yet I am informed that the result has by no means confirmed them. The old kitchen-gardeners continue their occupations with undiminished activity, until they or their landlords are tempted to devote the ground to still more productive employment.

The diminution of the population and wealth of the respective towns would have proved a far more serious and immediate loss to the gardeners and their landlords than the competition which they dreaded.

NOTE (3.) PAGE 427.

"Governments rather depend upon men, than men upon governments. Let men be good, and the government cannot be bad. If it be ill, they will cure it. But if men be bad, let the government be never so good, they will endeavour to warp and spoil it to their turn. That, therefore, which makes a good constitution, must keep it; namely, men of wisdom and virtue,—qualities, that, because they descend not with worldly inheritances, must be carefully propagated by a virtuous education of youth; for which after-ages will owe more to the care and prudence of founders, and the successive magistery, than to their parents, for their private patrimonies."

[*William Penn's Preface to the Constitution of Pennsylvania.*

"The power of empires which does not avail itself of the best auxiliaries of knowledge which the age supplies, will never abide the test of trial with nations which bring all such resources into the field."—From *The News*, 1. 9. 1828.

NOTE (4.) P. 433.

I HAVE said, that the practice of modifying the heads of children is not confined to uncivilized countries, but that it likewise exists in some of the civilized. In these, however, it is rather to be ascribed to a pernicious mode of dressing, inadvertently employed, than to an acknowledged design to alter the shape of the head. Throughout a considerable district of France, the pliant heads of children are bound up, with a view to give them support; and the consequence is, that the top of the head is considerably flattened, whilst the posterior part is strangely elongated. From an attentive examination of statistical returns, it would appear that a sensible increase in the proportionate numbers of insane and epileptic patients concurs with the prevalence of this deformity. This subject has been carefully investigated by my

valued friend, Dr. Foville, who has written an excellent Essay on the subject. Somewhat analogous deformities may sometimes be found, even in this country. Although the mode of bandaging the heads of infants, in use in some of the departments of France, is very seldom resorted to, there is unquestionably a great difference in the susceptibility of different infantine heads to undergo modification. It is liable to be increased under disease: consequently, in some cases, the mere position of the child's head, while lying down, will produce a striking degree of want of symmetry. This simple fact deserves the attention of nurses; since deformity from this cause may be prevented, by attention to the position of the child during rest.

NOTE (5.) P. 434.

I would strongly recommend those who take an interest in the very important subject of education, carefully to peruse the valuable Lectures of Dr. Biber. They contain many excellent remarks, forcibly and cogently expressed, which can scarcely fail to prove useful hints, or stimulants, to those engaged in the work of education. When I had the pleasure of hearing them delivered, I could not do so without feeling very desirous that all teachers might share in the advantage which I conceived them calculated to produce. But whilst I give them the tribute of warm approbation which they deserve, I cannot bestow upon them unqualified praise; since I widely dissent from the harsh and undeserved censure which he extends to certain modes of instruction, with which I conceive him to have been imperfectly acquainted. Such censure is not in keeping with the excellent precepts, in favour of charity, which his Lectures contain.

NOTE (6.) P. 435.

An apprehension has been felt, lest Infant Schools, by overworking or over-exciting the infant brain, should injure that organ, and produce either acute and speedily fatal disease, or mischief of a less violent or permanent character, occasioning fits or weakness of intellect for the remainder of life. Such an apprehension is by no means unreasonable; and it is highly expedient that the dangers attendant on overdoing the infant

brain should be better understood, as well as more frequently present to the attention of those who may be concerned in rearing bright and lively children, whose readiness to exert and display their intellectual powers may become an insidious and fatal snare. Some excellent remarks on this subject may be found in a little work by Dr. Brigham, of the United States; which has been edited and somewhat extended by Dr. Macnish, of Glasgow. It is proper that the Infant-School Teachers should be alive to this danger; but the system on which these schools are conducted, is less exposed to it than those who have expressed their apprehensions with regard to them may be aware. The pursuits of the children are greatly varied; and so frequently changed, that no single faculty is put to a continued stretch. The number of scholars and classes who have in turn to receive the Teacher's attention must be another means of causing intermissions of labour to the children. Danger may certainly exist, for two or three precocious children, should the Teacher allow the visits of strangers to tempt them to urge their children, by a disproportionate pressure, for the sake of display. If this evil be guarded against, and the school-room and play-ground be dry, moderately warm, and well-aired, these schools may be safely trusted to prepare young children, by well-contrived and well-apportioned exercises of mind and body, for any future course which they may be destined to follow.

NOTE (7.) PAGE 433.

False Economy.—"Many fathers there are, that so love their money, and hate their children, that, lest it should cost them more than they are willing to spare to hire a good schoolmaster for them, rather choose such persons to instruct their children as are of no worth; thereby beating down the market, that they may purchase a cheap ignorance. It was therefore a witty and handsome jeer which Aristippus bestowed on a sottish father; by whom being asked what he would take to teach his child, he answered, 'A thousand drachmas.' Whereupon the other cried out, 'O Hercules! how much out of the way you ask; for I can buy a slave at that rate.'—'Do then,' said the philosopher; 'and thou shalt, instead of one, purchase two

slaves for thy money;—him that thou buyest, for one; and thy son for another.' "—*Plutarch.*

NOTE (8.) P. 440.

The example of Devonport illustrates what might be done by the voluntary principle; which, whenever it can be brought into operation with sufficient extent and energy, is, beyond all comparison, the best principle on which our efforts for the education of youth can be based. But what is to be done, when we find this principle so lamentably behindhand in raising the necessary funds, when compared with the compulsory principle, as exhibited in grants and stipends applied to similar benevolent purposes? That most excellent and valuable Institution, The British and Foreign School Society, exhibits at once the advantages and the difficulties of the voluntary principle, which it is my object to recommend. When, as at Devonport, sufficient means can be raised on this principle, the advantages are conspicuous in all concerned—in pupils, teachers, parents, and patrons; but when, on the other hand, the voluntary principle flags, the school, which its temporary energy may have well established, soon sinks into a state from which it is extremely difficult to elevate it;—the master is ill paid, and worse looked after; the children are suffered to attend badly, and are badly taught when they do attend; the parents feel no inducement to send their children to such a school, or, by the boon of a coat or a gown, are led to prefer another school, where less is professed to be taught, and where their ideas will become as uniform as their dress. The British, or Lancasterian method of instruction, lends the most important assistance to the voluntary principle, as an agent in the cause of education; not merely by enabling the most to be effected which the means afforded can produce, but because it tends in a peculiar manner to call into activity the powers of the children as well as the master. Its catholic and tolerant spirit, and its comparatively comprehensive range in the subjects which it teaches, give it the strongest claims to universal support. Let its Annual Report be perused, and its central establishment be visited, for the proof of what I have just advanced; and I conceive, that it will be readily admitted

by any impartial mind, that it would be difficult or impossible to find another Institution which deserves so well of the public, and which receives so little support from it.

NOTE (9.) PAGE 446.

I cannot omit taking this opportunity of recommending the simple rules, for the formation and combination of letters, which have been laid down by my Father, in his Introduction to Writing. I have been convinced, by repeated personal observation, as well as by the concurrent testimony of different Teachers, by whom these rules have been employed, that the art of writing is, with their assistance, rendered much more certain and expeditious than when it is taught as a purely imitative art. It is doubtless the difficulty of teaching to write well by the imitative mode, which has introduced the odious shove, and other angular forms of writing, by which beauty and legibility are systematically sacrificed.

The pupil may easily acquire, in the course of a very few lessons, the rules for the formation and combination of all the letters. As he applies these rules by the eye, they have no tendency to produce stiffness in his writing, but, on the contrary, enable him to imitate, with more certainty and precision, the correct forms which his copy presents. As soon as these rules are rendered familiar, dexterity and expedition, which practice only can give, may be easily acquired; whilst writing is being employed, as I have already recommended, as the means of fixing in the memory many useful branches of education. To assist in carrying this object into effect, I must be allowed to recommend a few little publications, likewise produced by my father, and expressly designed to enable the writing pupil to acquire and remember the declinable parts of speech in several languages; and, also, many astronomical and geographical terms and facts. I shall not attempt to detail the numerous instances which have proved the importance of this mode of assisting the memory; yet I would just state, that having on one occasion undertaken to assist a foreign friend in acquiring English, I adopted this method of making him acquainted with our irregular verbs, and had the most satisfactory proof of the assistance which he derived from it.

APPENDIX.

HINTS TO A YOUNG MAN, COMING TO LONDON.

"A YOUNG person who comes to London should know, that it is a place where many have found their fortune, and many their ruin. It should be his great object to be of the first class. It is too evident to need being pointed out, that to succeed in this object he should be virtuous and industrious. There are some points which require to be very scrupulously attended to.

1. "Be very careful in making friends, and choosing companions.

2. "Do not waste time, even with the best friends; but take care to save moments, and many good hours will be saved.

3. "Be very careful in spending money. Never spend a penny when half a one will do; and do not spend a farthing when it is not necessary to do so. It has been well said, 'Take care of the pence, and the pounds will take care of themselves.'

4. "Make a point of laying up all that can be saved: and having managed to save a sum in one month or week, do as much or more the next. At any rate, try hard not to do less; and rather suffer some inconvenience, or even want, than do so. Prosperity and fortune are more easily attained by careful expenditure, than by great gains.

5. "Let every thing that is done, be done quickly, if possible; but, at all events, well. What is well done is done for oneself; but then, to be able to do all, that one does, well, we must only try to do what is necessary or useful, and not throw away time and pains on trifles.

6. "By temperance and regularity preserve the health of the body; and take all the time which can be

saved from work, meals, exercise and sleep, for improving the mind by different kinds of profitable study.

"Dr. Franklin, the great American philosopher, began life in a very poor station. But he was industrious and frugal. He drank water, and fed on simple food, whilst his companions made longer meals, with richer food and stronger drink; 'and thus he saved the money which became the foundation of his fortune;' and saved the time which he so successfully employed in cultivating his understanding, that he became one of the greatest men whom his country has produced.

7. "It is of the highest importance, and the most sure means of success, at once to begin well, and with a strong resolution to go on in the same course; not weakly satisfied with what is little; though patiently expecting what is greater, and steadily using the means to gain it.

"If these points are really minded, friends will not be wanting to assist; and the blessipgs of Providence will crown the whole."

A LETTER TO A MEDICAL FRIEND, ON THE ADVANTAGES OF VACCINATION, AND THE EVILS OF INOCULATION FOR THE SMALL-POX.

MY DEAR FRIEND,

I AM much obliged to thee for the information thou hast conveyed to me, respecting the prevalence of Small-pox in thy neighbourhood;—and I am grieved to learn, that, in some instances, it has attacked those who have been vaccinated, with so much severity, as very materially to shake the confidence which had once been placed in that protective means, and even to induce a disposition to return to the older method of inoculation for the small-pox. As I am still disposed to regard Vaccination, notwithstanding the numerous instances in which it has been followed

by Small-pox, as a measure of great advantage, and calculated materially to diminish the number of small-pox patients as well as greatly to mitigate their suffering, I cannot help lamenting that it should in any degree be abandoned; and still more so, that it should give place to the old plan of inoculation. Such a change would, at the very best, be giving up a doubtful advantage for a positive evil. I feel so much interested in the subject, that, at the risk of sending thee a Letter of unseasonable length, I shall state the reasons which induce me to continue in favour of vaccination: and I shall be glad to learn that thy influence has been successfully exerted, both in confirming the doubtful, and in convincing opponents.

Before we allow our judgments to be carried away by the announcement of a large number of cases, in which vaccination is reported to have been unsuccessful, it is very important that the validity of this evidence should be examined. We must not, as thou well knowest, allow every case in which the operation of inoculation with vaccine virus has been performed, to be admitted as a case of vaccination. This operation is often followed by no specific inflammation, and may even pass off as a mere scratch. Such cases ought to be completely set out of the calculation; and even when a sore arm has been produced, it is important to know whether it has been sanctioned, by competent authority, as the legitimate effect of vaccination. To my certain knowledge, a case of small-pox, stated to have succeeded vaccination, and calculated to throw discredit upon that operation, proved, on reference to the register of the medical man who had vaccinated the child, and watched the appearance of the arm, to have been one of those cases in which the legitimate effects of vaccination had not been produced, and the vaccination was recorded as doubtful. Such cases should of course be set aside, and not allowed to complicate the result of calculations which should be made upon

cases of unquestionable vaccination. By doing so, the proportion of reported failures would, I believe, be considerably reduced. When we have thus arrived at undoubted cases of vaccination followed by small-pox, we should direct our inquiry to ascertain whether the small-pox has not been very materially modified, through the influence of vaccination. As far as I have been able to learn—and I have inquired of persons who have made this subject a point of the most attentive study on a large scale—this modifying and mitigating influence is nearly, if not quite, universal; and, although a few cases—and I believe them to have been very few—have occurred, of this modified disease being fatal, there has, without exception, been some concurrent cause, to give to these cases their unusual severity. It has not been the essential malignity of the disease, small-pox—which used to number so many hundreds amongst its victims—which may be said to have carried off the patients in these cases.

Can, then, a better and more effectual protection be found in small-pox itself, if we return to inoculation to produce it? Small-pox unquestionably attacks those who have had the disease before, as it does those who have been vaccinated; although I am ready to admit, that the number and proportion of those attacked after having had small-pox is less than after vaccination. Even those who have suffered most severely, whose lives have been endangered, and whose countenances have been permanently disfigured, have not obtained better protection than those who have only had a single vaccine sore: in fact, the fatal cases of this kind have been, if any thing, more numerous and remarkable than those which have occurred amongst the cases of small-pox preceded by vaccination. I am borne out in this remark by the high authority of Professor Thomson, of Edinburgh, who has collected the most extensive details on this subject; and also by that of Dr. Fisher, who made very careful statistical

inquiries respecting an epidemic of small-pox which occurred in Paris a few years ago. The reason that the protecting influence of small-pox is by some regarded as more effectual than that of vaccination, is perhaps to be attributed to the notion, that small-pox cannot occur twice; and that, except when the eyes have been opened by cases unusually severe or even fatal, the modified small-pox has been regarded as chicken-pox.

The numerous cases of modified small-pox after vaccination have induced a belief that the protecting influence of vaccination is worn out by time; and repeated vaccination has been consequently recommended. I confess, that I cannot believe that the mere lapse of time can impair the protection; since we may see a child who has been vaccinated, become, in the course of a few months, the subject of modified small-pox; whilst another individual may remain protected for a quarter of a century, and resist the most complete exposure which can well be conceived. He may have remained for hours in company with the sick, have been in contact with their persons, and been inoculated with the virus with perfect impunity; yet, a few months after, the same individual may take small-pox, when he is scarcely aware that he has been exposed to the contagion. We must therefore look for some other cause, capable of effecting this very remarkable and apparently rapid change. I believe that serious attacks of indisposition, such as typhus and other fevers, are the most likely causes to which this effect can be referred. The well-known case of a man in Norfolk, who felt no inconvenience from the stings of wasps, and who lost this singular peculiarity after labouring under ague, affords some countenance to this idea; which is further supported by cases which have come under my own knowledge, in which severe attacks of illness have intervened between vaccination and the attack of modified small-pox. Whether this reproduced susceptibility be transient or not, must be

difficult to decide; but in the case of the wasp-catcher, his insusceptibility returned some months after the ague had been cured. My friend Dr. Gregory, of the Small-pox Hospital, has made several observations which support the idea that illness impairs the protecting power of vaccination: and he believes that there are other influences which produce the same effect; amongst which, change of climate is very remarkable. Could we ascertain, or have reason to suspect, when any of these causes had impaired the protecting influence either of vaccination or of small-pox itself, there would probably be advantage in resorting to vaccination on the occasion.

In conclusion, allow me briefly to state the disadvantages of inoculation in contrast with the advantages of vaccination.—If you inoculate a child with the small-pox, you are pretty sure to produce a decided fit of illness. It may be severe, and even fatal. The child may indeed escape without a mark; but the probability is, that he may have a few pits, and he may be seriously disfigured. At the same time, you expose the child to the danger of glandular swellings, sore eyes, and disease of the lungs, the not unfrequent consequences of small-pox. In return for all this mischief and risk, what advantage do you obtain?—just about as much chance of escaping an attack of small-pox as is enjoyed by the child who has been vaccinated:—I doubt the fact, that he is much safer. There is, however, a more important consideration than this; viz. How are the neighbours, and the community at large, affected by the inoculation of a child with small-pox? The parent may think that he has a right to endanger his child's life in one way, to protect him from what he may regard as a greater risk; but is he less than criminal, if, to do this, he also endanger the lives of an unlimited number of his neighbours? The inoculated child, from whose person may fly off a thousand invisible but fatal shafts, may

communicate the disease to numerous wholly unprotected individuals, unconscious of the danger to which they are exposed;—each of whom may become fresh centres of infection, until a fatal epidemic is produced. The man who would set his chimney on fire, and scatter the sparks over his neighbour's thatch, in my opinion commits a less evil than he who makes himself an accessary to the production of the foul contagion of small-pox, and performs and advocates inoculation for that purpose. I have recently heard of a medical man in the country, who has disgraced his profession, and outraged society, by inoculating with the small-pox far and wide in the district around him; and that in several of these cases, small-pox, by inoculation, has proved fatal. Is there any medical man, however extensively he may have vaccinated, who has lost so many patients from modified small-pox, succeeding to effectual vaccination?

Vaccination, on the other hand, produces little or no suffering or inconvenience. Its protective power is admitted on all hands, and in many instances it probably remains unimpaired through life; and, perhaps, does not oftener fail than the protection obtained by inoculation with the small-pox. When it does fail, the consequence is generally a mild disease; the severe cases of modified small-pox, whether succeeding to vaccination or inoculation, being only the rare exceptions. Genuine vaccination may then be regarded, even when it fails to be a complete protection, as more advantageous to the individual than inoculation; seeing that it is then the means of his having a mild form of small-pox only once, instead of twice. To the community, the advantages of vaccination over those of inoculation are almost incalculable. Instead of multiplying the seeds of a fearful and deadly contagion, to be diffused indiscriminately amongst the protected and unprotected, vaccination may be the means of propagating a salutary influence, but cannot generate an injurious one.

If vaccination were generally resorted to, straggling cases of small-pox would stand so good a chance of being surrounded by individuals in a state of insusceptibility, that its diffusion, even in its milder form, would be very improbable. The experience of some foreign countries, in which vaccination has been made imperative, confirms the truth of this remark. For several years, small-pox was, I believe, wholly unknown; and though in some of these countries, at least, the disease has since made its appearance, it has been the modified, and generally mild form, which prevailed. I am informed, that there are districts in which the disease has been alarming; but I suspect that fears have been exaggerated by the disappointment which the cases of failure have excited in the minds of those who had been confiding in perfect indemnity. The rarity of greatly disfigured faces attests the beneficial influence which has been exerted in our own country; and I believe that the advantage has been at least as striking in all the countries in which vaccination has been fairly introduced.

The preceding considerations induce me anxiously to wish that our Profession, which so nobly and disinterestedly advocated the cause of vaccination when it was first systematically proposed, may not now, either through tergiversation or supineness, relax in their efforts to make vaccination general; and still less throw obstacles in its way; and lend a hand to death and misery, by propagating a poison, which has been one of the greatest scourges to mankind*.

T. H.

* It is very desirable that Medical Men, Colonists, and the Captains of vessels going to parts of the globe inhabited by uncivilized men, should be provided with *vaccine virus*, and exert themselves to procure its universal employment, in order to check one of the greatest of the many evils by which we are the means of destroying these poor people.

London: Richard Watts, Crown Court, Temple Bar.