A dissertation on the nature and properties of the Malvern water, and an enquiry into the causes and treatment of scrofulous diseases and consumption : together with some remarks upon the influence of the terrestrial radiation of caloric upon local salubrity / by William Addison.

A

DISSERTATION

ON

THE NATURE AND PROPERTIES

OF THE

MALVERN WATER,

AND AN

ENQUIRY

INTO THE CAUSES AND TREATMENT

OF

SCROFULOUS DISEASES

AND

CONSUMPTION;

TOGETHER WITH

SOME REMARKS UPON THE INFLUENCE OF THE

TERRESTRIAL RADIATION OF CALORIC

UPON

LOCAL SALUBRITY.

BY

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&c. &c.

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ERRATA.

Page 30, line 17, *for* waters has, *read* waters have.
73, Note—omit the word "the" before local disease.
97, line 12, *for* preclude, *read* precludes.
124, 6, *for* homogenous, *read* homogeneous.
126, 6, the semicolon should be after the word "noticed", and not after "them".

PREFACE.

THE quiet and romantic Village of Malvern, which has long been celebrated for the purity of its atmosphere, the beauty of its scenery, and the quality of its water, is annually becoming more and more the resort of Visitors and Invalids seeking health, or protection from disease, in its retirement, away from the noise and hurry of the more crowded Watering Places.

The Author, therefore, deems no apology necessary for the appearance of the following pages, which are designed to promulgate the nature of the contents of the Malvern Water, and to shew the manner of its efficacy in scrofulous and debilitated habits—to convey some observations upon the causes, symptoms, and treatment of the more important diseases which take place in scrofulous or tuberculous constitutions—and to point out the intimate and important connexion which seems to exist between the Terrestrial Radiation of Caloric and Local Salubrity.

Malvern,
April, 1828.

ON THE

NATURE AND PROPERTIES

OF THE

MALVERN WATER.

The chain of elevations denominated the Malvern Hills, runs in a direction nearly north and south for a distance of almost nine miles, the northernmost extremity, which is about seven miles and a half S. W. of the city of Worcester, being the highest and the boldest.

This remarkable chain is composed of hard rocks, jumbled together in the utmost apparent confusion, and consisting chiefly of quartz, feld-spar, hornblende, and mica, in various proportions. The surface is for the most part covered with a reddish kind of earth, in many places of considerable depth, affording nourishment and support to trees of some magnitude, at others

it is hardly sufficient for the growth of a few humble mosses, while again in several parts the rugged stone protrudes its gray weather-beaten front, covered only by some hardy lichens.

This red earth arises from the decomposition which the various constituents composing the chain are undergoing, and to which "not only the generally smooth sur-"face of these hills is attributable, but also "the existence of the numerous masses of "green stone, sienite, and red feld-spar, in "the valleys, which are still angular without "exhibiting any appearance of having suf-"fered by attrition."*

The summits of the Malvern Hills attain to a height of between fourteen and fifteen hundred feet above the level of the sea, and rising up in several places in a pointed or conical manner, in others running along in a narrow undulating ridge, and their sides sloping down in a broken and precipitous descent, render the outline of the whole remarkably picturesque; while the deep ravines, which in numerous places in-

* Phillips on the Geology of the Malvern Hills, in the Annals of Philosophy.—New Series, vol. i. p. 21.

tersect the masses composing the chain, present a grand and romantic appearance when they suddenly burst upon the view.

The country extending from the western side of the Malvern chain, is generally upon a much higher level than that on the eastern, and the different aspects which the surface presents are not less remarkable. The view on the former side is diversified with every variety of hill and dale, indeed so undulated is the whole extent which the eye embraces in this quarter, that the appearance has been compared to the waves of the sea, a semblance which in other countries has been noticed by the celebrated Humboldt, who observes that it is always characteristic of a primitive tract, while on the latter, the country displays an immense level plain, broken only here and there by a few rising hillocks, but diversified in a beautiful manner with cities, towns, &c.: the whole watered by the Avon, the Teen, and the Severn, whose distant silvery stream may be seen on a clear evening, winding its course towards the sea.

The village of Great Malvern is pleasantly situate upon the eastern side of the range at its northern extremity, and is in a great

measure sheltered in the valley or ravine between the two highest elevations of the hills, called the Worcestershire Beacon and the North Hill. The high road through the village forms as it were a boundary between the uncultivated and uninclosed rocks, forming the chain, and the alluvial cultivated soil, which sloping down in a gradual manner, for a considerable distance below the village, at length spreads out into the extended plain just noticed.

Malvern is, perhaps, one of the most healthy and delightful spots in the kingdom, and possesses advantages very rarely indeed to be found combined elsewhere. Nature seems to have unfolded her choicest beauties in the surrounding scenery, and to have collected here every thing that can delight the eye, or engage the imagination. The air has always been justly celebrated for its great purity and invigorating quality; the healthiness of its topographical situation has been acknowledged by all who have resorted to it; whilst its salutary and wholesome water holds out a paramount inducement to those who are suffering from bodily infirmity. It is to an examination of the latter, and to an enquiry into the manner in

which it has proved serviceable in scrofulous and other diseases occurring in weak habits, that some of the following pages will be especially appropriated, particularly as it has long been resorted to not only for the cure of these, but also for the alleviation of other important disorders to which mankind are subjected.

There are two wells here frequented by invalids, one called St. Ann's Well, which is a little distance above the village of Great Malvern, the other, or the Holy Well, is nearly a mile and a half upon the road towards Little Malvern and Ledbury, where are a number of genteel residences and some boarding houses for the accommodation of those, who either for benefit or pleasure, resort to this enchanting spot.

Both these springs are upon the eastern side of the range, and being situated some distance up the ascent of the hill, are removed from the influence of decaying vegetable or animal matters. The hills being, as I have already observed, but sparingly covered with loose earth, and the rocks being composed of some of the most insoluble substances in nature, it might be expected that the water issuing from them

would be very free from the contamination of earthy and other impurities, this too is the fact; indeed the whole of the springs upon the eastern side of this hilly range, are remarkably pure, and the small proportion of solid matter discoverable in those of St. Ann and the Holy Well, is different from that found generally in the water of other places.

It has been remarked, that popular opinions are seldom found wholly devoid of foundation, and therefore, that the notions of the multitude should always engage a certain degree of attention. It was, perhaps, a feeling of curiosity, prompted by this consideration, which induced Dr. Wall and Dr. Wilson, to turn their attention to the subject of the Malvern water; they having endeavoured to ascertain, by analysis, to what ingredient the cures it was reported to perform, were attributable. Conjecture had, indeed, prior to that period been busy in assigning its virtue to some bituminous or oily parts, to some volatile mineral spirit, or a concealed acid, even copper was by some supposed to exist in it, and to have a share in its effects. When Dr. John Wall wrote, chemistry, or, at least, the chemistry of mine-

ral waters was in a very imperfect state, the various actions which substances mutually exert upon each other, were not then sufficiently known to enable him to arrive at any results upon which great reliance could now be placed; nevertheless we must allow his conclusions to have some weight, as they were in a great measure deduced from simple experiments, which only required common attention, to be accurately understood. These led him to suppose, that the water of the Holy Well, upon which he operated, contained *some vitriolic acid, a volatile mineral spirit, and perhaps some other matters not discoverable to our senses.*

"Some preparations of antimony and "other minerals," says he, "will we know "communicate very extraordinary qualities "to liquids in which they are infused; and "yet as nothing discernable is lost by the "mineral, so nothing can by any analysis "be discovered in the medicated liquor."....
"May not water, therefore, be impregnated "in somewhat the same way, by effluvia from "mineral substances, perhaps from some hi-"therto unknown to us, and whose proper-"ties, therefore, we are unacquainted with?"
...."and who will venture to assert that

" there may not be many such in the bowels " of the earth?"* From these observations it may be collected, that Dr. Wall not having been able to discover any tangible matters in the water, thought that its virtue and reputation must depend upon some hidden spirit or effluvia, or some concealed acid which he was unable to discover, or else, as he afterwards observes, to its great purity and freedom from foreign ingredients.

Dr. M. Wall re-published the remarks of his father with some experiments of his own, instituted likewise to discover upon what the character of the water as a remedy depended. The conclusions he drew, were that the water of the Holy Well contained, though not in any great quantity, *fixed air, or carbonic acid gas, some atmospherical air, some selenites,* and likewise *some calcareous earth.* " Its principal virtue, therefore," he says, " must depend upon its extreme purity, " assisted by the fixed air which it contains; " for though this principle did not appear " present in any great proportion in those " small quantities of water on which we made " our experiments, yet when it is considered

* Wall on the Malvern Waters, p. 12.

" how freely many persons drink the water at " the spring, it will be admitted that no small " quantity of the air will daily be received " into the system, where it must prove a " powerful assistant in correcting vitiated " juices, and giving a gentle and constant " stimulus to the decayed functions of the " stomach, (with which all other functions " are immediately connected,) and thus will " prove of singular service in restoring " health."* From this it appears he agreed with his father, in the opinion that the efficacy of the Malvern water was in a considerable degree owing to its purity.

Dr. Wilson's analysis at a subsequent period, afforded very different results from those obtained either by Dr. J. or Dr. M. Wall, and it was his opinion that the efficacy of the Water of St Ann's and the Holy Well, was derived from the ingredients dissolved in them. His experiments led him to conclude that the water of each of these wells contained the following saline compounds, viz. Carbonate of soda; carbonate of lime; carbonate of magnesia; carbonate of iron; sulphate of soda; muriate of soda;

* Wall on the Malvern Waters, p. 134.

" and some residuum, probably of an earthy " nature ;"* the whole amounting to more than fourteen grains in the gallon.

Dr. J. Wall having evaporated three quarts of the Holy Well water in a silver vessel to dryness, obtained no residuum, " only," as he expresses it, " the bot- " tom of the vessel was tinged of a pale yel- " low colour," whereas from what Dr. Wilson makes the water contain, there ought to have been at least, eight or ten grains of solid matter found in that quantity: again, Dr. Wall says, " after a wet season, when " the source must have received some foul- " ness from the mixture of extraneous bodies " washed into it by the continual rains, two " quarts of this water being *carefully and* " *slowly* evaporated, left only *half a grain* of " earth and a very inconsiderable quantity " of saline matter, *too small* to be estimated, " probably not the *sixtieth part of a grain*," whereas this quantity of the water, to agree at all with Dr. Wilson's results, ought to have afforded six or seven grains of residuum.

Now whatever superior advantages Dr. Wilson may have enjoyed in the department

* Wilson's Analysis of the Malvern Waters.

of analysis, from the advances which chemical science had made since Dr. Wall's experiments upon the water, it must be obvious to the most superficial observer, that they could not have been the cause of this discrepancy, for as the ingredients discovered by the former in the water, are not volatile, so they must have been found, one would imagine, remaining in the vessel from which the fluid had been expelled by evaporation; but Dr. Wall informs us, that the greatest quantity he found in two trials, amounted to little more than half a grain in two quarts. It is true that Dr. Wilson in detailing his experiments observes, that if the distillations are carried on too rapidly, part of the saline contents of the water will pass over into the receiver; these portions, however, must have been too small to account for the difference between these experiments, even if this had occurred to Dr. Wall; but it is completely set aside by his telling us, that he conducted the evaporation in a *slow and cautious* manner.

They both agree that the Holy Well water contains some atmospheric air, yet disagree as to its having any uncombined carbonic acid gas: Dr. Wilson says, he was unable to

discover any, whilst Drs. Wall considered that its efficacy was in some measure increased by the fixed air.

Seeing that the conclusion of these physicians differed so much from each other, a number of experiments were undertaken to determine which was correct, and to discover whether the virtues of the Malvern water, the repute of which has long been abroad, are attributable to its purity and freedom from earthy and saline compounds, or, on the contrary, to be ascribed to the quantity and quality of its contents. The difficulty of examining accurately, the nature of a mineral water, and of determining what saline matters it may contain, has been candidly acknowledged by all those who have been engaged in any analysis of them, and the discordant results we have just noticed, and those which, even at the present day, are frequently arrived at by even the most celebrated chemists, oblige us to confess that, notwithstanding all our precautions, and in spite of all our endeavours, true accuracy is to be obtained only by the accumulated labours of successive enquirers.

I shall not here enter into a detail of the

various manipulations which were undertaken to discover the real nature and quantity of matter in the water of St. Ann's and the Holy Well; those however, who feel inclined to consult them, will find them placed as an Appendix at the end of this book. The conclusions to be drawn from them are, that the efficacy of the water of both the wells *mainly depends upon its extreme purity.*

It will, I dare say, appear strange to the non-medical reader, that any water should possess medicinal properties arising only from its purity, or that it should derive any sanative power from the absence of its ordinary contaminations; and I confess that I did myself at one time very much doubt it. But when I considered the large quantities of fluid consumed daily by every individual in some form or another, and to observe attentively the route, which an acquaintance with anatomy and the physiology of the body has shewed me, it must take in it, I became convinced that pure water is very desirable for all persons, even those in robust health, and may be to many labouring under certain diseases, or to persons in a weak and debilitated state, most essential.

The water constituting most of the springs

arising from the ground, permeates through masses of rock, and traverses, before making its appearance at the surface, large tracts of different kinds of earth; it consequently acquires in its course a variety and oftentimes a considerable quantity of saline and other contaminations.

This tendency in water to take up in its course those substances which are capable of solution in it, renders it not only able to dissolve things beneficial to mankind, but likewise liable to become impregnated with earthy, saline, or metallic matters, very obnoxious to the organs of the human frame, consequently therefore, we must not expect to find in every spring containing foreign things, a medicine either to cure or alleviate disease; on the contrary, a few only have been discovered to be decidedly adapted to this purpose, and these are called medicinal springs; while, on the other hand, many of our common, or as they are termed *economical* waters, are without doubt of a more deleterious quality than is generally supposed. Now as water is such an indispensable article in the preservation of animal existence, it becomes necessary to direct the attention to it, in order that we may know

how to avoid or counteract those things contained in it which have an injurious tendency, and likewise how we can avail ourselves of those which have been found beneficial.

Many medicines act only by being persevered in for a long time, their first exhibitions do not appear to influence any of the organic functions, and it is only by a steady and prolonged taking of them, that an obvious benefit accrues; yet the medicine or remedy from the beginning, perhaps, makes an impression upon the organs, which, although imperceptible at first, becomes ultimately apparent enough in its accumulated effects. So also with respect to the medicinal waters, to derive the full benefit which any of them can afford, a perseverance in their use for a long period is necessary. These observations, it is clear, will equally apply to those waters not adapted for the common purposes of domestic life, from their containing matters incapable of being properly assimilated by the organs of the animal body, they likewise may be taken for a long period without producing any sensible deviations indicative of their injurious properties, not only by those in the perfect enjoy-

ment of health, but even by those in whom their effects might be expected to become evident very soon, viz. those in whom the organs and powers of assimilation are weak, still they may be slowly and insidiously working an injurious effect, and tending to excite disorders, oftentimes painful to endure, and difficult to remove, and which will sooner or later become apparent. There are doubtless many persons, in whom the derangements which the ingredients in the water they may chance to consume tend to produce, are for a long time counteracted by the healthy and vigorous tone of all the organs engaged in the complex operations of the living body, especially when aided by regular intervals of activity and repose; nevertheless it may often happen, when complaints do arise, that they become aggravated from this circumstance, which they perhaps little suspect. "If the inconveniences "attending the drinking of water impregnated "with impurities," observes the learned Dr. Mead, "are often not felt, at least not until "towards the declining age, in strong and "active habits of body, yet I am, from very "good experience, assured that they de- "serve consideration in weaker constitu-

" tions, and a sedentary life, especially of " the tender sex."* Those, therefore, who are subject to disorders of the viscera, or obstructions of any kind, should seek as pure a water as possible, or, at least, take care that its contaminations do not interfere with the bodily functions. For " it is not only the " quality, but the quantity of matter which " water contains, that renders it unwholesome, and liable to excite and bring on " certain disorders; the most effectual and " lasting cure for which, must be sought in " a purer and less contaminated element."

In order fully to understand how water which is free from impurity may act medicinally upon the human frame, and at the same time perceive how, when it contains any, it may prove prejudicial, it will, perhaps, be advantageous, to take a slight view of the function of digestion, and to explain the use and office of the fluids we swallow, as well as the intricate course they take in the body.

The solid food, after being properly masticated, and mixed with the saliva, passes by the action of deglutition into the stomach,

* Vide Mead's Essays.

where it remains for about an hour before any change takes place; at the end of that time, the portions next the lowest, or pyloric extremity of this viscus, become gradually converted into a pultaceous and homogeneous substance, of a grayish colour, and sweet, yet rather acid taste, called Chyme; after an uncertain period, depending upon the nature and quality of the food, the manner in which mastication has been performed upon it, and the individual disposition, the whole contents of the stomach undergo a similar change, and pass into the small intestine, where the mass preserves its colour, properties, and consistence, until it encounters the secretions from the liver and pancreas, when they become very soon changed; the colour is then yellowish, and the taste bitter. In a strong person, this operation of the formation of chyme takes place without inconvenience, and is merely perceived by the sensation of fulness, from the distension of the stomach, which disappears by degrees; but frequently with people of a delicate temperament, digestion is accompanied with many disagreeable sensations, a feebleness of the senses, a feeling of weight and heat in the region of the sto-

mach, which is often much distended with air, while the activity of the mind diminishes, and there is a disposition to sleep. These effects are felt particularly towards the end of chymification.

During the passage of the chyme along the smaller intestinal canal, it becomes gradually separated into two parts, the fluid portion called the chyle, which has a white colour, and alkaline taste, is by degrees absorbed, or taken up, by the minute orifices of the *lacteals*, which open over every part of the internal surface of this intestinal tube; the solid portions after this operation, are eliminated from the body *per vias naturales.*

The Lacteal Vessels containing the chyle soon begin to coalesce together, and after passing through a number of small glands, called the mesenteric glands, they proceed on, increasing in magnitude and diminishing in number, until at last they terminate in a single trunk, called the thoracic duct.

The Mesenteric Glands, through which *the whole* of the nutriment of the body passes, are small, irregular bodies, variable in magnitude and number; their structure is but little known; they are very vascular, and

endowed with a vivid sensibility. The chyliferous and sanguiferous vessels that go into these bodies, are reduced to canals of an extreme tenuity, without our being able to say how they are disposed, yet through these must all the fluid nutriment derived from our food pass.

The Thoracic Duct, formed by the union of the chyliferous vessels coming from the mesenteric glands, passes through the upper part of the abdomen and chest, close to the bones of the spine, and empties itself into a large vein near the top of the left shoulder; here its contents mix with the mass of the circulating fluids, and proceed on with them to the right side of the heart, whence it is sent to traverse the innumerable minute vessels of the lungs, where the chyle, together with the venous blood mixed with it, becomes converted into scarlet arterial blood, which then returns to the left side of the heart, to be sent from thence to all the various parts of the body, where it permeates vessels of extreme tenuity, and in which the most important and wonderful changes occur. Besides this intricate route, which all that portion of fluid elaborated from our aliment by digestion takes, there

is another, which it appears is pursued by a large proportion of the simple or diluent liquids we drink, upon which the stomach does not seem to exert much action, and which do not appear to have any share in the formation of the chyle; this portion, which frequently consists of little else than *water*, seldom or ever passes in the chylopoietic canal farther than the stomach, or upper part of the intestine, being there absorbed by the extremely small orifices of the veins, and conducted directly to the *liver*, entering it by a large venous trunk, formed by the junction of many of the abdominal veins. This trunk has no sooner entered the liver, than it again branches out into a number of very small and, at last, imperceptible ramifications, which, after giving out the bile, are again collected together into two or three canals, which pour their contents into a vein going to the right side of the heart, where they are mixed with the chyle and venous blood brought from the superior parts of the body; whence it proceeds, as we have already seen, to the lungs, from them back to the left side of the heart, which then propels it through every organ in the body; by some of which, large

portions are separated, as by the kidneys and the skin, to be discharged away from the body. So that we find the fluid excrement is eliminated by a much more complex and circuitous route, than that by which the solid parts of the ingesta are got rid of.

"The offices of the stomach and intestines," says an old writer "are to break and digest the "materials for nourishment, and to prepare "them to be admitted through the lacteals "into the blood, and those solid portions, "which cannot be thus prepared, are de-"tached quite out of the body, by the peris-"taltic action of the intestines. The next "scene of digestion is in the arteries, and "what cannot by them be broke fine enough "for further secretions, is strained off by "the kidneys, and rejected in the form of "urine. The third and last way, by which "the excrementitious fluids of the body "are eliminated, is that of the perspiration, "and before they can arrive at the pores of "the skin, they must traverse some of the "minutest vessels in the body. If from any "cause they do not find their proper outlet, "but are driven back into the circulation, "then they lodge upon the viscera and

"glands, occasioning obstructions, indura-
"tions, and tumours of various appearances
"and consequences, and hence frequently
"arise stone, gravel, jaundice, and other
"chronical disorders."* From the preceding view, it is certain that the fluids taken into the body, must pass through the small vessels, in a state of extreme tenuity, and will, therefore, pass with more ease or difficulty, according to the degree in which they are either free from, or loaded with, adventitious matters. "The gross
"particles with which water is impregnated,
"let them be of any nature, saline, metallic,
"&c. will, according to their various gra-
"vity, the capacity of the canals through
"which they pass, and such like circum-
"stances, when they come to circulate
"in the animal body, be, by the laws of
"motion, deposited in one part or another;
"and if they do not exert a salutary action,
"must prove obnoxious to the economy."† If it is true, that the quantity of solid matter in many medicinal waters, acts in a benefi-

* Quincy's Essay on Gout, in the Medicina Statica, p. 409.

† Mead's Essay.

cial manner upon those parts through which it traverses because it is small, then we may very well suppose, that even a trifling portion of the noxious ingredients of those, whose impregnations are not so good for the body, may, by being admitted through the same channels, work an opposite effect.

From some experiments made by Mr. Faraday, some time since, it appears that gases pass through very small tubes with very differerent velocities, although under the same pressure, or driven along with the same degree of force, and it seems too, that the facility of their passage is inversely as their specific gravity, or, those which are the lightest pass the readiest. May not something of the same kind obtain with regard to the fluids passing along the very minute vessels of the human body; the lightest and finest passing the easiest, and thus tending to clear away and remove unnatural obstructions? At all events, it is not at all surprising to find many medical writings supporting the opinion, that disorders may be aggravated, and some even excited, by habitually taking water which holds earthy contaminations in solution, and although it is very probable, that formerly

too great an effect was attributed to them, yet I think it has not yet been satisfactorily shown, that precautions on this head are unnecessary. "That the lighter water is, "it is the more suitable to the constitution, "the reason is plain, because, as it answers "all the purposes of diluting as well, if not "better than any other, it also passes the "strainers of the body better; for the "heavier water is, it must needs be the "more charged with greater quantities of "gross mineral particles, which will render "it not only the more unfit to get through "the finest vessels and orifices of the glands, "but likewise be very apt to form stony "concretions in the body, by the attractions "and adhesions of those mineral salts with "which it is impregnated. It might, there-"fore, be of much service to such as are "subject to any diseases from obstructions, "to take the utmost care about their water, "and always be sure to use that which is "lightest."*

"It is an old and just observation," says Dr. Wall, "that persons who drink waters

* Vide the Aphorisms of Sanctorius in the Medicina Statica, p. 134.

"loaded with styptic particles, are liable to "strumous complaints and glandular ob- "structions; the reason of which seems to "be, that those earths, though small enough "to enter the lacteals, and circulate through "the larger vessels, yet are not reduced "to a sufficient degree of tenuity, to pass "the glands where the vessels are smallest "and most convoluted, and the force of "the circulation most languid."*

Sanctorius has an aphorism to the same effect as the above observations. "The "weight of water," he says, "may be easily "known by weighing heavy bodies in it, "for that is the lightest, and consequently "the most wholesome, in which a body "weighs the heaviest; but that water in "which a body weighs less, is heavier, or "containeth mineral particles, and is not so "wholesome."...."In many spring waters, "there abounds such great quantities of hard "mineral particles, which cannot but contri- "bute to the ills here complained of, viz. those "of the gout. Of this no one can be unap- "prised who has considered what hath been "related by many natural historians and

* Wall on the Malvern Waters.

" physicians, the writings of both, abound-
" ing with divers instances of indurated tu-
" mours upon the glands, gravel, gout, and
" stone, common to those who have been
" accustomed to hard spring waters; and it
" is notoriously known, how much the inha-
" bitants upon the Seine, in France, which
" washes over a sandy bottom, are subject
" to such ails."*

Hippocrates atributed not only the occurrence of certain diseases, but even that variety of disposition, &c. called temperament, observable in people of different countries, to differences in their air and water. " Water," observes an ingenious author, " is of so constant service, not only
" for our drink, but also in the preparation
" of our flesh and bread, that it may justly
" be said to be the vehicle of all our nou-
" rishment, so that whenever this happens to
" have other properties than are necessary
" to fit it for the purposes of our economy,
" it is no wonder if, in its passage through
" the body, these make obvious impressions
" there."

How these opinions originated, it would

* Quincy's Essay on Gout.

not perhaps, be of any utility for me to stop to enquire, but it may with the greatest reason be inferred, that they had some foundation in experience from facts, and it is probable that the neglect into which they are at present fallen, is owing to that propensity so prevalent among mankind, and perhaps particularly so in those of the medical profession, which not only induces them to rely upon, and place so much confidence in any favourite point, that they frequently overlook others, too important to be neglected; but likewise to assign a cause for every effect they witness, and when their favourite theoretical doctrine of causes fails, or is abandoned for want of support, *the effects*, which it should be remembered, remain unshaken by theory and supposition, are too often neglected or forgotten; they are on these accounts frequently led to abandon well-founded and useful opinions, because, like numerous remedies which have enjoyed an ephemeral reputation, too much has been expected from them, "and when they are found *to* "*fall short* of their *expected* efficacy, are "abandoned in disgust."

But whatever objections may be raised

against the foregoing reasoning, experience, and the testimony of various persons, tend amply to prove the good effects, not only of the Malvern, but other pure waters, in preventing and assisting to cure a great many diseases.*

"The cures performed by the Malvern "water in *scrofulous cases*, are very nu- "merous and surprising; indeed, I have "seen few persons who have used it pro- "perly, and continued it a sufficient time, "who have not received great benefit from "it. In *old and fistulous ulcers*, and in *glan- "dular obstructions*, this water has likewise, "in a great many cases, proved highly ser- "viceable. There are numerous instances "also, of persons who have come to Mal- "vern for *disorders in the eyes and eyelids*, and "received every, or at least, great benefit "there, after every other method had failed. "In *disorders of the urinary passages*, this "water has been used with much advantage; "for as there are very few stomachs which "will not bear it in large quantities, and in-

* There are several springs on the Continent, resorted to for their medicinal virtue, but in which no active ingredient whatever has been found, and which owe all their good qualities to *a great degree of purity*.

" deed, which are not strengthened by its use,
" and as it passes off very freely by urine,
" the acrimony of this secretion is diluted,
" the puriform mucus washed away, and the
" saline and terreous parts dissolved and
" evacuated. The Malvern waters are of
" great service in *scorbutic disorders*, and also
" in other *cutaneous cases of the leprous kind*;
" and though in the latter it does not always
" effect a cure, yet few persons drink them
" without considerable advantage, where the
" eruption is of a moist kind, when the
" parts are excoriated, or if covered with
" scabs have yet an oozing of some foul
" sharp matter from under them; in such
" cases, whether topical or universal, the
" waters has very seldom failed. But when
" the skin is hard and dry, or is covered with
" a scaly or branny eruption, the effects
" are much more precarious. In *coughs* and
" *catarrhs*, the efficacy of the Malvern water
" is confirmed by every day's experience,
" few persons coming there for scorbutic, or
" other disorders attended with any defluxion
" on the breast, who are not speedily relieved
" in their pectoral complaints."

Dr. Wall, about the middle of the last century, published seventy-six cases of persons

afflicted with some of the above enumerated complaints, in which the water and air of Malvern had effected cures, after other means had failed, all of which, he observes, "I have attended myself, and therefore I "will be answerable for their veracity." I shall close this enquiry with the following extract from another valuable author. "The "springs at Malvern have proved efficacious remedies for many obstinate and "deplorable diseases, which have resisted "the powers of the most useful and appropriate medicines; they have proved extremely serviceable *in scrofulous cases, in "inveterate ulcers and sores,* which have been "called *fistulous; in obstructed and scirrhous "glands,* and some that approached the state "of *cancer; in disorders of the eyes and eyelids; "in nephritic complaints, and disorders of the "urinary passages; in some cutaneous diseases; "and coughs from scorbutic or scrofulous "causes; loss of appetite, and immoderate evacuations of the female sex.*

"But the most careful analysis of the "Malvern water, has not been able to detect in it any active ingredient whatever, "to which medicinal powers can be ascribed, it is no more than the uncontami-

"nated element, nearly approaching the "purity of distilled water; as it is, there- "fore destitute of all proper and peculiar "medicinal powers, the benefit derived from "its use, can be attributed to no other cause "than the cessation of the constant and ha- "bitual application of the noxious matter "contained in the water of common springs. "When the morbific force is removed, the "innate powers of the system are developed, "and become active, and thus the body is "gradually restored to the actions and sen- "sations of health."* But to enter into an examination of all the disorders for which the water, air, and situation of Malvern have been found serviceable, would lead me far beyond the limits of my present intention, most of them will be found to depend upon weakened constitutional power, or influenced in their origin or progress by that peculiarity of the body termed scrofula, the nature of which is but little understood, even at the present day, though conducive to some of the most troublesome and long continued disorders, to which the human subject is liable. It is, therefore, to a few

* Lambe on Scrofula.

remarks upon the causes of scrofulous diseases, and to some observations upon the manner in which they are developed, and their treatment, that the following pages are chiefly appropriated.

SECTION II.

CAUSES OF SCROFULA.

In considering the causes of Scrofula, I shall confine myself as much as possible to facts of practical importance, without devoting much time to speculative doctrines, from which little can be deduced towards either the cure or alleviation of its symptoms.

Scrofula* is a term the meaning of which is not well defined, perhaps because not well understood; it has been indiscriminately used by writers to denote a certain peculiar disposition in the constitution, as well as to designate the diseases arising from, or supposed to be influenced by it; we continually hear of scrofulous diseases, and likewise of scrofulous constitutions, in which

* Those who wish to see a critical enquiry into the origin and use of the terms Scrofula, Struma, and King's Evil, may consult Dr. Hennings' work on Scrofula.

no obvious disease exists at all, a proper discrimination not being made between these two different states; besides which, as if to render the subject still more obscure, the word scrofula is too often made the cloak of ignorance, being frequently used to account for the anomalous symptoms of almost every disease that can occur.

By the term Scrofulous Constitution, I understand a constitution free from actual disease, but hereditarily predisposed,* upon the occurrence of any disorder or irregularity, especially in any of the glandular structures of the body, to set up a peculiar and specific action, which may be either confined locally to the parts affected, as in some instances may be seen in scrofulous affections of the lymphatic glands, or on the contrary, as we find to be the case in a great majority of instances, disturbing and deranging the functions of the whole system, neither texture, mode of growth, nor office

* "*Predisposition* has no reference to any morbid "poison, but implies *an original*, usually *an hereditary* "*formation in the constitution*, which renders it liable to "fall *into certain diseases peculiar to* certain climates, or "*excited by certain causes.*"—Adam on Morbid Poisons, 2nd Edition, p. 8.

of any organ, affording the least protection against its ravages when roused into activity.

By a Scrofulous Disease, I understand a local or particular disease influenced by this peculiar hereditary taint or disposition in the constitution.

In adverting to the *causes* of *scrofula*, an important distinction must be borne in mind between those which act *ab interno*, and depend upon some peculiar arrangement of the organization, "or some hereditary for-"mation in the constitution," and those which influence the body *ab externo;* the former may be called (and have been generally, I believe, considered as) the *predisponent causes*, the latter the *exciting causes*. This distinction has, however, been too much neglected by writers upon scrofula, and this inadvertence has tended very much to render this difficult subject still more obscure.

Upon taking a review of the various opinions which have been formed of the nature of the *predisponent causes of scrofula*, by those who have devoted themselves to the enquiry, I fear we shall be constrained to confess that however ingenious some of them may appear, and however well they may accord with some of the observed effects of scrofu-

lous diseases, they have done very little, or nothing, towards perfecting the cure, and that none of them offer any rational explanation of the condition of the system upon which they depend. What practical advantage, or what solid information do we derive from being told that the causes of scrofula are to be found *in a certain delicacy* of structure in the absorbent vessels, or in a want of balance between them and the secerning arteries; in an acrimony, acidity, or viscidity of the fluids of the body; in a laxity of its fibres, or a particular relaxation of the lymphatics, or in some virulent peculiar specific or septic poison: I can discover none at all, nor can I find out upon what foundation these notions are entertained. It is thus that the beauty and apparent consistency of theorizing flights of the imagination lead us into devious routes far removed from the sober path of observation and experience. I imagine we must make ourselves much more perfectly acquainted with the means by which the healthy operations of the body are performed, before any satisfactory advances can be made towards a proper understanding of those influencing diseased action. If all the important functions of the

body take place without our being able to detect satisfactorily the apparatus, explain the means, or calculate upon the powers by which they are effected; if we do not understand the chemical operations of *life*, nor have been able to discover the vessels in which the numerous secretions are elaborated; or by the most patient investigations, to satisfy our minds, by obtaining a knowledge of those causes, which by means of slight and almost imperceptible differences in structure, are capable of producing from the same source, fluids differing so widely from each other in all sensible qualities, as milk, urine, and the bile; if, in short, we do not know the controul which the various nervous filaments distributed to the different organs exert over their secretions, how can we pretend to account for diseases by congestions and deficiences, acrimonies or acidities in the fluids, or by delicacies, rigidities and laxaties of the solids, as departures from a standard about which we know so little?

Acute affections have in them much of similitude, there is a common character in them which the experienced practitioner immediately apprehends; the pulse—the fe-

brile excitement—the pain—the anxiety of the patient—all direct him to the kind or species of the affection, and experience points out distinctly the measures to be adopted for relief, which in this class are few, decisive, and often efficacious; but in the list of chronic disorders, there are many causes of suffering not at all understood, to combat which a thousand different modes of treatment are had recourse to, not indeed from choice, but necessity, and the multifarious appearances which these disorders assume, render discrimination a difficult, and sometimes almost impossible task. If then in the former class, divisions of opinion arise, respecting the cause and nature of the diseased action, what may we not expect in the latter, which is so obscure. If inflammation, the most common, and perhaps the simplest of all diseased actions, is a stumbling block; if that has been asserted to consist in two of the most opposite states, excitement and debility; and if the same experiments have been adduced to explain and favour both hypotheses, ought we not to be extremely cautious in admitting similar reasonings upon the more obscure subjects? It is a remarkable, and perhaps fortunate circum-

stance, that in every instance, even those where the greatest ingenuity has been displayed in attempting to discover the proximate cause of any disease, that experience or practical observation has furnished the theory, not theory the practice; were it otherwise, what mischief might occur by letting loose the reveries of a fervid or heated imagination. Thus the theory of inflammation, either way brings with it no practical utility, nor are the usual remedies arraigned or condemned by the supporters of either supposition, only the explanations of their action are bent and tortured to suit the views of both. Do we know what takes place when a slight blow on the head, producing a little tumefaction of the scalp, is followed by stertorous breathing, coma, &c.?—No; but the symptoms are marked, and the means to be resorted to sufficiently well known. Such being the difficulties then in the most common, certainly the least variable disorders, where the kind of explanation too often adopted by medical practitioners brings little else than assertion, how can we be expected to acknowledge its truth, or allow our conduct to be guided by such reasoning in diseases, the symptoms of which are seldom

exactly similar, and the indications always obscure? It is owing to these improper and unsupported exertions of that natural propensity in the mind, to trace effects to their causes, that we find such a thick and almost impenetrable cloud of theories and hypotheses obscuring the knowledge of disease.

The learned Dr. Heberden lamented that, after a labour of fifty years in the profession, he "should have made so little progress to-"wards the understanding of those things in "which the various diseases of the body consist."—"This, perhaps," he modestly says, "may be owing partly to my own want of "ability, in making a proper use of the op-"portunities I have had; but it may too," he justly remarks, "be in some measure at-"tributable to the difficulties of the subject." And is it not better for us thus candidly to acknowledge, that hitherto it has been out of our power to understand the means by which the actions of the organs of the body are accomplished, that the phenomena of vitality are still too obscure for us to comprehend, and therefore, that we yet remain ignorant of those changes in the structure or constitution of the body which constitute the predisponent causes of disease, than to be led

away by speculative doctrines and unsupported assertions? Is it not better that we should candidly confess that the *internal or predisponent causes* of scrofula are yet unknown,* than to have our minds clouded, and our exertions impeded by useless hypotheses? Amidst these discouragements, however, it should still be our business to cherish hope, and to continue our endeavours to advance the knowledge of every department in the science of medicine and disease, which although difficult of approach, must not be regarded as inaccessible, and though slow in its advances, yet progressive. The human mind is daily making rapid strides in every department of knowledge, and will one day perhaps surmount these obstacles; but until then, we must be content, in a great majority of instances, to observe accurately the effect which external agents have upon the body, and adopt curative measures more from the rules of experience, than the dictates of reason.

Whether the internal arrangements of the organization which constitute the peculiarity

* The opinion concerning the identity of the scrofulous and tuberculous diathesis will be examined hereafter.

of the scrofulous constitution, whatever they may be, are of themselves sufficient to induce a state of disease, independent of any external cause, is a question yet to determine. I do not think they are, for if they were, we should not, I imagine, find practitioners who have written upon scrofula, detailing in their works certain marks, or signs, by which they may be discovered or known to exist, in the absence of, or previous to any disordered actions occurring, thus—"an ap-"pearance of languor and debility depicted "in the countenance,"...."a peculiar thick-"ening of the upper lip, extending to the "septum of the nostrils,"...."a dilatation of "the pupils, with a hanging or falling down "of the upper eyelids,"...."light hair, blue "eyes,"...."a fine and soft skin,"...."a deli-"cate and beautiful complexion, with a "peculiar softness and flaccidity of fibre,"—have all been considered by one writer or another, as indications of the presence of a disposition in the constitution to take on scrofulous action; or, in other words, as shewing the existence of the predisponent causes. Again, if the predisponent causes of scrofula were of themselves capable of exciting disordered actions in the body suf-

ficient to constitute disease, the indications would be, I should think, more uniform, and more reducible to some leading and determinate characters than we find them to be. We should not then observe so much discrepancy in the opinions which have been formed of their nature, and in the different practices which have been had recourse to, to counteract them; nor such incompatible medicinal articles used at various periods by practitioners, to alter or amend the state or habit of the body upon which they supposed them to depend. But if, on the contrary, some extraneous cause or other, influencing the body *ab externo*, is in operation in every case of scrofulous disease, first producing certain derangements in the system, determined by peculiar circumstances to particular parts, which subsequently become subject to, or characterized by the evil taint or peculiarity in the body, then we can reconcile, in a great measure, the varieties and discrepancies both of opinion and practice; for the remedies employed must then be applicable not only to the nature and situation of the primary disease, but likewise adapted to allay the scrofulous irritation, and to put the constitution generally into the best

and strongest state. Now, although the internal irregularities of the scrofulous system, or, as we have termed them, the predisponent causes, are not sufficient alone to constitute disease; yet I am sure, that persons with this habit are very much more suceptible of the injurious influence of the external agents to which the body is daily exposed, than others. This I think every practitioner will admit; and if these, which in conformity with medical language I have styled the exciting causes, could be altogether avoided or counteracted, I believe that any one even with a strong hereditary predisposition to scrofulous action, might pass through a long life without any symptoms to indicate its existence. A knowledge of the sources of irregular stimulation to which the body is exposed from without, therefore, becomes of the greatest importance in a practical point of view, for in guarding against their influence, and in counteracting their effects, our endeavours in preventing and curing scrofulous diseases will in great measure consist.

To be able to enumerate all those circumstances which may act as exciting causes to scrofulous disorders, and point out the particular manner in which they produce an effect

upon the body, would require more experience, a more acute judgment, and more varied observation, than even the longest and most industrious life well spent in the study of disease would furnish. The different susceptibilities of different people, and even of the same persons at different periods; the differences of habit, temperament, and mode of life; together with the extreme subtlety of many of the agents affecting our corporeal frame, whereby they elude the cognizance of our senses, with various other difficulties continually occurring, appear to preclude the possibility of our arriving at absolute certainty in our knowledge upon these topics. There are nevertheless many which have such an obvious influence in causing or prolonging disease, and so particularly promoting the development of scrofulous actions, that they may justly be considered in a *practical* view as *immediately* concerned in their production. Among these, climate will hold a prominent rank. The term Climate has been generally restricted to the state of the temperature of the atmosphere in the different parts of the earth, dependant upon the mean meridian altitude of the sun, but in a medical acceptation of

the word, it is obvious that it embraces not only those atmospheric differences, which depend upon solar influence, but also those arising from various other causes, as the nature of the soil, its condition and cultivation, the vicinity of running or stagnant waters, of woods, mountains, or valleys, and especially, perhaps, upon *the terrestrial radiation of caloric*, which last we shall hereafter shew to have a very important influence upon the temperature and salubrity of the air.

The Atmosphere is a subtle and invisible fluid, every where surrounding the earth, uniform in its chemical composition, and essential to the existence of animal and vegetable life. Its salubrity in different situations, however, varies very much, owing to vicissitudes in its temperature, and to the nature of its peculiar impregnations.

In considering the phenomena produced upon mankind by changes in the temperature of the air, it must be remembered that the living human body steadily maintains by its own powers a heat several degrees above that of the inanimate objects by which it is surrounded; while, on the contrary, the temperature of the atmosphere, &c. being de-

rived from the sun, varies very much at different places, and at the different seasons of the year. Nevertheless we find the human species scattered over every quarter of the globe, inhabiting every climate upon its surface, and capable of sustaining in them the extremes of *heat* and *cold*.

An elimination of caloric from the body, being a natural and healthy process, that state in the contiguous objects which abstracts it in a slow and equable manner is the one best adapted to the well being and pleasure of the individuals, and man uses every endeavour to counteract any departure from this standard, by differences in his dress and habitation. In the tropics, where the temperature of the air is scarcely below, and sometimes equal to the heat of the body, we find him clothed in the lightest possible manner, and in numerous cases dispensing with dress and dwelling altogether; in the frigid regions of the north, on the contrary, where water becomes a solid, and the face of nature whitened by continual snow, he endeavours to retain the vital heat by thick furs, and other articles of covering capable of resisting the external cold. Nature too, ever provident of her creatures has im-

planted in him certain powers, by the operation of which, *independent of artificial precautions*, great changes in these respects, when slowly and gradually made, are endured without injury, without necessarily inducing a state of disorder or disease. By these salutary powers, the variations of temperature in the different places upon the earth are in numerous instances effectually obviated, it is the unlooked for vicissitude, and the partial exposure of the body to currents of cold air, which induce functional derangements, and which are found so particularly favourable to the development of scrofulous action. But these prophylactic efforts of nature seem to be impaired, or weak and inadequate, in those who have the scrofulous predisposition, so that a particular and constant attention to dress, and the preservation of an equable temperature upon the surface of the body is to such persons doubly important; it is on this account also, that we find those sudden transitions, which in every climate are extremely prejudicial to the human frame, to be especially injurious to the scrofulous constitution. "A great and un-
"prepared for change of weather, from hot
"to cold, cannot but very much affect and

" disorder the constitution, by suddenly " straightening the cutaneous pores, where- " upon the perspirable matter will in a great " measure be detained, and occasion fevers, " &c., unless by the strength of the constitu- " tion it be soon thrown off by an increase " of some of the sensible evacuations." Now as our latitude and situation render us in this country more liable to noxious vicissitudes, than perhaps any other place in the world, and as numbers are continually sacrificed to diseases arising from them, we should awaken ourselves to a just sense of their importance.

The impression produced by a current of cold air upon the body, especially when in some degree heated by exercise, is immediately perceptible at the surface; under its influence the skin contracts and loses its usual suppleness, the cutaneous pores become closed, and their functions almost annihilated. These changes are very soon sympathetically felt in every part of the system, from the circumference to the centre; the powers of the circulating apparatus are concentrated and driven towards the internal organs, and the equilibrium of their action destroyed. Nature, however, always power-

ful in her conservative measures, very soon manifests an attempt to allay the disturbance, by the subsequent movements she displays; but as the primary influence has been only partially exerted, so the natural reaction also will be only irregular, inadequate, and productive of still further disorder, too often rousing into activity the latent disposition to disease.

The morbific effect of sudden variations of temperature is greatly increased by the atmosphere being loaded with aqueous particles, a cold moist air being much more deleterious than a cold dry one. Cold humid air, is indeed one of the most dangerous enemies of the animal œconomy, the body experiences from it a peculiar disagreeable and piercing sensation, it relaxes the epidermis, and hastens in an especial manner the evolution of caloric. "In a dry clear air "the perspirable matter is best discharged, "for there is both a freer passage for it, and "more liberty for it to exhale and fly off; "whereas in damp wet weather, the skin is "moistened by the external air, and the "pores become foul and clogged up with "the gross particles hanging upon it, and "less liberty is left for the perspirable mat-

"ter to go off."* An atmosphere loaded with moisture, generally contains likewise the noxious exhalations from the earth; perhaps invisible, or else in the form of fogs or mists which will vary in the height to which they ascend, according to the weight of the air. Those who have been out at sea for a month or two, become fully sensible, upon

* A cold and moist atmosphere has always been considered to conduce the most to scrofulous diseases, and it seems true that a temperature varying from about thirty to fifty or sixty degrees of Farenheit's scale is the most favourable for their development. The reason of this it is not very easy to explain, unless we suppose with Dr. Hunter, or the ingenious Dr. Henning, that the exciting causes of these diseases are *always* to be found in the morbific aqueous effluvia, or hydrogen gas, floating about in the air, and that the skin by absorbing them into the constitution, thus produces scrofulous action; if this explanation be admitted, we can easily explain the greater increase of the disease at these temperatures than at others; for the aqueous particles at forty degrees of Farenheit, have attained their minimum of bulk, and will therefore be peculiarly fit to be taken up into the body by the pores of the skin.

I must confess, however, that I have never seen any thing which would warrant us in concluding that scrofulous disease is often excited in this way, though I would not venture to assert that it never is. I imagine that the injurious effects of climate arise, in most instances, from *the irregular stimulation of the body* consequent upon any sudden vicissitude.

approaching shore, of the quantity of matter which the atmosphere over the land contains, for when the wind comes off from it after a hot day, it is astonishing how strong it smells; this is commonly observed among sailors.

When the land wind comes from off the Island of Ceylon, I have myself been sensible of a very powerful earthy odoriferous scent, at the distance of between thirty or forty miles from the island, which has, I believe, been erroneously attributed to the flowers of the cinnamon plant. Again, the loom over the land, which an experienced sailor's eye will detect long before land itself can be seen, is dependent upon the greater density of the atmosphere from matters drawn up into it by the sun's rays. These exhalations are of themselves frequently productive of many disorders, and tend very often materially to encrease the inveteracy of others.

Stagnant waters and Swamps impregnate the air in their neighbourhood with vapours which are extremely pernicious.* These are often hovering upon the low grounds,

* The cause of which will be explained hereafter.

over which, when the coolness of evening has condensed them, they may be seen from the contiguous elevations rolling along like white clouds upon the earth, being too gross and heavy to rise into the higher regions.*

From the preceding remarks the following conclusions may be drawn: the neighbourhood of swamps and stagnant water—low

* The height of the column of atmosphere above us, must be very much influenced by the moon, which may therefore have a far greater effect upon the weather and upon the feelings of individuals than we are inclined at the present day to admit. If this planet has such a very considerable power in raising an immense body of water, causing a high tide in the ocean, how much greater must be its effects upon the lighter air?

The reason why the barometer, under these circumstances, does not show the tides in the air, or is no indication of the extent of the mass of atmosphere above us, will be obvious to every scientific mind, for by how much the more the influence of the attraction of the planet is greater, by so much the more will the effect of gravitation be diminished; and the barometer, therefore, will remain *in statu quo*; but there is great reason to believe it is not so with the mind and imagination of man. "The remote "or predisposing cause of many indispositions and dis- "eases, is, as they say of wit—much talked of—not to be "defined.—But the immediate or exciting cause, is oftener "to be found in the influence of the moon, nay in a pass- "ing cloud, than in the jargon of nosologists.—Moseley, p. 621.

marshy situations, where the air is usually gross, and loaded with hurtful impregnations—all places subject to sudden changes in the quantity of sensible caloric—all drafts or currents of cold air—in short all causes vitiating the atmosphere, or causing sudden variations in its temperature, should be assiduously avoided, not only by those predisposed to scrofula, but also by all who seek to avoid the exciting causes of disease; while, on the contrary, a dry raised situation, sheltered from the colder winds, is to be preferred to those which lie more exposed, in order that an uniformity of temperature may as far as possible be preserved.

An elevation from three to five hundred feet above the general level of the surrounding country, thus protected, is in this climate the most healthy, not only because it is freed from the vapours arising from the ground, and the fogs and mists floating in the atmosphere; but likewise because it is exempt from those rapid abstractions of caloric from radiation, to which low situations are peculiarly subject.

In a place much higher than this, the air becomes so rarefied, that, in winter especially, it is very often enveloped in the fogs

occasioned by the low dense clouds which sweep through the air, as may be frequently seen in the neighbourhood of mountains, or high hills, the summits, and a considerable portion of which, are often in a thick mist, while those parts just below are perfectly clear; so, on the contrary, from places of this elevation, the plain below is often to be seen covered with rolling fogs, while they remain quite clear. I therefore esteem those situations removed from either of these inconveniences, in any climate, to be the best adapted for delicate scrofulous persons, and invalids.*

THE INFLUENCE OF DIET over the tendencies to disease, is naturally important, and the habits of civilized and luxurious life have rendered it still more so. Diet is made up of those substances which are received into the stomach for the nourishment and support of the body, and it may be distinguished into *food*, or the solid aliment and *drink*. The former ministers chiefly to the nutrition of the system, the latter contributing also to this purpose, either by dilution,

* The influence of change of situation over diseased action will be noticed hereafter.

or by the vigour imparted to the organs by its stimulus.

Food is either of an animal or vegetable nature: in the colder regions of the north, the former chiefly predominates; while in most of the countries of the torrid zone, the latter forms the chief bulk of the nutriment. So that the powers of digestion appear to be encreased by cold, or by the habits of activity necessary in those climates where it predominates; while, on the contrary, in warm climates, the tone of the digestive apparatus becomes impaired, and the stomach, especially, weak and relaxed; partly by reason of the excessive heat, and partly perhaps by the habits of indolence which it promotes. In the temperate regions, animal and vegetable food are usually combined.

The quantity and quality of the food proper to be taken, and the interval which should elapse between meals, depend so much, in health, upon the habits of different persons, and, in disease, upon the nature of the indications, that general rules cannot be laid down with any great advantage; we may, however, observe, that they should always be adapted to the state and feelings of the stomach, which ought never to be dis-

tended by an immoderate quantity, nor pampered by a luxurious quality; in order to avoid which, it is better to sit down to a few simple things, than to a table covered with delicacies; for a variety of savoury dishes too often induces persons to eat more than is proper, or good for them, which gives rise to flatulency and oppression, and, if often repeated, will surely lay the foundation of those troublesome and intractable disorders arising from indigestion. Too often has a poor unfortunate stomach been loaded with a heterogenous mixture of soup, meats, vegetables, fruits, custards, wines, and perhaps many more *good things*; and then after all, people wonder that they feel uncomfortable and full.

As it is not my intention to enter into all the complaints and disorders occasioned by these excesses, and since scrofulous diseases are much more frequently produced by a poor and deficient diet than the contrary, I shall merely observe here, that a strict attention to articles of food, is very important in children; for they often prove the exciting causes of disorder in the abdominal viscera, and in which the mesenteric glands will surely partake in those of a

scrofulous habit. Prior to the age of adolescence, therefore, the effects of the ingesta should be carefully watched, in order that a proper regimen may be adopted upon the first approach of this formidable mesenteric disease, and its progress thus arrested.

DRINK, or the fluids taken into the stomach, may consist of a great many things, but the basis of them all is *water*; a fluid essential to the existence of life. "Every "liquid we receive may be considered either "as a diluent, or a medicine; water is the only "diluent we are in the habit of mixing our "alimentary matter with, its medicinal, or "stimulant qualities, will depend upon the "nature of its impregnations." It will not be necessary here to consider the variety of articles of drink, which the progress of refinement has introduced into society, or to enumerate the effects which their various qualities may be liable to occasion, this would lead me from my present purpose. I have already entered fully into an explanation of the way in which an impure water may prove detrimental to the health; I shall, therefore, only observe here, that the opinions of those medical writers, who have witnessed the beneficial effect of a pure water

in some debilitated constitutions, are undoubtedly carried too far, when they attribute the origin of every constitutional disease to the contaminations of our ordinary springs; and declare that a "*septic poison*" lurks in them all, to be avoided only by using distilled water in the purposes of domestic life; which tends, it is said, "in all habits "to promote digestion; remove obstruction "of the glands, and prove of the greatest "advantage in the cure of consumption." * Without falling into these excesses in opinion, we may affirm, that although many of our spring waters are quite wholesome enough for persons in robust health, yet some of them may be hurtful in those of a weak and scrofulous frame of body. A naturally pure water is, however, much preferable to an artificial one, prepared by distillation; the latter does not appear to agree very well with the stomach, and is, therefore, apt to bring on, after some time, a train of dispeptic symptoms. These, however, I think might be obviated in a great measure, by impregnating the distilled water with a small

* Lloyd on Scrofula, and Reece on Consumption.

proportion of the fixed air, or carbonic acid gas; which may be readily accomplished, by adding to it two or three bottles of the common ærated water. This will be found very beneficial to the scrofulous habit, in those situations where the ordinary springs are contaminated by any quantity of earthy or mineral impurities.

Derangement in the actions of the body from any cause, and diseases originally unconnected with any appearance of scrofulous action, are frequently found to develope that morbid type; thus fever, catarrh, measles, small-pox, and especially, perhaps, the venereal disease, with many others, whose effects go to debilitate the powers of the system, are commonly observed sooner or later to excite into activity the strumous predisposition; and these, therefore, must be ranked among the exciting causes of scrofulous disease. Some practitioners have attributed a certain real, or supposed increase of scrofulous diseases, to the practice now adopted in many of those eruptive disorders. "The "increase of scrofula I should, in great mea- "sure, impute to the treatment usually em- "ployed in small-pox, measles, &c.; which, "in my opinion, according to the present

" fashion, strongly checks the eruptive fever, " and prevents the pustules from making that " kind of appearance which the system " might probably require." * There can be no doubt that an improper interference with the process of nature in eruptive complaints, will tend very much to injure the constitution; and any treatment which prevents the pustules from running their appointed course, may prove the means of exciting scrofulous disease in those who have the predisposition. I should hope, however, that this is seldomer the case than some imagine.

It may be proper here to remark, that the influence of climate, diet, &c. will sometimes occasion a particular disease, and yet not appear at all to favour the development of scrofula primarily; which, notwithstanding, may after some time be brought into activity by a long continuance of disorder in the system, so that the exciting causes sometimes act in a direct, sometimes in an indirect manner; sometimes sooner, sometimes later; thus rendering our knowledge of what is due to any one of them extremely difficult.

There are several circumstances which

* Brandish on Scrofula.

have a considerable share in determining where any morbid action shall be established. Those parts upon which the exciting causes exert the most powerful influence, will, in most cases, become the seat of scrofulous disease in a scrofulous constitution. Thus the agencies of climate affect chiefly the surface of the body and the lungs; they will, therefore, be more likely to effect disorder in the function of these parts than in others less exposed; while the injurious action of a bad, deficient, or intemperate diet, or of impure, contaminated water, &c. being more particularly determined upon the chylopoietic viscera, and the lymphatic system, they will be more likely to produce disturbances there than elsewhere. So local diseases or injuries when they excite, or develope scrofulous action, generally induce it first in those parts in which the original complaint existed, or to which the morbid cause was immediately applied. Thus injuries of the knee, from any external agent, are too frequently, the origins of a scrofulous joint. Such too was the case with the cook, related by Wiseman, and quoted by Dr. Henning, who went to sleep one summer's night, upon a form which pressed very much

on one side of his neck, and when he awoke in the morning, he found his neck was full of *strumæ*, some as big as a walnut, which ulcerated, and ultimately killed the patient with every appearance of scrofulous disease. Conjoined with these circumstances, and sometimes apparently independent of them, we find that the period of life has a very considerable influence in deciding as it were upon the seat of Constitutional Diseases, by reason of the changes which seem to take place in the balance of the circulating fluids in its different stages. Before the age of adolescence, the powers of the arterial circulation are chiefly directed towards those parts engaged in supplying materials for the growth of the body; in the earlier periods of life, therefore, disease in the lymphatic, or mesenteric glands are frequent; about the epoch of puberty, the balance of action inclines towards the thoracic viscera, and inflammation of the pulmonary apparatus, and consumption of the lungs, are then the attendant maladies. As life advances, every part begins to feel the decay of the natural powers of the body, and becomes prone to fall into a state of disorder; but particularly, perhaps, the pelvic viscera, and the organs in

immediate connection with them, giving rise to those troublesome and harassing disorders of the urinary apparatus in the male, and those no less distressing complaints in the uterine system and its appendages, in the female.

Having thus noticed, in a cursory manner, the various causes which tend to produce scrofulous diseases, and the circumstances which *promote* and *determine* their operation; it perhaps may be useful now to make known those things which have considerable power in counteracting them; and as the prevention of disease is better and easier than the cure, to offer some general observations upon the means best calculated to preserve the health, and to enable those especially who are known, from previous *unequivocal*, though perhaps *slight*, indications, to have the scrofulous predisposition, to avoid as far as possible, the influence of those agents which, as we have just seen, tend so greatly to develop it.

Custom and Habits, either natural or acquired, exhibit important effects in counteracting or blunting impressions from changes of temperature, and in fortifying the system against the injurious vicissitudes of climate,

and the action of other external agents, their influence is important, and should never be overlooked or forgotten. There are, no doubt, differences in individual sensibility, which may produce some variety in the sensations of heat and cold, as well as in the effects produced upon the body by other agents, so that we may say each person is influenced by them in a particular manner; still it is not to this cause alone we can attribute the differences of susceptibility to the various external impressions observable among mankind in different, or even in the same climates; it is to the way in which they are reared while young; it is to the management of the infant and youthful state, and to the habits which the body acquires at these periods, that they are in an important degree to be attributed. There is an old rule which might be attended too with great advantage in this luxurious age—"Avoid warm nurseries and close air, for "fear of making a child delicate, weakly, "and susceptible of cold;" and, indeed, all those who wish to bring their children up in the paths of health, should accustom them very early to bear moderate degrees of cold; for by these means, they are rendered

insensible to slight vicissitudes of climate. The body at that early period of life, when it has not been weakened by over anxiety and care, is generally in a perfectly sound state, the powers of the system are robust and vigorous, and their reactions powerful and effective. It is to this cause that we find infants, in general, bear the cold bath and cold exposure so well. So it is to the hardihood acquired in early life, that "the "Russian peasant, be he where he may, can "wrap himself up in his pelisse, and sleep "profoundly, at full length, upon the snow; "or travels alike, by day or night, regardless "of the rigors of his climate;"...."that the "Norwegian works with uncovered breast "in a freezing atmosphere;"—and "that "the Canadian savage, in defiance of the "cold, goes but lightly clothed to the chase." Parents should bear these facts in mind, they shew them that the health of their offspring depends, more perhaps than they imagine, upon the habits acquired by the management of the first periods of life. A masculine and rough education tends to give vigour to the frame, and impress upon it a fitness to endure the inconstancy of climate. This observation is intended to apply to the

strong and healthy; tenderness and forbearance, in all their several degrees, are required towards the weak and sickly; still, however, keeping in view the important effects of early habits upon the comforts of after life. The effects of *habit* may be farther instanced by persons living in low marshy situations, who often remain free from the diseases so frequently occurring there, while new comers are almost invariably attacked by them. In India too, Europeans generally experience one severe attack of the bilious remittent fever, before the constitution becomes reconciled or habituated to the great change of climate they experience; but after this *seasoning*, by care and attention, the health is, in many instances, preserved.

Facts, not less curious than surprising, also evince that every injurious impression upon the sensibility of individuals may be greatly diminished in effect, and often entirely counteracted, by any thing which strongly *engages the mind, and interests the intellect or passions.* It is not uncommon to see persons plunged in profound meditations, remain insensible to all external impressions. "The "indefatigable hunter forgets every thing in

" the satisfaction of his passions, we see him " expose himself to the fierce North wind in " the depth of the rudest winter; plunge into " the icy marshes, impatient to surprise the " aquatic bird. He traverses the valley, wet " and cold; and penetrates the wood, rushing " among the thorns and briars, in pursuit of " the hare and roebuck, regardless of every " thing except the object he is endeavouring " to obtain."...." So likewise the fashionable " lady, lightly clad, as in the warm days of " summer, fully possessed with the desire of " pleasing, and the brilliant effect of her " finery, endures, without complaint or " thought, a temperature which, under other " circumstances of less powerful excitement, " would make her shiver."

Thus too, in the medical history of fleets and armies, we find that " during the fa- " tigues and suffering of a hot campaign, " or the active progress of warlike opera- " tions, the men are very little liable to " illness of any sort; as if the elation of hope, " and the other great passions with which " they are agitated, had the virtue to steel " the constitution against the most powerful " causes of disease. This circumstance, no " less wonderful than true, proudly proves

"the ethereal origin of our nature, and goes "far to assert the almost omnipotency of "*mind* over matter. No sooner, however, "does a great failure, and the dejection it "draws after it; a cessation of operations, "and a return to the '*vita mollis*' allow "the spirit of enterprise to flag, than the "previous fatigues and exposures begin to "tell upon the constitution, by their usual "result—diseases. Like a machine wound "up beyond its pitch, the excitement of ac- "cumulated motives once withdrawn, the "human frame rapidly runs down, and "yields with a facility almost as unex- "pected as its former resistance."* These truths are very remarkable—they are very important; they plainly evince the powerful influence which the mind has over the body; they point out to us an agent which should always be engaged on our side in the treatment of disease, and which we should more particularly interest in the treatment of all scrofulous diseases, where the mind, from prevailing opinions upon their origin and nature, is too often inclined to become desponding and distressed. This influence of

* Vide Johnson on Tropical Climates.

the mind over the body, will explain many extraordinary and almost miraculous cures, which, without acknowledging these powers of our intellectual nature, would be inexplicable; still they must never induce us to neglect the precautions of avoiding, as far as can possibly be done, every injurious impression upon the body, because they sometimes have the power of counteracting them.

EXERCISE is an important means of preserving the health, but it should always be proportioned to the strength of the individual, and in no case ought it to be so violent, or so long continued, as to occasion excessive fatigue.* There are many ways in which the body may be gently stimulated by exertion, such as walking—running—riding on horseback—gestation in a carriage—swinging—sailing, &c. by all which the organs are roused more or less to a certain degree of activity,

* It ought, however, when taken to prevent the development of constitutional diseases, as those which are to be apprehended in the scrofulous or tuberculous habit to be continued until the skin, or surface of the body, is sensibly bedewed with perspiration; or we use, perhaps, a more familiar expression, when we say that *a person should take his sweat regularly once in twenty-four hours.*

and the healthy secretions, especially those from the bowels and the skin, duly promoted. Exercise is beneficial likewise from the fresh invigorating air which circulates around persons at those times, and from the amusement afforded to the mind by change of scene, &c. The difference between walking —riding on horseback—running, &c., and exercise in a carriage—swinging, and sailing, is, that in the former instances a very considerable exertion is required from the muscles, and strong efforts are necessary, while in the latter, the requisite movements of the body are effected with little muscular labour, these, therefore, are adapted to the weak and delicate, those to the more strong and robust. Particular modes of exercise are indicated in particular complaints, of these we shall speak more fully when considering the diseases themselves. "I do not "allow the state of the weather to be urged "as an objection to the prosecution of "measures so essential to health, since it is "in the power of every one to protect them- "selves from cold by clothing, and the ex- "ercise may be taken in a chamber, with "the windows thrown open, by walking ac- "tively backwards and forwards, as sailors

" do on ship-board."* Now that I am upon the subject of those things which it is necessary to attend to, to preserve the health, I cannot omit quoting the next paragraph to that which I have just transcribed from Mr. Abernethy's Book, it is so just a picture that every one will perceive the advantage to be derived from an attention to it.—" I also " caution patients against sleeping too much; " waking from sleep indicates that the bodily " powers are refreshed; many persons upon " first waking feel alert and disposed to rise, " when upon taking a second sleep, they " become lethargic, can scarcely be awakened, " and feel oppressed, and indisposed to ex- " ertion for some time after they have risen."

Dress is very important as a preservative, against the influence of such an inconstant climate as ours, and it should not be so much neglected in this point of view as it is, particularly by the female sex. Rules, however, upon this head, although they may be conceived to have a beneficial tendency, are not often adhered to; in fact the use and objects of dress are better known than heeded; all I shall say, therefore upon this subject is,

* Abernethy on the Local Diseases.

that where the constitution is naturally delicate, and more especially where any symptoms of scrofula have been developed, flannel in winter, and stout calico in summer, should constantly be worn next the skin; the former is certainly the most preferable, and may, by a little use, be worn without inconvenience at all seasons of the year. It is a mistaken notion to imagine that this article of dress is of a warm nature in itself, and therefore not adapted for summer, or warm climates; it is, perhaps, as much worn within the tropics as in the colder regions, and is equally serviceable. Flannel is an excellent non-conductor of caloric, and upon this property all its virtues as an article of clothing depend. In Winter it confines the natural heat of the body, and thus protects it from the influence of external cold, dampness, &c.; while in Summer it greatly modifies the external heat of the rays of the sun, and by absorbing any excess in the perspirable fluid, will in a great degree prevent any sudden check to the salutary functions of the skin.

The Cold Bath is a very potent agent in rendering the organs vigorous and energetic, in restoring tone to the system, and fortifying it against all the injurious influences of

climate; for by the great, instantaneous, and general impression it produces, it renders the body for some time, insensible to all minor injurious agencies to which it may be exposed, while the glow and happy temperature which succeeds, may truly be said to preserve the system against any sudden atmospheric vicissitude; so that it holds an especial rank among those precautionary measures which should be adopted by persons disposed to scrofula, who wish to prevent the accession or recurrence of disease.

The cold bath however must always be employed under proper precautions, or it may prove productive of very great mischief, and in order to derive any benefit from its use, the more important organs of the body must be free from local disease, or congestion of any kind. It would not be of any utility to enter into speculations upon the manner in which the cold bath influences the living powers, as the enquiry is connected with some of those secret operations in the animal machine which still remain hidden in obscurity; without therefore pretending to determine in what way cold acts, when it depresses the vital powers, or how it operates

as a stimulant, I shall only observe, that in its application by means of the bath to invigorate the actions of the animal frame, our great object must always be to secure the latter effect, and to avoid by every means in our power the former; and if we cannot accomplish this indication, it behoves us to lay aside the cold bath as an injurious and very dangerous agent. The medical practitioner therefore, as well as every one who resorts to it, must bear in mind that its salutary effects do not proceed directly from the application of cold to the body, but from the vital reaction which succeeds; consequently we must always labour to secure, as far as possible, this rebounding, as it were, of the powers of the system, and to counteract any thing in the constitution which will interfere with it, for the more perfect this effect is, the greater will be the tonic efficacy produced by the bath. The various phenomena exhibited by the temporary application of cold upon different persons, is attributable entirely to the vigor or debility of these efforts in the system; and it often requires a nice discriminative judgment in observing them, to determine upon the propriety, or even safety of its repetition. There can be no fixed rule

laid down which shall be applicable to every case, for the good effect is only conditional; that is, it is only to be reaped where the body enjoys adequate vigor to ensure a due and sufficient reaction; bathing, therefore, if resorted to as a preventive to disease, must be conducted upon sound pathological principles to be successful.

Those who, after coming out of the cold bath, feel a sense of fulness or weight about the forehead, cold sensations creeping over various parts of the body, with shivering and flatulency; where the skin falls into a state of collapse, and the features especially become shrunk, accompanied with a sense of weariness; and those who lose all desire for food or exertion, should be extremely cautious how they repeat the experiment; it is fortunate, indeed, that where these effects follow, the person seldom feels desirous to repeat the attempt; this aversion may be justly regarded as a presentiment of the mischief likely to accrue from an imprudent perseverance. How often do we see boys during summer amusing themselves upon the bank of some river, or pond? and how different their feelings and actions with respect to the water: some plunging in and

out of it for half a day together, splashing about for an hour at a time; others enjoying one or two dips, and then hastening to dry themselves and dress; others again not to be prevailed upon to bathe at all: this difference of conduct certainly proceeds from a difference of feeling, which is, I think, in a great degree indicative of the effect which the practice produces; it emanates from a perception, which a judicious practitioner, when he meets with it, will always attend to, as being of considerable importance. And it affords a striking instance, if instances were wanting, to prove the truth and justness of the remarks of the great Hippocrates, who says, "Nature is sufficient for all things "in all animals; or it is to them instead of "all things. It knows of itself whatever is "necessary without being taught, or being "under the necessity to learn of any one."... "Nature rejects every thing superfluous and "hurtful; but it attracts, retains, and assi- "milates every thing good and useful."

The salutary effects of the cold bath are characterised by a feeling of comfort and pleasure, the head remaining light and clear, and the mind feeling invigorated and refreshed; while the reaction, or glow, by which

is to be understood the return of the blood to the surface, following close upon the immersion, renovates all the organs with fresh vigor. We cannot, with safety, recommend the adoption of cold bathing to a patient, without having first clearly made out in our own minds the absence of every contra indication; and the certainty, as far as any thing of this nature can be sure, of these salutary effects succeeding; which is to be attempted by a particular attention to the glandular system, the liver and spleen especially, also the stomach and bowels; it is necessary also to notice the state of the circulation, and whether there is a local determination to any organ. "If after due in-
"vestigation there appears to be no material
"disorder, then cold bathing may be re-
"sorted to under happy auspices; but, on
"the contrary, if there should be found a
"defect in the system, the necessary reme-
"dies must be had recourse to, ere a mea-
"sure, which may encrease mischief, or
"aggravate disturbance, be employed."

I think it highly advantageous to go into the warm bath at a temperature of about 95° Fahreneit, an evening or two preceding the use of cold bathing, in order that the

skin may be cleansed from every impurity and put into a proper state for the due performance of its functions; and persons should use every endeavour to fulfil this indication by being well rubbed, this will remove the exfoliating particles of the cuticle, clear the excretory pores from obstruction, gently stimulate the surface, and render the succeeding cold baths successful and efficacious. The proper temperature of which will be from 55° to 75° of Fahreneit's scale.

To those who are of a very weak habit, or upon whom I do not feel quite assured of good effects succeeding, or where by plunging into a large mass of cold water, the shock appears to prove too great for the powers of the system, instead of raising the temperature any higher, which is I think worse than useless, I recommend the following practice, which may be very advantageously and beneficially adopted, viz—to have one, two, or half a dozen earthenware jars, or small wooden buckets (holding each about a gallon) filled with water, which are to be emptied in quick succession over the person. In India this mode of bathing, as it may conveniently be repeated two or three times in the day, is very generally practised by Europeans, and

the rooms there are formed for the purpose, a pipe conducting off the superfluous water. In this country, a large tub may be placed in any suitable apartment, the patient standing in it, and emptying over himself one, two, or more of the jars, or buckets, according to his feelings. This mode is rendered peculiarly beneficial by the head and superior parts of the body receiving the first impression from the water, and advantageous from the power which the person thus has of conveniently modifying the intensity of the shock.

SECTION III.

ON SCROFULOUS DISEASE IN THE LYMPHATIC GLANDS.

We come now to consider some of those diseases which most commonly arise in those who have the scrofulous predisposition, to detail the peculiar symptoms and appearances by which they are characterized, and the plan of treatment best adapted for their removal or cure.

An indurated enlargement of the lymphatic glands, particularly those situated about the neck, is perhaps the most common diseased action in the scrofulous constitution, especially during the first twelve or fourteen years of life. These tumours may arise from the influence of any of the exciting causes, acting in conjunction with the internal predisposition, most frequently perhaps, either from the habitual use of an impure water, or exposure to wet and cold. The distinguishing characteristics of the true scrofulous enlargement, or swelling, of a lymphatic

gland are, its hardness, and almost total freedom from heat or pain, the gradual and sometimes very dark discolouration of the skin covering it; its slow progress towards suppuration, which is always imperfect or incomplete; the flaky or curdly nature of the contents of the abscess; the indolent and troublesome ulcer which often succeeds, and the ugly, puckered, irregular scar, which is ultimately left upon the parts. These, or some of them, in conjunction with other general appearances already noticed, which present themselves in strumous persons, must serve to guide us in our judgment and prognosis.

From these peculiar distinguishing marks of scrofulous action, there can be no doubt of its tardy, indolent, and chronic nature, yet with some practitioners, to explain every scrofulous disease by saying that it is nothing more than chronic or long continued inflammatory action in the parts, is, I conceive, only throwing a still greater obscurity over this difficult subject by a pretended explanation, instead of placing the matter in a new and clearer light; for whether we call the diseased action a chronic inflammation, a stagnation, or congestion in the vessels, an acidity, or a

poison in the fluids, we explain nothing of the cause of the disease, but only give a new and perhaps imaginary name to the unknown operations set up in the part; for we understand no more of what is passing in a chronic inflammation, than we do of what is going on in a scrofulously diseased gland; we comprehend as much by the one term as the other, for there is as much '*poison*,' I conceive, in chronic inflammation, as there is in scrofulous diseased action.

The observations which were made while upon the subject of the predisponent causes of scrofula, will sufficiently explain why I shall dismiss any speculations upon this subject, and confine myself entirely to the appearances and character of the disorder, and to the means best adapted to remove it, without enquiring into the nature of the change which has taken place, or in what the particular diseased action consists, especially as it would not expedite or improve the means of cure.

The *treatment* of all scrofulous diseases must be both of a general and local nature: the leading indications in the former case will always be the same, viz. to avoid as far as can be done, all the exciting causes;

to exhibit such medicines as tend to invigorate the constitution, and keep all the functions of the body in a proper state; and to combat accidental indications; those of the latter will of course vary with the state and situation of the disease.

In detailing the local treatment of a scrofulous lymphatic gland, it will be useful to notice the different stages of the complaint, and to shew *first*, the measures applicable to the swelled and indurated period; *secondly*, those to be adopted when suppuration has taken place, or cannot be avoided; and *thirdly*, the treatment best calculated to heal the confirmed scrofulous ulcer, and to amend that state of the constitution which appears to favour and promote its continuance.

In referring to the practice adopted by surgeons during the former of these periods, we find that it has varied according to the notions which they have entertained of the cause; those who imagined that the disease depended upon some acrid humour, or poison, have generally deprecated all attempts to resolve or disperse the swelling, affirming that a virus, possessed of such powers of deranging the functions of any part with which it came in contact, could not be re-

pelled and driven in upon the constitution, without manifest injury; while others who have entertained a different opinion of the nature of scrofula, have used every endeavour to remove it, and prevent suppuration, at the same time guarding the constitution against any injurious effect by appropriate internal prophylactics. From a due consideration of the subject, and in accordance with my experience, I think the latter to be the most judicious practice, when adopted with those necessary precautions which an experienced and intelligent practitioner will always observe, for the arguments against any specific humour or poison greatly preponderate over those to the contrary.

When, therefore, swelling and induration occur in any of the superficial lymphatic glands, the surgeon should immediately determine upon adopting local measures, calculated to dissipate them, using in conjunction, those internal medicines indicated by the constitution and habit of his patient. While the tumour, by any actual increase, or tendency to enlarge, appears to possess some degree of activity, our endeavours must be directed to calm and allay it; this will be best accomplished by the frequent topical

application of leeches and the assiduous use of cold lotions; six, eight, or more of the former may be applied at the same time, according to the magnitude of the swelling, and repeated every two or three days, keeping rags, wetted with some mild wash, constantly upon the part in the intervening periods; and in this stage of the complaint, where the beneficial effects of cold only are required, simple cold water is, I believe, as effectual as any other application. The constant and continued use of cooling washes, is useful by diminishing the swelling and restoring a healthy action to all the affected parts, for the agency of cold is, when long continued, not confined merely to the superficial portions alone, but it extends to those diseased beneath the surface; These means, with the exhibition of the Hydr: c̄ Cretâ or Calomel, with Pulv: Rhdi: at night, and the occasional use of an active saline cathartic in the morning, with some light tonic, during the day, will sometimes be all that is required.

In many cases where the disease gets well by these simple means, it will be difficult for the practitioner to say decidedly whether the swelling has been in any degree of a scrofulous nature, nor is it of much

consequence, if he cures the disorder. Where any suspicion attaches, however, and indeed in every case, the patient should persevere in some alterative stomachic plan for some time, which, with good moderate diet, attention to dress, and a proper degree of exercise, with the use of the cold bath, (where it is not contraindicated,) will generally prevent a recurrence, even in those where it is most to be feared.

If, however, the disposition to enlarge only, has been abated by these means, and the tumour still remains stationary and indolent, then a more stimulating practice must be had recourse to for its discussion. The lotions may now be made with the Zinci Sulphas, or the Plumbi: Super: Acet: in the proportions of a drachm, or a drachm and a half to the pint. Friction, with a liniment composed of a little mercurial ointment, with the compound soap or camphor liniment; or, indeed, any sufficiently stimulating application of the like nature, will, in this state of the gland, often be found very useful. Electric sparks may sometimes be advantageous. If these measures are insufficient, and the swelling continues indolent, stationary, and without pain, the Iodine

ointment may be tried.—I have sometimes found it extremely useful, by producing a tendency to absorption; a blister will also often prove serviceable in the same way; lastly, a seton, when it can be advantageously placed, will occasionally succeed, when the foregoing means have been insufficient.

In conjunction with these local measures, the requisite attention must be paid to the general health, which may generally be improved by mild tonics, aperients, good diet, exercise, and sometimes, while the tumour is in this indolent state, Cold Bathing. Should the swelling shew any signs of an increase of heat, or tendency to enlarge, the leeches and cold water must again be had recourse to; and, perhaps, it may be necessary to recur from the one plan of treatment to the other more than once, which will teach us, that patience and perseverance are very requisite, both in the practitioner and in the patient, during the cure of these long continued and troublesome complaints.

If, in defiance of these measures, the tumour continues to enlarge, and becomes painful, with some degree of vivid redness in the skin, they are to be abandoned, and

the natural indication promoted by poultices, fomentations, and other warm emollient applications.

These appearances are not to discourage us, they are rather favourable than otherwise, for, generally speaking, those tumours which display this activity, are sooner ultimately got rid of, appearing to be less influenced by any strongly marked scrofulous action, than those which are more indolent.

" The swelling must now be frequently ex-
" amined, and as soon as suppuration has so
" far advanced that fluctuation is distinguish-
" able, although the base of the tumour may
" still be hard and indurated, it is better to
" open it, and allow the contents to be dis-
" charged, than to permit the thinning pro-
" cess to go so far as to destroy the chance of
" union between the divided parieties, and
" thus promote a tendency to slough, and con-
" sequently the formation of a large unsightly
" scar. At the boundary where the hardness
" terminates and the softness begins, there-
" fore, the tumour is to be opened, by pushing
" the blade of a small spear-pointed lancet
" through the parieties of the abscess, so that
" its point may reach the centre of it. The

" lancet is then to be withdrawn, the whole of " the matter evacuated, and the skin to be " firmly pressed on in all directions, that none " may remain. The lips of the orifice are then " to be adjusted with minute accuracy, and are " to be kept in exact apposition by two nar- " row slips of simple adhesive plaister, over " which two or three others may be placed, at " nearly right angles, the whole to be sup- " ported by a compress, if necessary, and " appropriate bandages, which are to be kept " continually wetted with cold washes." A saline aperient draught may be exhibited, in most cases, the following morning, after which, the body must be supported with a good diet, pure water, and tonics.

" At the end of a day or two, the dressings " are to be removed, any more matter that " may have collected is to be squeezed out, " and the parts treated as before." " In dis- " charging the contents of these abscesses, " it will sometimes happen, that the orifice " will be choked with coagula or flakes, so " frequently met with in them; instead of " enlarging the opening to give vent to these " substances, or thrusting them back with a " probe, it is better to seize them, and draw " them out; for this purpose, the small for-

" ceps used by oculists, is a very convenient " instrument."*

The cavity of the abscess may now diminish, the opening heal, and the parts return to their natural state in the course of a few days, or it may continue to discharge for a considerable time a tolerably healthy matter, during which period the same measures are to be pursued, dressing the sore every day or two, and keeping the parts constantly wetted in the intervals; and the edges of the orifice still looking well, it ultimately heals, without any more unfavourable symptoms.

If instead of these favourable terminations, the disease assumes an inveterate disposition to remain stationary, or displays any tendency to slough, while the neighbouring parts become thickened and discoloured, and the orifice made by the surgeon, or the opening established by nature, instead of closing, continues open, and displays an indolent ill-conditioned ulcer beneath, then we can have no doubt of the nature of the diseased action, and the difficulty we have to contend with: still when

* Dr. Henning on Scrofula.

these unpleasant occurrences happen, we are better off by having made an opening into the abscess ourselves, for although we have not been able to counteract, or check the scrofulous action, yet the sloughing process will be more confined than it would have been if left entirely to nature.

The Scrofulous Ulcer thus formed by the degeneration of a scrofulous abscess in a lymphatic gland, is in many respects different from that which occurs in other parts of the body. The former is characterized by its seat and origin, by the thin, loose, overlapping and unhealthy integument, which forms the walls of the abscess, and by the sinuous openings which generally form after a little time, in consequence of the deep-seatedness of some of the diseased parts, and the contraction and consolidation of the surrounding parieties. The patient under these circumstances often feels but little inconvenience, the discharge frequently after a long time, and independent of any remedies, becomes less and less; that which does exude by the evaporation of the more watery parts, forms a scab, which will adhere for a length of time, the discharge sometimes oozing out in small quantities from beneath it, but ultimately

the ulcer and sinuses heal, leaving a large, pale, shrivelled, ugly scar upon the part.

The other kinds of scrofulous ulcer are generally independent of any glandular structure (and arise not from an abscess, but from other causes, as injuries, &c.); they are more exposed and more superficial than the former, so that the whole of the diseased parts may be seen. The surface of these ulcers has generally a very unhealthy appearance; the granulations are either pale, inactive, or dark-coloured; or there may be no attempt at this process at all in the sore; the discharge is often thin and flaky, or bloody and sanious; the margins of the diseased parts, in some measure, over-lap or lie loose upon the ulcer, as in the former cases, but in a much less degree. The pain may sometimes be considerable, and the effect upon the constitution at large often proportionably encreased. If there are any sinuses in, or connected with these sores, they generally communicate with some diseased subjacent bone.

The local remedies applied to these scrofulous sores will vary, of course, in both kinds, according to the state or condition which they happen to be in; for although scrofulous action

is generally considered to be of a specific and determinate nature; yet those who expect to cure scrofulous ulcers by any specific application or remedy, will very soon discover themselves to be mistaken: this state, therefore, it is important to discover.

A scrofulous ulcer may be either indolent or irritable, and its treatment undergoes important modifications, according to the degree in which it partakes, either of the one or the other of these conditions, which generally depend upon the reciprocal sympathies, occurring between the habit, or constitution, and the sore. But it is often difficult to detect the state or condition of a scrofulous ulcer, because minute differences are not easily observed, or if noticed, are not happily embodied in language.

Sometimes indeed, we cannot determine whether an ulcer is irritable or not, by its external characters, for they are all so liable to variation, that no dependance can be placed in them, this therefore, is sometimes nay frequently not to be learnt, until by the application of one or two dressings its habits are determined; we must in such cases then endeavour to judge of the disposition of the ulcer, more by the habit of the patient

altogether, than by looking at the local disease. Nevertheless, the following appearances, will often serve to guide us in our judgment.

In the *irritable scrofulous ulcer* the granulations generally appear glossy, and red streaks are observed passing over them, which bleed upon the slightest touch; the margin or boundaries of the sore are ragged and uneven, there is sometimes a fiery surface, which denotes great irritability; the discharge is entirely composed of a thin humour, which is often highly reflective, producing a glassy or even metallic appearance, and the pain frequently comes on in paroxysms.

An indolent scrofulous ulcer neither spreads nor fills up, but presents for a long time the same unvaried, dingy, unhealthy appearance, and when any granulations do arise, they are either tawny and dwarfish, or large, pale and soft, a film of mucous extending frequently from one point of granulation to another, which adheres so firmly, as not to be easily removed; the discharge consists of an imperfect kind of pus, which is flaky or curdly; the granulations, when any have grown, often die or sink away, being removed frequently without any very evident cause; the

bottom of the ulcer, when this happens, puts on a sloughy appearance. This kind of ulcer is always benefited by stimulating applications. In those scrofulous sores in which these two characters are as it were combined, we do not observe any attempt at healthy granulation, and yet the sore is so irritable as not to bear any application in the least approaching to a stimulus, so that the vessels seem too weak to make any attempt at reparation, while the irritable state of the nerves of the part preclude the employment of stimulating remedies.

To enumerate the different articles which have been tried and recommended for the cure of scrofulous ulcers, as external applications, would furnish a list of more than half the substances in the Materia Medica, and in the end answer no very useful purpose. They may all, I conceive, be arranged under the four following heads: *emollient*—*emollient-anodyne*—*stimulant*—*and stimulant-anodyne*; (*i. e.* stimulant to the vessels, anodyne to the nerves). Those applications which have the two former qualities, are indicated chiefly in irritable sores; such as have the two latter, in those which are indolent; ulcers combining the two conditions,

or those in which the vessels seem to be very indolent and the nerves very irritable, will require a varied treatment, which may have possessed at one period or another all the above qualities. Bearing these leading indications in mind, the surgeon need never to be at a loss for articles to fulfil them. I shall here enumerate some of the most important:—

Ulcers which are irritable, are to have this state removed by poultices, anodyne fomentations, and washes. Poultices are extremely useful for this purpose, and for promoting the growth of granulations; they favour also the separation of parts disposed to slough, and encourage a healthy discharge. Poultices may often be continued for a long time, appearing to agree better than any other application; they may be made with bread and water; linseed meal; the root of the Dancus Carota, or garden carrot; or the leaves of the Conium Maculatum; according to the circumstances of the case. The anodyne fomentations, which under particular circumstances are preferable to poultices, are made with hemlock, (*Conium Maculatum*) opium or poppy heads, &c. In short, the irritability of the ulcer is to be allayed by

emollient and emollient-anodyne applications, in that form, and of that strength, which best fulfils all the indications, and agrees best with the sore, aided by the exhibition of appropriate internal medicines, before any successful attempt can be made to heal it. Poultices made with bread and water, are not only beneficial in irritable sores but they are extremely useful in those which are indolent. When an indolent scrofulous ulcer, which has existed a long time, is dressed with them, the granulations will frequently spring up and fill the sore, but they are generally large and unhealthy. Should the poultice now be discontinued, and some proper stimulating application used, they will after a little time become more compact, redder, and free from any flabby appearance, when this has happened the practice recommended by Mr. Baynton may be adopted with the best advantage.

Ointments are generally made the vehicles for stimulating substances, but the unctuous matter with which they are composed, often appears to counteract, in a great measure, the benefit derived from the other ingredients; when this is the case, the stimulus must be applied in another form. The sub-

stances of this class, which we have at our command, and which have been found very useful at different periods for changing the ill condition of an indolent scrofulous ulcer, and promoting healthy granulations, and the combinations of them, which have been used by different practitioners, are extremely various; many are best applied in the form of a lotion, or wash, as the metallic salts, the acids, and resinous tinctures, as Tinct. Myrrh, &c.; others may be sprinkled upon the ulcer in the form of powder, as the mercurial precipitates, metallic oxides, &c. And as soon as the parts are by these means brought into a healthy condition, bandages and rollers are to be firmly and neatly applied. Scrofulous sinuses, not connected with any diseased bone, will generally heal by the use of stimulating injections and pressure, aided by constitutional treatment. If not, they must be traced out, depending openings made, and some of them, perhaps, laid open.

In every case, the limb, or the diseased parts, may be kept continually wetted with *cold water*, particularly where there is any degree of heat and redness in the neighbourhood.

There is something remarkable in the good effects produced by cold water upon ill-conditioned and irritable scrofulous sores, and the cures which the Malvern water is reported to have accomplished when externally applied to them, are very extraordinary. In Dr. Wall's collection of these cases, there are many instances detailed, where "several sinuous ulcers,"...."scorbutic "ulcers of long standing,"...."sores of the legs "of sixteen years standing,"...." scrofulous "swellings and ulcers of the neck,"...."a putrid "ulcer which was black, foul, and extremely "fœtid,"...." phagedenic, or eating ulcers," ...."deep scrofulous sores,"...."fistulous ul-"cers," and many others of a similar description, which were cured by constantly and intermittingly keeping the diseased parts wetted with the water, and at the same time using it internally. But the mode in which patients are reported to have "lain "every night with their limbs wrapped up "in linen, wet with the Malvern water, and "yet never received any cold from it,"...."of "a boy who continued at the well three "months, (1756) and was constantly kept "wet over his whole body all the time, and "went home after that cured of his dis-

"ease, a leprosy from birth;"... "of a man "from Cripplegate, near Worcester, who "often dipped his shirt in the water, and "put it on wet, without receiving any cold; "on the contrary, got quite well of his dis-"ease,"...."of a woman from Droitwich, "who was cured of a leprosy, in 1757, by "drinking and bathing in the water, and "dressing upon her wet linen," and Dr. Wall's own report, that "those who bathe "for cutaneous foulnesses, *usually* go into "the water with their linen on, and dress "upon it wet,"—are indeed singular and extraordinary instances of a practice, which, I should think, very few would much like to recommend or adopt. "This method, odd "as it is," says the doctor, "has never yet, "as I have heard, been attended with any ill "consequences, though I have known it "used by several very tender persons."

Whether the Malvern water has any particular and peculiar virtue, as an external application to scrofulous, and other ill-conditioned sores, I can hardly determine: I should think not; these cases, therefore, which are reported, with a great many more, from the actual observations and enquiries of the late Dr. Wall, of Worcester, serve to

point out to us what may reasonably be expected from a similar practice pursued with any other water; and the use of cold thus applied, I have in many instances found highly advantageous; upon what principle it acts I do not pretend to determine, for it is very serviceable even in those ulcers and sinuses where the preternatural heat is not great; if I may be allowed to offer a conjecture, I should say that it appears to stimulate and strengthen the diseased vessels of the ulcer, and to allay the morbid irritability of the nerves. Persons using the water at Malvern, have the advantage of, perhaps, the purest and most invigorating air in the kingdom, which contributes in a great degree, no doubt, towards the establishment of a healthy condition, by improving the tone of the constitution. Thus, perhaps, it may have appeared to many who have overlooked this powerful adjuvant, that the water there possesses a very superior efficacy even as a local application.

Having thus detailed the appearances, symptoms, and consequences of scrofulous diseased action in the lymphatic glands, and the external applications best adapted to alleviate and cure them, we come now to

advert to those medicines which must be exhibited internally, in order that while we are endeavouring by local treatment to dispel, or remove the external tangible affection, the internal constitutional power may be improved, and rendered capable of co-operating with, and assisting our attempts, without which, we shall find that our other measures are weak and inefficient.

We might expect, that as the internal conformation or arrangement of the body, or that original or hereditary formation in the constitution, which constitutes the scrofulous habit, and which is the cause whence the peculiarity attendant on scrofulous diseases springs, is entirely unknown, so the foundation upon which remedies are administered to alter or amend it, must be extremely unstable; for medicines being only *instruments* for removing bodily infirmity, it is manifest that unless the parts affected can be discovered, it must be difficult to discern what kind of instruments are to be employed for remedying them. I have before noticed the strange and discordant opinions which have been entertained concerning the scrofulous peculiarity, and I shall now enumerate some of the various remedies which have

been recommended to remove, counteract, or alter it. Calomel, with preparations of antimony and opium; guaiacum, sarsaparilla, mezereon, and sassafras; muriate of lime, muriate of barytes, and medicines of the narcotic kind, particularly hemlock; the juice of the tussilago, or coltsfoot; burnt sponge and lime water; the alkalies, potass, soda and ammonia; the vegetable tonics, cinchona, cascarilla, gentian, myrrh, &c.—Mineral tonics, the sulphuric and nitric acids, the various preparations of iron, and even arsenic, with many others, have all been tried and praised for their efficacy in curing scrofulous diseases. If we examine into the effects produced by this apparently discordant list of medicinal agents, we shall find that they may all be arranged into Tonics, or such as strengthen and give tone to the system:—Anodynes, or those which allay morbid irritability:—and Eccoprotics, medicines which act as gentle purgatives. It is true, some remedies have been extolled which cannot, perhaps, be considered as coming under either of the above heads, but most, or all of these, are of very doubtful efficacy, such as the muriates of lime and barytes, &c. No very accurate discrimi-

nation, however, has been made of the particular conditions in which remedies from one class are more desirable than those of another.

In attempting to form a criterion by which the constitutional treatment is to be regulated, or by which we may be enabled to make a judicious selection from the various medicines offered to our notice, the condition of the local disease, especially in these scrofulous complaints of the lymphatic glands, I have found the most useful and important. This condition we have seen may be either irritable or indolent, so I imagine the constitution may be considered as being weak where the local disease is indolent, and irritable where that is irritable. In the former case, the constitution, together with the local disorder, will be greatly improved by medicines from the tonic class, as bark, steel, the mineral acids, and iodine, with all the vegetable bitters; in the latter, the constitutional treatment will be more successfully pursued with medicines of the narcotic order, or such as are adapted to allay morbid irritability, conjoined with the tonic plan—such as preparations of the conium and tussilago; the sulphureous mineral waters, the

alkalies, hepatized ammonia, the sarsaparilla decoction, &c. Calomel, all the milder preparations of mercury, rhubarb, and other eccoprotics, may be given advantageously in every form of scrofulous disease, to keep the bowels moderately and gently moved, and to preserve the secretions of the chylopoietic viscera in a proper and healthy state.

The mercurial preparations will be found to have a more beneficial effect where the local disease is indolent, than where it is in an irritable state; in the latter cases, therefore, they must be exhibited with a sparing hand, while in the former they may be frequently given, carefully avoiding purging or salivation.

But whatever may be the articles with which the constitutional treatment is conducted, the strictest attention is requisite to avoid all the exciting causes, to take advantage of every thing capable of counteracting them, and to adopt every measure conducive to the re-establishment of the functions of health.

SECTION IV.

ON SCROFULOUS DISEASE IN THE MESENTERIC GLANDS.

We have now to treat of a disease much more prejudicial to life than that which has just been dismissed, a disease not always characterized by any local external appearance, but chiefly confined to the hidden recesses of the interior of the body; and the symptoms of which I shall proceed to detail, and point out the measures best calculated to remove it.

The scrofulous (or tuberculous?) mesenteric disease, has by different nosologists been arranged under various appellations, derived either from the organs most implicated, or from some obvious and constant symptom, such as Hectica tabes, Tabes scrofulosa, Tabes mesenterica, &c.

The mesenteric glands are, no doubt, liable to different kinds of disorder, and as the same symptoms frequently accompany very different complaints, it is important we should

possess some discriminative characteristics, which may serve to direct our diagnosis. In the first place, then, the existence of any number of those marks of peculiarity generally observed to accompany the scrofulous predisposition, will excite strong suspicions of the scrofulous (or tuberculous?) influence: as a delicacy of the habit—a fine and soft skin—dilated pupils—very red lips, which strongly contrast with the whiteness of the adjacent integument; a dejection of the upper eyelids, with very long eye-lashes, &c.* If any disease partaking of the scrofulous character has previously shewn itself, or if enlargement and induration of any of the lymphatic glands should be present at the same time, with the symptoms which are presently to be enumerated, as is indeed frequently the case, then there can

* These appearances, as will be more particularly noticed hereafter, are, I conceive, indicative of the tubercular diathesis, they are generally, however, stated to be marks of the existence of scrofula. If the tuberculous and the scrofulous constitution be the same, no discrimination can of course be required, or made between them, and the terms may be used synonymously. If they are different, the diseases occurring have very often been confounded together. We shall revert again to this topic presently.

be but little difficulty experienced in determining upon the nature of the affection.

The scrofulous mesenteric disease *always* occurs *before* the age of puberty, *generally much earlier* than that period.* The symptoms of disorder in the functions of the body, arising from this complaint, develope themselves so extremely slowly, that the practitioner is too often not consulted until the diseased action has made considerable and formidable advances, or even not until some degree of disorganization has taken place; it is therefore important, that the very first deviations from healthy action in any of the abdominal viscera of children should be observed and attended to. The first indications of this disease generally consist in a gradual enlargement or inflation, as it were, of the abdomen, while the rest of the body slowly emaciates; the countenance becomes whitened and shrunk, so that the eyes appear large, and the nose long and sharp; the appetite is very variable, and the child always seems languid and dull. The alvine evacu-

* Dr. M. Hall, in his Treatise upon the Mimoses, has detailed the symptoms of a strumous affection of the mesentery in *adults*. I am not aware of having seen the complaint to which he alludes.

ations, which should at this time be especially observed, will be found unhealthy, being pale, loose, and frothy, often rising up very soon after being evacuated to twice the bulk they were when first discharged, owing to a working or fermentation taking place in them. These symptoms, however, are frequently overlooked, or not noticed until, by a gradual accumulation, and the advance of some degree of pain, they claim attention, and the child is supposed to have worms.

At a more advanced period, when the medical practitioner is, perhaps, for the first time consulted, the debility has much encreased, so that any slight exertion of the body produces a sense of exhaustion and fatigue, although the mind may retain a great deal of activity; the countenance, and indeed the whole skin, is now remarkably white; the loss of flesh is considerable, while the belly still remains tumid, and is painful under pressure; the appetite is often variable, the food generally being loathed; the evacuations from the bowels are white, clay-coloured, or greenish, and very offensive; the sleep is generally not interrupted, but it is not followed by a feeling of refreshment, on the contrary, the langour is en-

creased for some time after; the febrile symptoms are not often very urgent; the tongue has occasionally, however, a white, sometimes streaked coating, indicative of considerable abdominal irritation.

As the disease advances, all these symptoms become more urgent; the restlessness, irritability, emaciation, and weakness encrease; the pulse becomes rapid, but without any wandering in the intellect; and the child, at last, sinks in a slow and gradual manner, unless the timely exhibition of remedies has been had recourse to.

"In the treatment of this disease, it is "necessary that the most rigid attention be "paid not only to the medical management, "but also to the dietetic;"...." and any plan "which would seem to hold forth the pos- "sibility of ultimate success, should com- "mence at an early period of the disorder."

The indications which are to direct the exhibition of remedies in this complaint, will be very similar to those mentioned in the foregoing, viz. to allay local irritation; to restore, as far as possible, a healthy action in the diseased parts; to strengthen the constitution, and sedulously to avoid every thing that may, in any way, tend to aggravate the disorder.

To accomplish these, let us consider the peculiarity of the mesenteric glands, arising from their situation and office.

We have already observed, that these bodies are placed at the very portals of the entrance, by which those matters that go to repair the waste of the body enter the circulation, and that all those things which act upon the system through the circulating fluid, must previously pass through them. They are, in fact, the first of the complex organized bodies which the fluid chyle, separated from the food by digestion, meets with; and are, therefore, peculiarly liable to be affected by any unhealthy quality in it. The diet, therefore, which furnishes the chyle, should be particularly attended to, whenever these glands are implicated in disease; for if it should be eliminated from any thing improperly digested, it will greatly aggravate the existing disorder. Something has been said before upon the importance of a strict attention to the digestion, food, and drink of scrofulously disposed children; this must now again be enforced with some further remarks. The food, during the continuance of this disease, and even for some time subsequent, should consist chiefly of

the farinaceous vegetable substances, with milk, such as arrow root, gruels, &c. taking but sparingly of animal food, and then choosing those kinds which agree best with the child's stomach, and are the easiest to be assimilated, avoiding fat, rich gravies, or any thing likely to vitiate the chyle; good and tender mutton well cooked, will be found to agree as often as any other. The meals should be more frequent than usual, and the food taken in smaller quantities at a time. Rich pastry, and fruits, of every description, are to be avoided, excepting, perhaps, ripe oranges.

With respect to drink, all spirituous and fermented liquors are to be avoided, substituting milk and water, toast and water, balm tea, or any other light infusion of the *aromatic didynamous plants;* and it is requisite to be particularly careful that the water is as pure as possible.

The lacteal vessels traversing the mesenteric glands very soon after their egress from the coats of the intestine, it is reasonable to suppose, that medicinal substances passing in them, frequently exert a local action, as it were, upon these parts; that is, they produce an effect prior to, or independent of

their entrance into the circulation; remedies, therefore, which are beneficial in the scrofulous mesenteric disease, may be divided into those which develope their efficacy locally, while passing in the lacteals, and those which exert their effect generally, or upon the system at large, by means of the arterial circulation. The preparations of mercury, given, as they ought to be, without inducing any specific action in the constitution, act, I conceive, principally, if not entirely, in the former way, by means of the lacteals; and the bitter aperients, by clearing the bowels of acrid and unhealthy secretions, improve the quality of the chyle, and are consequently beneficial in the same way. The preparations of iron operate through the medium both of the lacteals and the arteries; the other tonic remedies do good by strengthening the system at large. The milder mercurial preparations, such as the grey oxide and calomel, may be exhibited in appropriate doses, according to the age of the patient, and the state of the evacuations, every or every other night, carefully guarding against the full effects of the remedy. The latter may be often advan-

tageously given in conjunction with the extract of conium.

Aloes, either in decoction or tincture, administered during the day, with some light tonic infusion, will be found extremely useful in correcting the secretions from the bowels, giving a gentle stimulus to the whole alimentary canal, and improving the assimilative process. This medicine may, in many instances, be conjoined with the Tinct: Ferri Muriatis, in the dose of from four to eight or ten drops, with advantage, where much febrile heat is not present, the pulse not quick, and the patient not in an irritable state. The local or abdominal irritation, will be often removed by these means, disappearing gradually as an improvement takes place in the other symptoms; where, however, it forms a prominent and troublesome feature in the complaint, the abdomen must be rubbed two or three times in the course of twenty-four hours with some moderately stimulating embrocation, which may frequently be made to contain a drachm or more of the Ung: Hydr: Fort: with advantage, the parts afterwards being protected against any vicissitude of tempera-

ture by an extra covering of flannel. The warm bath will occasionally be found an useful adjuvant; a pure air, and moderate exercise, are indispensable. The particular, and often minute circumstances which sometimes arise in this complaint, and require a modification of the treatment, must be left to the judgment and experience of the practitioner. We have noticed the most important and the most constant indications, and the means most likely to accomplish them.

If the body is examined after death from this disease, the mesenteric glands will be found in a very unhealthy condition, many being enlarged, hardened, and more or less changed into tuberculous matter, some being entirely dissolved into a curdly or flaky humour, generally considered to be characteristic of scrofulous action. The other abdominal viscera, as the liver, the spleen, pancreas, and intestinal canal, are mostly discovered to be in a less or greater degree implicated, as might indeed be anticipated from the attendant symptoms, and the appearances of the alvine evacuations; tuberculous matter in its several states, being often found deposited in their textures.

From the frequent appearance of Tubercles in persons considered to be of a scrofulous habit, a question has arisen whether the existence of this foreign and insulated matter, in the different structures of the body, does not constitute the scrofulous peculiarity? and, therefore, whether scrofulous and tuberculous diseases have not the same origin; or, in other words, whether scrofulous affections are not the effect of the tubercular degeneracy? "The glands of scrofulous "persons are often enough obstructed. The "obstruction has happened on a sudden, or "insensibly. When it has occurred sud- "denly, it may disappear very readily, or "remain a long time. If an accidental "cause destroys a scrofulous person, whose "glands are thus obstructed, we commonly "find that those which have enlarged slowly, "are transformed in their whole extent, or "at least partially, into tuberculous matter. "Those which have encreased rapidly, are "sometimes white, and sometimes reddish "internally; but one does not observe in "them, at any time, the least indication of "tubercular degeneracy. Manifest traces "of it, on the contrary, are observed in those "which have exhibited, during some time, a

" slight intumescence, to which a much more
" considerable obstruction has at length
" succeeded. If tubercular glands suppurate,
" this suppuration is of very long duration.
" All the tuberculous matter must be ex-
" pelled, in order that the part of the gland
" which was only tumefied, may insensibly
" return to its natural state. In this case
" also, the cure of the ulceration, which has
" succeeded to the abscess, is always very
" slow. On the contrary, if an abscess oc-
" curs in glands which do not contain a tu-
" bercular kernel, the exit of the pus is
" commonly easy, and the cure pretty quick;
" the gland tumefied by inflammation, after-
" wards easily subsides.

" When a gland shews itself under the
" chin, in those who have a carious and
" frequently painful tooth, the swelling of
" this gland may last many years. If the
" tooth is extracted, the gland insensibly
" diminishes, and the obstruction is com-
" pletely resolved. If the individual is
" destroyed by an acute disease whilst this
" gland is obstructed, no trace of tubercular
" affection in the gland is found after death;
" its volume alone is augmented, and its tis-
" sue slightly reddened. The same results

" take place in many other circumstances,
" and in particular when the axillary glands
" are examined after being long tumefied by
" the effect of a blister on the inside of the
" arm. These facts, and many other analo-
" gous ones that we might call to mind,
" prove, in an incontestible manner, that
" every chronic inflammation is not sufficient
" to render a gland tubercular.

" It happens often enough, that the cer-
" vical glands swell in scrofulous persons
" whilst they are very young; some suppu-
" rate; the enlargement of others disappear
" altogether with time; but in certain in-
" dividuals, some of these tumid glands re-
" main voluminous, hard, and indolent,
" during life. In examining these glands
" after the death of the subjects, who some-
" times attain a great age, they are found
" always transformed entirely, or in part,
" into tuberculous matter. It seems that, in
" this case, the glands have remained station-
" ary, like what one observes in some wens
" which arise under the hairy scalp."

" These observations prove, that tubercu-
" lar degeneracy is a chronic disease; that
" it is of a peculiar nature; and that it ought
" not to be regarded as the consequence of

" any inflammation whatsoever, either of the
" glandular or the lymphatic system.

" The tubercular affection is very probably
" of a scrofulous nature, as M. Portal seems
" to me to have proved, in his Treatise on
" Phthisis Pulmonalis. Some other authors
" also are of the same opinion. Besides, the
" scrofulous taint is a particular affection,
" which is not the effect of any inflammatory
" state, not even chronic; and this degene-
" racy does not shew itself in those who are
" not scrofulous, even when they are af-
" fected with a phlegmasy, either acute or
" chronic."*

It is true—that tubercles are very commonly found in persons supposed or known to be of a scrofulous habit—that those who have had scrofulous induration, and enlargement of the external lymphatic glands, at an early period of life, do very often, at a more advanced age, die of tubercular phthisis—that scrofulous disease of the lymphatic glands, and a tuberculated state of the mesenteric glands, frequently exist together at the same time in the same person—and that

* Bayle on Phthisis, by Barrow, p.p. 69, &c. &c.—Consult also Barron on Tubercles.

tubercles sometimes degenerate into a flaky matter, exactly similar to that which has been stated to be characteristic of the scrofulous action. These considerations would lead us to coincide with the opinion that Scrofulous Diseases originate from Tubercular Degeneracy, yet the great dissimilarity observable between the soft and delicate complexion—the generally beautiful features—the transparent healthy looking skin—the long eye-lashes—dilated pupils—and frequently brilliant intellect, which I consider indicative of the purely tubercular diathesis; and the thick unsightly lips—the reddened excoriated eye-lids—the matted ciliæ—unhealthy countenance—ill-formed, and often loaded teeth—which accompany the truly scrofulous habit, appears to point out a considerable difference between these two states. However, whether tubercles are to be considered as constituting the predisposing cause of scrofulous disease or not; remains yet undetermined, *still for the purposes of practical utility*, I am sure that scrofulous and tuberculous diseases may be *considered* as having the same origin, for—they are found co-existent—they mutually influence each other—and require the same plans of treatment—

these reasons, which have induced me to comprise a tuberculated condition of the mesenteric glands among the diseases of Scrofula, will influence me to admit, also, disorder and irritation in the pulmonary organs, arising from tubercles under the same head—irritations which too often terminate in incurable phthisis.

SECTION V.

ON TUBERCULAR IRRITATION AND PHTHISIS.

THOSE peculiar masses, so often found in the lungs, and denominated tubercles, are formed of a homogenous substance, of a white or whitish yellow colour, generally of a cheesy consistence, and apparently made up of a multitude of small granules in the manner of a mealy potatoe. These masses are very variable in size, and are frequently found clustered together, affording the appearance of a large tuberculated mass. Some tubercles are evidently enveloped in a cyst, or membrane, which is interposed between them and the substance of the lungs; others do not present so clearly the appearance of any distinct sac, but seem adhering to the parenchyme of the organ in which they are embedded. Bayle observes, that these last are ordinarily marked with black lines, and he also states that both kinds of tubercles are penetrated by capillary blood-vessels.

The opinions which have been advanced by different members of the profession respecting these bodies, are extremely various; Hippocrates attributed their formation to the putrefaction of phlegm or of bile, and Dr. Reid imagined that they consist in an obstruction of the exhalent vessels, caused by the viscidity of their contents. Some medical writers have considered tubercles to be scrofulous glands—others, not scrofulous glands, but analogous to them—while others again have thought them to be independent bodies of an hydatoid nature. Those who affirm that tubercles are of a similar nature, if not identical with hydatids, remark, that in their original condition they are always of a soft or fluid consistence, and that they afterwards agglutinate and harden. But whatever may have been the state of tubercles at their first formation, they are generally found, even when quite small, firm and opake; they subsequently grow soft in the centre, which degenerates into a purulent fluid, and at last the whole of the tuberculous matter undergoes a similar change; and a vomica is thus produced.

The existence of tubercles, or a predisposition to their formation, in certain consti-

tutions, seems to be hereditarily transmitted in families, in the same way apparently as the scrofulous predisposition.

The usual appearance of persons in whom tubercular disease may be expected to occur, has been already noticed in them; the very first indication of a cough, or any other symptom of irritation in the chest, especially about the period of puberty, is to be regarded with the utmost anxiety, and those measures before recommended for the adoption of persons of a scrofulous or weak habit of body, for the prevention of disease, are to be immediately enforced, viz. an attention to diet, dress and exercise, a pure and dry air, and pure water.

Tubercles (as we have already remarked, of the internal or predisposing causes of scrofula,) may exist in the lungs for a long period without producing any symptom of disorder indicative of their presence, nor do they frequently at all interfere with any of the pulmonary functions, until some adventitious or exciting cause stirs up, as it were, the irritability of these organs; it is on this account that we so frequently observe the first symptoms of tubercular irritation in the lungs, threatening phthisis, to arise conse-

quently to an inflammatory affection of the chest, an eruptive fever, a catarrh, or some other disorder. The symptoms indicative of pulmonic irritation from tubercles, are wandering pains in the chest—a tearing sensation behind the sternum—a frequent dry, short or hacking cough, more or less violent, which is encreased by a deep inspiration—sometimes accompanied with hæmoptysis, and often aggravated at night—respiration quick, and as it were superficial, sometimes difficult, and accelerated by the slightest exertion, especially upon ascending a few steps—pulse variable and frequent, generally small and wiry—loss of appetite and strength, commonly with emaciation—bleaching of the skin, and more or less of partial perspirations at night. These formidable symptoms, unless checked by the timely exhibition of appropriate remedies, and by a strict adherence to the proper regimen, will very soon become more and more severe, and more complicated, and at last bring on an incurable *tubercular consumption*.

The existence of an *abscess*, or a *vomica*, in the substance of the lungs, accompanied with emaciation of the body, is, I conceive, the *essential* characteristic of phthisis, or pul-

monary consumption; nor do I think this definition ought to be laid aside or avoided, because we are not always able before death to make out with certainty the existence of either, or because the symptoms of other affections of the pulmonary apparatus very much resemble those of phthisis. When the stethoscope, percussion, or any other mean shall have rendered our diagnosis in diseases of the chest more perfect than we can boast of at present, (and which I am sanguine enough to hope they will accomplish,) then the propriety of adhering to this character will be still more apparent.

By an Abscess of the lungs, I mean a suppuration, or corrosion of the substance of these organs themselves, having no membranous lining. An abscess may arise from several causes, and phthisis has been divided by some writers into species, according to its nature or origin.

Vomica is a term I restrict, in this Treatise, to the degeneration or softening of a tubercle; it is often independent of any ulceration in the parenchymatous substance of the lungs themselves, and is therefore not necessarily fatal. A vomica is bounded on every side by an adventitious membrane or cyst, which

sometimes protects the substance of the lungs for a long period from ulceration, and as it enlarges, the lungs become compressed, not destroyed. I am not aware of any other diagnostic mark by which an abscess, or suppuration in the substance of the lung, can be, during life, distinguished from a vomica communicating with the bronchia, than the colour, smell, and consistence of the sputa; the distinction however is important. Tubercles being uniform in their texture and consistence, afford, when they degenerate into vomicæ, a white, opake, homogeneous, and inodorous pus : whereas an abscess of the lung, by corroding, and destroying different textures, such as vessels, cellular substance, bronchial tubes, &c. produces a variously coloured and offensive pus, a heterogeneous mixture caused by the ravages of the disease. These differences in the colour, consistence, and smell of the expectorated matter, has been noticed by many accurate and experienced observers, and they have drawn conclusions in strict accordance with the views advanced here. Hippocrates states, that the easy expectoration of a white matter is the sign of a favourable result. Bennet notices the varieties of colour often found in the

expectorated matter, and remarks that "an "ash-coloured, clay-like expectoration is a "fatal symptom, and after death the lungs "are found reduced to a state like mud or "clay;"—or, in other words, completely destroyed by abscess,—"whilst on the con- "trary, when the sputa are good," that is, I suppose, whitish and not offensive, "the "prognosis may be favourable." Bayle has more recently described the differences he has observed in the appearances and smell of the matter arising from ulceration, or abscess, in the parenchyme of the lungs, and that produced from tubercular vomicæ. Many other authorities might be adduced in support of these statements which have lately been little regarded, but these are sufficient.

Tubercular disease of the lungs may be divided into the three following stages :—

First.—*Pulmonary irritation from tubercles, or close vomicæ, or both*—usually denominated Occult Phthisis, where the tubercles, from the action of some exciting, external, or adventitious causes, have increased in magnitude, and some of them, perhaps, having passed into a state of imperfect purulent degeneration, are producing a considerable

degree of irritation in the pulmonary organs; but where ulceration has not yet taken place, either in the cyst, or membrane of the tubercles, or in the structure of the lungs, and consequently where no communication exists between the diseased sacs and the bronchial tubes.

Secondly.—*Pulmonary irritation or disorder, with open vomicæ, or* MILD TUBERCULAR CONSUMPTION, where the cyst of one or more of the vomicæ, or degenerated tubercles, has become the seat of ulceration, and communicates with some of the divisions of the bronchia; but where the parenchymatous substance of the lungs, although perhaps a little thickened around the membrane of the vomica, from an effusion of coagulated lymph, still remains free from serious or fatal disorganization.

Thirdly.—*Pulmonic disease, with both vomicæ and abscess, or* CONFIRMED TUBERCULAR CONSUMPTION, where a real ulceration of the tissue of the lungs has taken place, which became inflamed at the period of the softening of the tuberculous matter, and involved in the suppuration of the cyst; here tubercular phthisis is combined or complicated the ulcerous phthisis of some authors.

The diagnostic symptom, by which the disease may be known to have advanced no farther than the first stage, is the total absence of purulent expectoration, or the dry cough, accompanied mostly with a mildness in all the other symptoms. The tubercular disease in this stage may sometimes be arrested, that is, the further progress of degeneration in the tuberculous matter may be stayed; the disturbance occasioned by it in the lungs, may be calmed or allayed, and these organs be made to forget, as it were, the existence of this foreign substance in them; and the tubercles may, perhaps, sometimes be completely removed; but the greatest care and attention is requisite when any abatement in the symptoms, indicative of this favourable process, is attained, for the slightest causes will sometimes reproduce all the danger.

The distinguishing characteristic of the second stage, is the existence of more or less purulent matter in the sputa, of an opake white or yellowish white colour, homogeneous and inodorous, or having only a faintish or sickly smell accompanied with very slight hectic symptoms, or none; the pus may be streaked with a little blood, and it is gene-

rally surrounded, or perhaps partly mixed, with the mucosities of the fauces. Several instances have, I believe, occurred where the disease in this stage has as it were expended itself, or been cured; for several cases are on record, where after purulent inodorous expectoration, the cyst of a vomica has been coughed up, and recovery afterwards taken place. Pascal describes a case of this kind. In Corvisart's Journal, there is an account of a consumption, in which a membranous substance was expectorated, and afterwards the patient recovered. Van Swieten relates a case of consumption after hæmoptysis, where great relief was experienced from the expectoration of a thick membrane, probably the lining of a vomica. Portal has noticed the expectoration of membranous substances, and he observes, that they indicate generally a mild form of the disease. Dr. Gilchrist remarks, "where the abscess is "encysted, the cyst must be expectorated "before recovery can take place." Dr. Heberden relates a case, in which the membrane lining a vomica was expectorated, and the patient soon after recovered. This favourable termination can take place, however, but very rarely indeed, and then only in

those persons in whom very few (not more perhaps than two or three) tubercles exist in the lungs; for although one or two tuberculated masses might be disposed of in this way, without destructive disorganization in the pulmonary organs, or one or two of the empty cysts collapse, after having been emptied of their contents by expectoration, and remain without further inconvenience, yet there too often exists, at the same time, many others, which are producing incurable mischief. Again, it can occur only where the tubercles are close to some of the larger ramifications of the bronchus, and where the cyst ulcerating in this direction empties itself, without otherwise materially interfering with the other portions of the lung; on the other hand, it must be remembered that this termination is materially facilitated by the gradual disappearance of the cartilaginous structure, as the bronchia diminish in capacity. The last stage of the disease, or the confirmed tubercular phthisis, may be recognized by the expectorated matter becoming more or less coloured, greenish, of a brown, or the various shades of grey—by its being much less homogeneous and occasionally flaky, and by its always exhaling a

very fœtid, and sometimes putrid odour—by the breath partaking of the same smell—by the emaciation, the extreme debility, and breathlessness of the patient, and by the confirmed hectic. In this stage, it is in vain to look for remedies, all that art can do is to render the situation of the patient as comfortable as possible, by combating the distressing symptoms, and by a kind and mild demeanour.

The objects we propose to attain by Medical Treatment, in the tubercular disease of the lungs, are, in the first stage, to arrest the enlargement, and to prevent the suppuration or degeneration of the tubercles,—to allay the irritation which they create in the lungs,—to calm the irritability of the system at large,—and to amend the constitutional diathesis. In the second, or the period of the mild tubercular phthisis, when disorganization, not necessarily fatal, has in some degree taken place, evidenced by purulent expectoration, the same views are still to direct our measures, as long as the matter coughed up is moderate in quantity, white, and inodorous; as long as the other accompanying symptoms are mild, and whilst the strength remains tolerably good. In the third, or hopeless

stage, when these favourable circumstances are all reversed, when the hectic is exquisite, and the strength has greatly declined—when the expectoration has changed its colour, and become offensive, our endeavours can extend only to an alleviation of the severity of the attendant symptoms, which are often violent and distressing, and which tend not only to abridge the little remaining comfort of the patient, but very soon (without medical aid) to terminate existence itself.

Tubercular affections having been considered as arising from, or influenced by scrofula, the discipline recommended upon the first indications of any tendency to them, has been much the same as that enforced in scrofulous complaints ; and such treatment is indeed well adapted to prevent their advance, and to combat them in their first stages. It is thus, when tubercles begin to excite irritation in the lungs, that great benefit has been derived from horse exercise, from travelling, from walking, or taking a voyage, and from declaiming, from the alkalies, from bitters, and from chalybeates, which are all more or less useful for combating tubercular pulmonic disorder, and for preventing tubercular phthisis, particularly when we assist their

action by a good regimen and strengthening food, which should be chosen principally from animal substances, easy of digestion.

Exercise in the open air, and every change of scene which seems to occupy the mind, and engage the imagination of the patient, are highly advantageous in the early periods of the disease. With respect to the most desirable mode of taking exercise as a preventive to tubercular consumption, Hippocrates preferred walking, even to the extent of ten or fifteen miles in the day, if the strength would bear it without much fatigue; Celsus, Pliny, and many modern authors, especially Dr. Gilchrist, strongly recommend a sea voyage; Sydenham, Monro, and others, riding, or horse exercise. The particular mode of taking exercise, as we have already observed, must greatly depend upon the strength and habits of the patient, any considerable degree of fatigue is to be carefully avoided, but exercise must be enforced.

Among the bitter tonics, the Cinchona bark has been pre-eminently extolled in the early stage of tubercular pulmonic irritation, for promoting the absorption of the tubercles, invigorating the constitutional power, and diminishing the irritability of the lungs.

It has, however, been objected to, as increasing the phlogistic diathesis, and inducing a tendency to hæmoptysis; but, as Dr. Young has remarked, "the inconveniences appre-" hended from a trial of the bark, are gene-" rally only temporary, and may be avoided " by watching its immediate effects." My experience warrants me in recommending the Cinchona, in those cases of pulmonary irritation occurring in the scrofulous or tubercular habit not complicated with an inflammatory affection of the chest, when the tongue is clean, the skin moist and cool, and the pulse not hard or frequent; and also in the latter stages of phthisis, with hectic, where the expectoration is copious and free; it may be given in the form of infusion or decoction, or the sulphate of quinine may be exhibited in a draught or pill. Preparations of steel have been much recommended, and they will generally be found serviceable in the same description of cases as those where the bark agrees—Griffiths's mixture is perhaps the best formula for its exhibition. Morton asserts that the chalybeate waters are of more importance in preventing consumption, than all the materia medica besides, especially in the

scrofulous constitution. I have, myself, repeatedly witnessed the good effects of the Tinct. Ferri Muriatis, in conjunction with the Sulphate of Quinine, in incipient irritation of the chest, not of an inflammatory nature, occurring in persons strongly impressed with the signs or marks of the tubercular diathesis.*

When the patient is in a plethoric state, and the tubercles are beginning to establish an injurious irritation in the lungs, accompanied with symptoms of an inflammatory tendency, we must immediately combat, and attempt to moderate and remove this dangerous disturbance by revulsives and counter-irritants, as blisters, issues, and setons, assisted sometimes by bleeding and evacuants. General bleeding is not often re-

* The following is the formula which I have generally used :—

℞. Acidi Muriatici, gtt. vj.
Sulphatis Quininæ, gr. iv. plusve.
Tinct. Ferri Muriat. gtt. xij. ,,
Aquæ distillat. ℥vj. M.

pars quarta bis die sumenda. The mixture is perfectly clear, and no disturbance in the chemical composition of its ingredients appears to ensue upon their union—at least none that interferes with the medical virtues of its constituents.

quired, to any extent, in tubercular disorder of the lungs, unaccompanied with an inflammatory affection of the chest or pulmonary apparatus; it has, however, been recommended in small quantities, as a sorbefacient. Where the cough is attended with a fixed pain in the side, which is increased by a deep inspiration—where the pulse is strong and full—and especially where there is any hæmoptysis, venesection will be very beneficial; the quantity to be abstracted, and the repetition of the operation, will depend upon the circumstances of the case, the urgency of the pain, and the character of the pulse. In like cases, cathartics also are very often of great service; they contribute in counteracting the tendency to inflammatory action, or in checking the progress it may be making; they appear, too, to quiet the irritation occasioned by the presence of the tubercular matter, and thus lessen the cough. A saline aperient, therefore, may be administered occasionally, and repeated more frequently where there is much irritation existing, and especially where any febrile symptoms present themselves. Calomel, and the other mild mercurial preparations, as they are esteemed to favour absorption, may

be perhaps very advantageously substituted, conjoined, or alternated with them, according to the circumstances which present in the case we have to treat.

A great number of chronic diseases, especially those influenced or produced by the scrofulous or tubercular diathesis, appear to give way to the prolonged use of very active preparations, derived from narcotic vegetables. Great part of these, which may be carried in a gradual and progressive manner to a very strong dose, seem to impede the progress of these diseases, by blunting, in some way, the organic sensibility; and it is thus, perhaps, that they are useful in the early stages of pulmonary irritation from tubercles; for much advantage has been derived from the judicious employment of hemlock, henbane, or even opium.* The two former are valuable medicines where the cough is dry and frequent, without acute fixed pain in the chest, and especially where the patient is of an irritable habit. The Hyoscyamus may be exhibited in the form of a pill, encreasing the dose gradually until the effect proposed to be accomplished is

* Vide Bayle on Consumption.

produced. The extract of Conium may be given in the same way, or it may be made into a draught, in combination with mucilage of acaciæ, syrup of poppies, and the sulphuric acid. Busch proposes to diminish the morbid irritability and sensibility, in the early stages of pulmonary consumption, by Aconite, which he prefers to hemlock or henbane. He gives the powder of the leaves of this plant in preference to the extract—two grains every two hours, increasing the dose to the extent of a drachm daily, sometimes combined with Ipecacuan and honey of Squills.*

When the pulmonic disorder arising from tubercles has gone on to the second stage, or when the first advance of incipient disorganization of the lungs is evinced, by the purulent expectoration, we are still to proceed in our treatment, upon the supposition of the existence of a vomica, or vomicæ, which may be cured; for it is thus that we frequently mitigate the severity of the symptoms for a long time; and, by continuing the exercise, the tonics, good diet, &c. with counter-irritants, and occasional venesection,

* Vide Young on Consumption.

at the same time that we prescribe the use of vomits, digitalis, and purgatives, we may even stop the further advance of the disease. Sea voyages are very useful at this period, when declaiming would be hurtful; they are advantageous by the nausea they so frequently excite, and by the amelioration of climate which attends them, when undertaken from this country for the prevention or cure of consumption—they promote the absorption of the tuberculous matter, or, at all events, lessen the irritation it produces in the lungs—they remove a tendency to hæmoptysis, and add frequently to the constitutional power:—where they seem to produce debility, and CONSTANT sickness, they are hurtful, and should be avoided. It is remarkable, as Dr. Young has observed, that most of the cures of consumption related by different authors, have been effected under the employment of emetics, or, at all events, of medicines which excite a very considerable degree of nausea; the temporary depression of the vital power which they produce, seeming to exert a very favourable influence over the disease; they have, therefore, been very generally recommended, and are said to act like magic in some cases.

We allude, here not only to the Ipecacuan, and the Sulphates of Copper and Zinc, but also to sea voyages, swinging, and the Digitalis.

The sulphates of zinc and copper are highly spoken of by several celebrated authors, among whom we may mention Dr. Moseley, who recommends three drachms of the sulphate of zinc to be dissolved, with a drachm of alum, in a pint of boiling water; "the common dose of this solution to create "a slight retching, for a man or woman, is a "table-spoonful, a little more or a little less "according to the age and the strength of "the patient; in some cases, where the retch-"ing is not excited, and the nausea produced "only very slight, it may be repeated in four "or six hours. It is to be given without any "addition or alteration by diluting it, or "mixing it with any solution whatever." Nauseating doses of ipecacuan, are preferred by others, and especially by Dr. Young, who observes, that he has frequently found them beneficial in checking the hæmorrhagic symptoms, and improving the quality of the pus.

The good effect of emetics in consumption, has been accounted for by supposing

that they restrain the purulent secretion, and prevent an extension of the suppurative process; they may be often serviceable in the mild tubercular phthisis, by producing, through the medium of the action of vomiting, a separation, or a change in the mode of connection between the cyst of the tubercles, or vomicæ, and the texture of the lung, and thus in great measure freeing the latter from a constant source of irritation; the tuberculous matter afterwards being permitted to remain as foreign substances sometimes do, in other parts without disturbance.

Respecting the employment and efficacy of the digitalis in pulmonary irritations, there has been a great difference of opinion among medical practitioners. Digitalis is a very powerful medicine, but, like some others, not certain, nor always uniform in its operation, affecting those to whom it is administered in different ways, so that we cannot calculate with certainty upon the effect it will produce: it is to this circumstance, we attribute not only the differences of opinion which exist respecting its employment in consumption, but also the disagreements which we find even among those who advocate its use, concerning the manner

in which it acts in those cases where benefit has accrued from its administration—some affirming that it does no good where the pulse is not brought down, and that it acts by extinguishing morbid action—some that its action, when beneficial, promotes the absorption of the pus, while it restrains the power of secretion—others, that it is principally useful as a narcotic, allaying all irritations—while others again, consider it of advantage as a tonic, a sorbefacient, or a diuretic—but the practical advantages to be derived from an exhibition of the digitalis, are not attainable by attempting to determine upon the mode of its operation, and it is, therefore, hardly worth while giving ourselves the trouble of advancing this or that conjecture concerning the manner of its influence, if we can otherwise determine upon the cases in which experience has decided it to be of service. Digitalis will be found most beneficial in those cases where emetics and nauseating medicines are indicated; where the habit is rather plethoric than otherwise; where there is evident fulness in the vessels of the lungs, or any tendency to hæmoptysis, and especially where the pulse is quick and frequent—it

must be omitted when it produces a feeling of debility or exhaustion, accompanied with weakened powers of digestion.

The foregoing observations comprise the measures which should be enforced upon the first appearance of tubercular pulmonic irritation; and also the prophylactic treatment which should be had recourse to, for preventing the confirmed tubercular phthisis: I proceed now to review more particularly those symptoms which, near the termination of this disease, often become so violent, and which frequently in its early periods begin to claim attention, so that medicines directed solely to their alleviation, must sometimes be conjoined with our other remedies, and sometimes alternated with them—such as the cough, hæmoptysis, hectic, and diarrhœa.

In the early stages of pulmonary irritation, the cough is the most important, and generally during the latter periods of pulmonary phthisis, the most troublesome and harrassing symptom. Coughing arises in consequence of the presence of irritating matter, either in the lungs, or in some of the ramifications of the bronchia, and it is an almost universal symptom in the diseases of these organs. Bichât has observed, that

perception, or as he terms it, the animal sensibility, exists only at the entrance and termination of those passages in the body which communicate externally, while all the remainder of these canals, as regards their own secretions and functions, are furnished only with organic sensibility; it is thus we are sensible of the food in our mouth, and the perception of it is continued to the fauces, but here we lose all knowledge of its presence in the body, until it reaches, in its course the inferior outlet of the body, where the animal sensibility again indicates to us its presence; so likewise a stone in the bladder produces pain at the extremity of the penis; and thus it is too with the trachea, and the ramifications of the bronchia, any irritating matters in them, produce perception only at the outlet of the tube, or at the top of the larynx, and all pulmonary irritations are therefore referred to, or felt in this part, which, by its sympathetic connections, induces that convulsive action in the respiratory muscles which constitutes the cough. During the first stage of tubercular irritation in the lungs, or even during the period of the mild tubercular phthisis, the cough will diminish as the indications which we pro-

posed in the treatment are attained, and its diminution, or disappearance, is the best index of success in our endeavours In the confirmed tubercular consumption, this symptom, frequently so distressing, requires every thing we can do to alleviate it, which we attempt by expectorant and narcotic, or demulcent medicines, such as mucilages, emulsions, and conserves, hemlock, henbane, or opium; the former increase the facility of expectoration, the latter allay the irritability, or increased sensibility of the glottis, and by the sympathy of this part, the irritations excited in the other parts of the pulmonary canal.

The prussic, or hydro-cyanic acid, given in combination with the decoction of Iceland moss, will sometimes appease the cough, and render the situation of the patient, even when recovery is hopeless, more composed and more comfortable; the dose of the acid, which may also be conveniently administered in milk, with a little syrup and rose water,* may be from half a drop, to a drop, begin-

* Whatever may be the chemical actions which occur on their admixture, I do not find that the taste, smell, or medical virtue of the acid is impaired.

ning, perhaps, with rather less, and increasing the quantity gradually according to its effect. Oxymel was a favourite demulcent with some of the old practitioners, and it is often serviceable in abating the cough, and rendering the expectoration more easy. Syrup of poppies, or any of the simple syrups, with tincture of opium, or hyoscyamus, or perhaps what is more preferable, the acetate of morphia, will be very frequently of great benefit, given occasionally only, as the cough seems to require. In those cases where the cough is attended with *hectic perspirations*, the diluted sulphuric acid will be found a very useful, and a very desirable addition. To these means we may add the inhalation of medicated vapours, which sometimes remove the morbid irritability of the glottis, and promote the expectoration of the viscid matter in the bronchia, which often encreases the violence and frequency of the cough; but medical practitioners are so often required to combat this symptom, that each has, as it were, his own peculiar combination of palliative medicines to alleviate the distress it so often occasions, therefore it would be of no utility to dwell longer upon the subject; it

is right, however, again to observe, that in the early stages of tubercular disease in the lungs, the cure of the cough can be successfully attempted only by the means already pointed out for the removal of the disease.

Hæmoptysis is frequently one of the first symptoms which arise indicative of irritation in the lungs from tubercles, and its appearance in the tuberculous or scrofulous habit is extremely unfavourable, as it shews that there is a great tendency or disposition in the lungs to partake of the diseased or suppurating process going on in the tuberculous matter; for whatever blood vessels tubercles may have running into them, it is always more than probable that the blood coughed up comes from the vessels of the lungs, themselves, and it is, therefore, a proof of incipient disorganization; this accounts for the rapidity with which those cases of tubercular pulmonic irritation, attended with hæmoptysis, hurry on to an incurable phthisis. Spitting of blood may arise from several causes, we are speaking of it here as a symptom attending the existence of tubercles in the lungs:—it is generally accompanied with a peculiar pain, or sensation of

heat in the chest, and a tickling or irritation about the glottis, usually precedes the bloody expectoration.

The means which have been resorted to for putting a stop to the hæmoptysis, and for preventing its recurrence, are extremely various, such as bleeding, emetics, the digitalis, and powerful astringents, saline cathartics, ligatures upon the limbs, and the cold bath; but in our treatment, or in the choice of our remedies, we must constantly bear in mind, that the hæmoptysis is, like the cough, only a symptom, and therefore, that something further than its mere removal must be attempted.

Bleeding may be carried with advantage to a greater extent, when irritation in the lungs from tubercles is complicated with this symptom, than would be required, or proper, where it is not; but the depletion which may be necessary, should not interfere with the general method of treatment already laid down. The patient, therefore, should be allowed a good and nutritive diet—should take tonic but not stimulating medicines—and, in fact, should still adhere to the principles of the plan which has already been given. We abstract the blood to allay the

irritation, and lessen the fulness of the vessels of the lungs, and to equalize the circulation, not to debilitate the constitutional power. Vomits, nauseating medicines, and digitalis, as they often reduce, in a remarkable manner, the force and frequency of the pulse, are very serviceable in all cases of hæmoptysis, and from their effects, we can easily understand the manner of their utility. Dr. Moseley extols, in cases of hæmoptysis, his vitriolic solution, taken in nauseating doses every eight hours, and I have no doubt it is an useful medicine for checking the discharge. Many practitioners, however, give the preference to Ipecacuan. Refrigerant medicines, as the mineral or vegetable acids, taken often during the day, will be very serviceable. Large draughts of cold water have, in some cases, proved very serviceable; sponging the chest freely with vinegar and water, where the constitutional power is sufficient for a vigorous re-action, will be always safe and often beneficial; the cold bath however must be considered as hazardous, and should never be adopted where sponging, as above recommended, has been found to disagree, or to produce shivering, with subsequent torpor in the skin.

When hæmoptysis has once occurred, or where it is to be apprehended, absolute rest should for a time be enjoined, and a saline cathartic frequently exhibited. The super-acetate of lead, in combination with opium, will, in the most severe cases, be found very serviceable in checking the expectoration of blood; this combination alone is said to have cured a case of consumption, complicated with hæmorrhage from the lungs; but in every case of hæmoptysis, occasioned by the existence of tubercles, medicines of this kind can be but mere palliatives.

Symptoms of hectic may be present, in a greater or less degree, during any of the stages of tubercular pulmonic irritation, they are always however most urgent towards the latter periods, when phthisis is established. Hectic Fever is characterized by a weak and rapid pulse, by a burning sensation in the palms of the hands, and the soles of the feet, which is more or less exquisite, by the circumscribed flush upon the cheek, the night sweats, and diarrhœa, and by the well marked remissions which occur in these symptoms during the course of twenty-four hours.

In the early periods of the tubercular pulmonic disease, we must endeavour to lessen the violence of the hectic symptoms, by combatting the disease, or diminishing the cause; in the latter stages, we can only palliate or abate their severity. The febrile heat, which is often very troublesome during the hectic paroxysm, is best diminished by cooling drinks, made with some acid, or nitre, by saline laxatives, and by sponging the body as recommended for the hæmoptysis; by these means the profuse perspirations also will generally be diminished, especially if at the termination of the paroxysm we give bark, sulphuric acid and aromatics, or opium; where the diarrhœa is severe, the quantity of the acid must be lessened, or altogether omitted, and creta, kino, and opium, or some other astringent, with small doses of ipecacuanha substituted.

With respect to the Diet which we ought to enforce in the different stages of the tubercular pulmonic disease, little more need be added to that which has been already said; it must, of course, be varied and modified according to the particular circumstances or complications that may arise, or according to the habits and peculiarities of the pa-

tient. Milk will very generally, (in accordance with the almost universal opinion of both ancient and modern writers upon consumption,) be found an extremely useful and beneficial article, "it is," as Aretæus has observed, "agreeable to the taste, easily "swallowed, nutritious, and congenial to our "habits from our infancy, it facilitates re-"spiration and glides easily downwards, "serving at once for food and medicine;" half a pint or more of asses' or fresh warm cow's milk, may be taken with great advantage in many cases an hour or two before leaving bed in the morning, this seems to improve the tone and digestive powers of the stomach, and to prepare this organ for the more substantial things, which are subsequently put into it, and thus enabling it to dispose of them more effectually and with greater ease. The meal usually called breakfast should follow soon after rising, and in those incipient cases of pulmonic irritation of the purely tuberculous character, broiled meats, or other substantial things of this nature, may be advantageously added to it, if the appetite of the patient will admit of the addition. At a moderate period afterwards, exercise commensurate with the strength

should not be omitted. About noon another pint of warm milk, with or without a little toasted bread may be taken, then moderate exercise; at three or four a light dinner, after which the patient may recline for an hour or two upon a sofa, and then a light infusion of tea, or a little warm milk and water, will assist the digestion: and lastly, if the patient's appetite and inclination allow, half a pint more of warm milk, or milk and water, may be taken a short time before retiring to rest.

Of course, the particular circumstances, and numerous variations, which continually occur to modify the diet of our patients, preclude any other than these general observations.

In the foregoing dissertation, I have confined myself to the symptoms and treatment of those disorders in the lungs, which arise from the presence of tubercles, and have not mentioned any thing concerning the complications which frequently present themselves, and which require important modifications in our measures. Thus the tubercular pulmonic irritation may be attended with some acute inflammatory affection—with pleurisy, peripneumony, and acute or chronic catarrh; it may be accompanied with spasmodic

affections, cutaneous eruptions, or with important diseases in other parts of the body. It must be obvious, that to enter into a particular examination of all these, to detail the variations they produce in the ordinary symptoms of *tubercular irritation*, and to point out the several modifications they each require in the treatment, would be to enter upon a catalogue of diseases not contemplated in this work; it may, however, be necessary to make a few remarks upon these subjects.

In all eruptive diseases, and particularly in measles occurring in the scrofulous or tubercular habit, the utmost care is requisite, not only during the progress of the complaint, and the continuance of the cuticular excitement, but for some time subsequently, for they too often prove the exciting cause of fatal pulmonic disorder. In such constitutions, therefore, the respiration and pulse should be scrupulously watched, and the very first indication of excitement about the chest, of pain, cough, or oppression, opposed by appropriate means.

Inflammation of the pleura, more or less extensive, often occurs to aggravate the sufferings of consumptive patients, and by

accelerating the advance of the third stage, to hasten the fatal termination. Severe local pain ordinarily betrays this inflammation, the pulse, the heat of skin, the excitement, together with other general signs which indicate the phlegmasiæ, will also serve to point out this state, which must be combated by bleeding, leeches, blisters, &c. It is in this and other inflammatory complications, that it is proper to subject the patient to a restricted diet, and to the use of other antiphlogistic measures.

Acute pulmonary catarrhs, which are complicated with tubercular irritation and consumption, or which occur in those disposed to it, ought to be attacked with particular care; for they accelerate, in a singular manner, the progress of tubercles seated in the lungs, and occasion them to pass into a state of suppuration long before the period at which the disease, if uncomplicated, would have produced that deadly result. Acute pulmonary catarrh is to be cured by the known means, combined or alternated with the particular remedies necessary for the particular stage of the tubercular degeneracy.

Chronic pulmonary catarrh is often enough united with phthisis, or with irritation from

tubercles, and this complication requires exciting and tonic medicines; but it is necessary to make a choice, according to our knowledge of the state in which we find the patient. When this complication is met with in very irritable subjects and such as are disposed to inflammation from the slightest causes, we may combine, with advantage, opiates with bitters and tonics; the mucilage of the lichen islandicus, and syrups made with this substance, united to sudorifics, become very suitable, as well as other similar medicines. But if the too great excitability of the patient do not forbid it, we shall derive more advantage still from the resinous or balsamic medicines, such as benzoin, balsam of tolu, the balsamic pills of Morton, and especially the balsam of sulphur, &c.*

* Vide Bayle on Consumption.

SECTION VI.

ON THE INFLUENCE OF THE TERRESTRIAL RADIATION OF CALORIC UPON LOCAL SALUBRITY.

The effects produced upon the living human body by variations in the temperature and hygrometric state of the atmosphere, have already been adverted to, while remarking upon those things which tend to excite a state of disease. These topics will here again be slightly touched upon, whilst endeavouring to point out the probable cause of those effects, so frequently produced by change of situation upon the human constitution, when suffering from functional derangements.

It appears from the experiments of those who have undertaken any inquiry into the nature and constitution of our atmosphere, that it is uniform with respect to its chemical composition, in every variety of situation, and in every quarter of the globe—whether in the frozen regions of the north, or on the equator—in the narrow, crowded city, or the

open plain—so that the salubrity of a situation, and the beneficial effects of change of air, so frequently observed during the progress, or subsequent to the termination of many diseases, must be sought for in something independent of its chemical composition.

The *Cæli mutatio*, so much commended by Celsus, and so often indiscriminately adopted by the moderns, may be advantageous either by causing a beneficial alteration in the habits, occupation, or amusements of the patients, and a removal from sources of anxiety and care, or by means of the difference of temperature produced by difference of latitude; or again, by bringing the patient within the influence of local atmospheric differences. Thus Celsus remarks, that "a "thick air is beneficial when the disease "originates in a thin one;" and Dr. Moseley says, that "it has ever been the practice of "physicians, who studied nature, to remove "their patients to situations opposite to those "in which their diseases originated—from "land to sea—from sea to land—from moun-"tains to valleys—from valleys to moun-"tains—and to remedy local diseases by "local contraries;" and that "mere change

" of air, often causes a great revolution in the " habit, and has performed miracles in dis- " eases, without any intrinsic superiority in " the air resorted to." It is thus, perhaps, we may explain the benefit which has been observed to accrue to consumptive patients by removing from a dry situation to a low and marshy district.* But although change of air and differences of temperature, experienced in different latitudes, may be beneficial, still the good derived in any case, particularly of consumption, from sending the patient to various places on the continent, is extremely questionable; the inconveniences, exposures, and often positive privations, which invariably accompany travelling *out of England*, too often, I fear, counteract all the anticipated good, and even when the looked-for resting place is at last attained, too frequently its advantages are found to have been much over-rated. " A " hot and moist Sirocco wind immediately " succeeding a cold and dry Tramontana " in some situations in Italy; and the cold " sharp Mistrau and Bise, in many parts of " the South of France, and in the neighbour-

* Vide Young on Consumption.

"hood of the Alps, have, to my knowledge, "destroyed several, and injured a multitude "of debilitated people, who have been "injudiciously placed, or carelessly exposed, "when sent thither from other parts of "Europe for their health."*

Sea air has been strongly recommended by some medical writers in all diseases influenced, or produced by scrofula, as well as in all the varieties of pulmonary consumption, and it has been as strongly condemned by others; the fact is, that sea air does not appear to have any uniform, or decidedly peculiar or specific effect upon any disease; it is, however, more impregnated with aqueous vapour, and probably with saline particles, and in certain situations, may be milder and more equable in temperature than the air more in-land.

But neither change of air, nor change of temperature, consequent upon change of latitude, nor any alteration of habits or occupation, produced by a removal from sources of care or anxiety, is sufficient to account for the happy effects so often witnessed in the constitution from mere *change*

* Moseley on Climate, &c.

of situation, a removal even of a few miles from a low to an elevated spot, producing very marked alterations in the character of a disease, or in the strength and feelings of the patient, which can only be accounted for by supposing that there are local peculiarities in the temperature, impregnations, and salubrity of the air, caused by the partial or local action of some powerful agent—and that such is the case I shall now endeavour to shew.

Caloric (a term by which we denote the source or cause of heat) is a medical agent of the utmost importance, for every change of temperature, and every variety of season and climate, depends upon its activity and distribution, and its properties and habitudes with the matter of our earth, afford a boundless field for experiment and observation.

It appears, as the result of a variety of observations, made by different individuals, upon the phenomena exhibited upon our globe, as well as by experiments upon the temperature of its mines, that the earth derives heat, not only from the sun, but also from some reservoir, or source of caloric, which it possesses within itself.—"The solid crust of the earth," says Humboldt, "already

" oxidised, separates the surrounding air " with its oxygen from the combustible un- " oxidised substances in the interior of our " planet. The observations which have been " made in mines and caves in every zone, " and which, in conjunction with M. Arago, I " have collected in a particular paper, de- " monstrate that the heat of the mass of our " earth, is much greater than the mean tem- " perature of the atmosphere at the same " place. Such a remarkable, and almost " generally proved fact, is closely connected " with those, which are proved by volcanic " phenomena; La Place has even gone so " far, as to endeavour to calculate the depth " at which the body of the earth may be " considered a melted mass." Now this heat, as well as that which the earth receives from the sun, or, in other words, the uncombined caloric of our globe, has a constant tendency to equalize itself by passing out of one body, and diffusing itself through others; and we may consider, that all bodies project heat at every temperature, but with unequal intensities, according to their nature, their surface, and their temperature.

Caloric escapes from bodies in two different ways, part finds its way through space,

independent of other matter, by radiation, while another portion is carried off by bodies of a lower temperature. When any substance cools *in vacuo*, its heat is entirely dissipated by the former process, the caloric which it throws off moving in every direction with immeasurable velocity; but when it is placed in air, or any other fluid, its rate of cooling is influenced by the quantity of caloric carried off by the fluid, and which must, in that case, be added to that dissipated by radiation. Radiant Caloric not only moves with very great velocity, but it is also uninfluenced in its progress, by winds or ærial currents.—In an experiment of M. Pictet, no perceptible interval took place, between the time at which caloric quitted a heated body and its reception by a thermometer, at a distance of sixty-nine feet, the quickness of its passage too was uninfluenced by a transverse current of air.

The researches of Leslie, Romford, and other philosophers, have shewn us, that different bodies have very different powers of radiating caloric; and also that the nature of their surface, has a most important influence over this process; the following

simple experiment will fully demonstrate this:—provide a canister of planished tin, forming a cube of six or eight inches, let one side of this canister be covered with black paint, destroy the polish of another side by scratching it with sand paper, tarnish a third with quicksilver, and leave the fourth bright, then fill the vessel with boiling water, and it will be found, that the blackened surface radiates heat much more copiously than the scratched one, this more than that tarnished with quicksilver, while the bright polished side radiates the least of all; these various degrees of radiating power, possessed by different surfaces, are attended by CORRESPONDING VARIATIONS IN THE RATE OF COOLING, those radiating most rapidly becoming cold much the soonest.

Let us now turn our attention to the Earth, which is an immense globe, radiating caloric at certain times with prodigious rapidity, but subject to many important influences, produced by the many different aspects which its surface presents. Now as the proportion of heat and moisture in the atmosphere, two agents, which exert an important influence over the functions of the

body, even in health, and an especial one during disease, has an intimate relation with the intensity of that radiating process which *cools the earth*, those circumstances which interfere with, or have any permanent effect upon it, must have a corresponding influence upon the salubrity of any particular situation. The opinion of Humboldt, that the present constitution of the climates upon our globe, is independent of any geognostical relations, is certainly to a very great extent correct; that all-powerful source of heat, the sun, is sufficient to cast all the minor influences, upon the temperature, &c. of our planet, far into the shade, and those, who, like this great observer, are accustomed to view the grand phenomena of nature *en masse*, are very likely to overlook the minor details of her operations; but when we affect to speak of climate in a medical sense, or wish to regard natural effects, as conducive to the health of mankind, or in subserviency to the well being of our species, not a fact ought to be overlooked or forgotten, for it is only by minute investigations, or a lesser sphere of observation, that minor, but most important influences are discovered. Thus the TERRESTRIAL RA-

DIATION OF CALORIC, a natural operation, productive of important effects, and which is daily going on under our observation, has been too much neglected, or overlooked in a hygienic point of view, although it is, I believe, sufficient to explain many of those hitherto unaccountable differences, which have been, and are daily observed in the salubrity or healthiness of particular places; and will also, in a great measure, discover to us, the reason why the strength and vigor of the human frame is regained, subsequent to disease, much faster and more perfectly in some situations, than in others. Let us then, examine into the operation and effects, produced by this interesting and important phenomenon. When the sun has merged below the horizon, especially on clear and still evenings, every portion of the earth's surface begins to radiate caloric with rapidity, and a consequent reduction of its temperature, together with that of the circumambient air, necessarily ensues, to a greater or less extent. But the radiating power of different situations and different surfaces, like the sides of the canister just mentioned, being very different, many places radiating at a very quick rate, while others

do so much more slowly, it must produce corresponding variations, not only in the temperature, but also in the hygrometric state of the air; a much greater degree of *cold* and *damp* existing over those places where radiation is greatest, than over others. The experiments which have hitherto been conducted with reference to terrestrial radiation, have shewn us that water, a grassy surface, and all hollow and low situations, are extremely good radiators, while the more raised situations, and those which are moderately enclosed, or overhung by trees, buildings, or other elevations, are much less under its influence; the observations also, which were lately made by Mr. Mackinnon, upon the comparative dryness of the air over different kinds of earth, go far towards inducing us to believe, that certain soils, or different geological deposits, may have various degrees of radiating power, and therefore, that they alone, independent of the nature of their surface, may have a considerable influence upon the salubrity of a place. Analogy would lead us to suppose, that this is the case, and facts are not wanting, tending to prove it; does not the every day expression of the agriculturist, go some way

in establishing the truth of these conjectures, when we hear him speaking of the *hot* and *cold* nature of the different soils upon his farm. But experiments, made expressly with reference to this matter, are required to substantiate it, and to point out the differences of radiating power possessed by different soils.

The various degrees of radiating power, possessed by the several surfaces presented by the earth to the air, become very evident indeed, on clear and still evenings, soon after sun-set; our rivers, pools, and lakes are soon shrouded with a misty fog—our meadows become spangled with dew—low and hollow places feel very raw, cold and damp, while the more elevated situations, particularly those upon the side of a hill, are dry, and comparatively warm. Water being one of the best radiators, the air where it abounds soon becomes cooled, and the aqueous vapour it held in solution is precipitated, giving rise to those unhealthy fogs and damps which follow the course of our rivers, and which frequently envelope the contiguous country in their mist. A grassy surface being another good radiator, is often found to be much colder than others, such as paths, gravel walks, roads, &c.; indeed, its radiating power

is sufficiently indicated by the copious depositions of dew upon it, an effect entirely resulting from radiation. Dr. Wells frequently observed a grass meadow to be several degrees below the air, some distance above it. On nights favourable to radiation, the earth, half an inch or an inch beneath the surface, is always found much warmer than the grass upon its surface, or than the air immediately above it, and if different thermometers are placed in different situations upon the ground, it will be found that those are the lowest where most dew is formed, or where radiation is going on with the greatest celerity. The atmosphere itself, at moderate elevations, is of a pretty uniform temperature, but substances on the surface of the ground, exposed to the effects of radiation, are found to suffer great variations in their temperature. On clear and still nights, a difference even of *thirty degrees*, *F.* has been observed between the temperature of radiating surfaces and the air some height above them; the atmosphere, indeed, two or three hundred feet above the ground, has been found *ten degrees F.* or even more, warmer than that only seven feet above a radiating surface. The leaves of trees are very often found to be quite dry,

while the grass of an adjacent meadow is loaded with dew, this effect arising solely because the former are removed by elevation, from the radiating effect to which the latter is freely exposed.

Now water, and a grassy surface, we have already shewn to be excellent radiators of caloric, and experience and observation inform us that, the immediate neighbourhood of either of them is unhealthy, unless the radiation from their surface is impeded by counteracting circumstances. Witness the frequent occurrence of agues, fevers of different descriptions, pulmonary affections, and a variety of other complaints, in marshes—in open, low, and extended plains, and in other situations bordering on rivers and lakes; while the healthiness or salubrity of the more elevated places, which are less affected by Terrestrial Radiation, and which are raised above the depositions which it occasions from the atmosphere, are well known.

It is to the various degrees of radiation going on from the different surfaces of the earth, that those very different temperatures are owing, which all who have travelled at night must have observed during their progress, when the air has been still—the raw and

damp ravine or valley—the cold and heavy air which borders upon the water of a river or lake, and the dry, warmer, and more comfortable sensations which succeed upon attaining an elevation.

In Egypt and Greece, medicine was cultivated by the priests, and practised in their temples, to which the sick were brought, and where beds and other necessaries were provided for their use. At this time, the healing art was in a very deplorable state, and the recovery of persons brought to these temples of Æsculapius, was chiefly, if not solely, attributable to the healthiness of the spots where they were erected. Now Plutarch informs us, that they were built upon *elevated* grounds, where the air was not only naturally pure, but rendered still more salubrious by the lofty trees which encompassed them. Now trees, or any kind of interposition between the atmosphere and the surface of the ground—not obstructing the rays of the sun—prevent, in a very considerable degree, the dissipation of caloric by radiation; thus the enclosed and cultivated parts of the country, which are protected by trees, hedges, &c. from the chilling effects of radiation, are much more healthy than large open plains, or extensive

tracts of grass, where no trees or hedges appear.

The influence which even the slightest covering or interposition exerts, in retarding the dissipation of caloric, cannot be better shewn, than by quoting the following observation of Dr. Wells. "I had often," says this accurate observer, "smiled, in the pride "of half knowledge, at the means frequent-"ly employed by gardeners to protect tender "plants from cold, as it appeared to me im-"possible that a thin mat, or any such flimsy "substance, could prevent them from attain-"ing the temperature of the atmosphere, by "which alone I thought them liable to be in-"jured; but when I learnt that bodies on "the surface of the earth become often "colder than the air, by radiating their heat "to the heavens, I perceived immediately a "just reason for the practice which I had "before deemed useless. Being desirous, "however, of acquiring some precise infor-"mation on this subject, I fixed, perpendicu-"larly, in the earth of a grass plat, four "small sticks, and over their upper extremi-"ties, which were six inches above the grass, "I drew tightly a very thin cambric hand-"kerchief. In this disposition of things,

" therefore, nothing existed to prevent the " free passage of air from the exposed grass, " to that which was sheltered, except the " four small sticks, and there was nothing to " radiate downwards to the latter grass, ex- " cept the cambric handkerchief. The shel- " tered grass, however, was found *five degrees* " *F.* or more, warmer than the unsheltered. " One night, the fully exposed grass was " *eleven degrees F.* colder than the air, but the " sheltered grass was only *three degrees F.* " colder. Garden walls act partly on the " same principle, and in the same way."

These facts enable us to understand why places moderately thickly inhabited, are more healthy than isolated and exposed dwellings, for the walls and projections of the buildings, together with the trees and plantations in their neighbourhood, counteract, in no inconsiderable degree, the cold produced by radiation.

The Preservation of Health, and its restoration subsequent to a period of disease, are the most important, and most interesting parts of the Science of Medicine, and consist chiefly in avoiding those things which tend in any way to derange or disorder the natural functions of the body, or to foster and

encrease any existing irregularity; and can we suppose, that that process which, as we have seen, covers our meadows with dew—which disturbs so much the equilibrium of the temperature of the air and the earth—which envelopes our rivers in fogs, and causes such copious precipitations of noxious vapour from the atmosphere—can we suppose, I repeat, that the cause of all these phenomena, may be neglected or overlooked with impunity, in the details of practical medicine? By no means—philosophical research has often stretched an aiding hand to medical science, and promises to rescue the obscure subject of *local salubrity*, from the perplexities which at present surround it. Although persons in high health and of a robust and vigorous constitution, may be insensible or uninfluenced even by these notable effects of Terrestrial Radiation, yet there can be no doubt, that those of a weak and delicate habit, or those just emerging from the dangers of an acute or long continued and debilitating disease, are by no means unaffected by them; the latter indeed, must have a greater variety of circumstances to guard against than the former, and many things will command or arrest their attention, because productive of evident effects

upon them; while by the former, they are not noticed, or not heeded, because not accompanied by any sensible influence; so therefore, those minor operations of nature, which are innoxious to one individual, may be very prejudicial to another, and many circumstances which may be neglected by the strong, require the serious consideration of the weak.

These observations are sufficient to enable us to understand the reason of the well marked healthiness of particular spots, and the ground of their efficacy in weak and debilitated invalids; while, at the same time, they lead to the conclusion, that all moderately elevated situations, upon a bad radiating stratum, with a bad radiating surface, and sheltered from the colder winds, will be found, in this climate, to be the most healthy; while on the contrary, all low situations, especially those which are open and exposed, and those in the neighbourhood of water, or marshes, will be unhealthy, and unfit for weak or debilitated constitutions or invalids; although they may not be prolific in generating inveterate or repeated attacks of disease.

But if we investigate this interesting sub-

ject a little farther, the importance of terrestrial radiation, will be still more apparent, for it will be found, I think, to afford the most probable explanation yet offered, to account for the development of those noxious exhalations, or rather depositions, which occur during the night, in hot and tropical climates, and which, it is well known, exert such a direful influence upon the human frame, occasioning dysentery, bilious fever, cholera, &c. We have already observed, that bodies radiate heat in proportion to their quantum of sensible caloric, and that a reduction of temperature, is co-equal with terrestrial radiation; so that in hot countries, where other circumstances are favourable, and especially where the air is calm and still, which is often the case, the radiation of caloric from the ground during the absence of the sun, and the consequent coolness produced, will be proportionally great.

Every person, who has had any experience in the practice of medicine in tropical climates, knows very well, that it is from exposure to the damp, chilly, and miasmatous air of the night, that diseases chiefly arise; and every document which refers to the exciting causes of these violent disorders, sufficiently substantiates this fact.

" In the months of September and Octo-
" ber, 1799, while the Leopard and Centu-
" rion, (two of Admiral Blankett's Squadron,)
" were working up from Mocha to Judda,
" along the Arabian coast, they were con-
" siderably harassed (the Leopard in parti-
" cular), with a low fever, not of the remit-
" tent type, accompanied with great head-
" ache, weak, small, and quick pulse, pain
" at the stomach, and over the epigastric
" region, frequent bilious vomiting, and
" purging, with uncommon debility, and de-
" jection of spirits. The days at this time
" were oppressively hot; the thermometer
" generally at 97°, *the nights cool*, but what
" was most singular, a copious fall of dew
" took place every night, perfectly salt and
" bitter to the taste; to this, the fever was
" ascribed; and what corroborated the sus-
" picion was, that the Leopard's crew *slept*
" *exposed to the nocturnal vapours*, and suf-
" fered ten times the sickness which occurred
" in the Centurion."

" On my passage from Madras to Cal-
" cutta," says Dr. Johnson,—" I sat late on
" deck one evening, after our arrival in the
" Ganges, the vessel being at anchor a mile
" from the shore, and not a breath of wind
" moving in any direction. As the dews be-

" gan to fall, I perceived all at once a faint " heavy odour, to account for which, I was " much puzzled, *as there was no breeze to waft* " *any exhalation from the adjacent shores.* My " reflections were soon interrupted, however, " by a sense of faintness, giddiness, and at " length nausea, with which I was suddenly " affected."

Mr. Neill also, while speaking of the fever which made its appearance among the crew of H. M. S. Sceptre, at the Island of Madagascar, observes, " the deleterious effects of " nocturnal exposure were particularly ex- " emplified here, by the disease raging most " violently among the marines, who were on " shore at night for the protection of the " casks, and to whom the mortality was " confined. The fever made its appearance " among some of the same party who did " not pass the night on shore, but in them, " it was infinitely milder, though similar in " type and general symptoms."

Mr. Shields, in his account of the endemic of Batavia, says that almost every person, who slept on the Island of Edam—*only for a single night, died;* " no ill effects were ex- " perienced from going on shore in the day- " time, or among the sick at the hospital; " I myself," he observes, " regularly visited

" the sick at Edam every day with perfect " impunity, till one night I staid rather late, " in consequence of which I was, three days " afterwards, seized with the fever, but re- " covered by mercury carried to ptyalism." These observations are fully sufficient to shew the injurious effects produced by those depositions or precipitations which take place when the temperature of the air is reduced.

" The nature of an unhealthy, swampy " soil"—says Dr. Lind—" is such, that no " sooner are the sunbeams withdrawn, than " the vapour *emitted* from it renders the air " raw, damp, and chilling in the most sultry " climates." Upon this passage Dr. Johnson remarks that—" it is difficult to imagine how " dews *descend* and vapours *rise* at the same " time; nevertheless"—he says—" it is cer- " tainly true that the stench emitted imme- " diately after sunset is much more percep- " tible to the senses than at any period of " the day" .... " and we find accordingly, " that four out of five of those who suffer, are " attacked or receive the deleterious principle " during the night season."

Surely no one can doubt that these febrific exhalations are emitted, and diffused through the atmosphere during the day, but owing to its elevated temperature at that season, they

disappear, are dissolved, or held in perfect solution, and perhaps ascend to the upper regions; on the contrary, at night they are developed and rendered sensible, or made active in proportion to the degree of cold produced by the radiation of caloric, from the surface of the ground during that period; for those effluvia which are given out by the ground, or by vegeto-animal matter exposed to the heat of the sun, must exist in the air in as great a proportion during the day as in the night; at all events nothing (most probably) is *given up* by the ground to the air after sunset. The deleterious damps and miasmatous exhalations therefore are produced or developed, because the cooled air of the night is incapable of retaining those matters which the warmer air of the day held in chemical combination.

Thus it is with the immense forests in the mountains of Ceylon, and in many of the ghauts in India, and in other hot climates; the thick foliage of the trees defies the influence of the rays of the sun, and therefore the air circulating amongst them is constantly of a lower temperature than that in the surrounding plains; whence the heated air, charged with various impregnations, coming to circulate among the branches of the trees

of these impenetrable forests, becomes cooled and its vapours developed, occasioning very often diseases of the most violent or inveterate character. Thus then it appears that the terrestrial exhalations as long as they are retained by the atmosphere in chemical combination, do not exert those deleterious effects which they betray when they are precipitated or liberated, and made apparent.

But the cooling effect produced by radiation, is much more prejudicial to health, than those vicissitudes of temperature induced by moderate currents of air; for in the former case the ærial stillness which contributes so greatly to the terrestrial radiation of caloric, permits every deposit from the air to stagnate as it were upon those places over which it is produced, thus filling up all the valleys and hollow places, and enveloping the low grounds with noxious precipitations, which are extremely prejudicial to mankind in every climate, and particularly so in those within the tropics; whereas, in the latter instance, those currents of air which bring with them a reduction of temperature, carry off or clear away the atmospheric depositions to which they may give rise.

The insalubrity of low situations in every climate is, therefore, not only attributable to

the encrease of radiating power which obtains in them, but also to the circumstance of their being the first to be enveloped in the miasms which may take place from the air, and which naturally subside to the lowest places, while the more elevated positions may often escape. Thus it is well known, especially in tropical countries, that a difference even of a few feet in height is sufficient to remove any one from the injurious effect of a cold and miasmatous stratum of air, formed at night near the surface of the ground.

From the foregoing facts and observations, I think we may infer, that ALL THOSE PLACES WHERE THE RADIATION OF CALORIC GOES ON WITH RAPIDITY, WILL BE FOUND SUBJECT TO GREAT VICISSITUDES OF TEMPERATURE, TO FOGS, HEAVY DEWS, AND OTHER NOXIOUS PRECIPITATIONS FROM THE AIR, WHEREBY THEY ARE RENDERED COLD, DAMP, AND OFTENTIMES EXTREMELY UNHEALTHY, *while cæteris paribus*, THOSE SITUATIONS WHERE THE TERRESTRIAL RADIATION IS DIMINISHED, WILL BE PROPORTIONALLY WARMER, DRIER, OF A MORE EQUABLE TEMPERATURE, AND MORE HEALTHY.

APPENDIX.

ANALYSIS OF THE MALVERN WATER.

The Malvern water, as it issues from the rock, is perfectly clear and transparent, and remains so after an indefinite exposure to the air—its temperature at the spring is about 47° F.

The place where it falls has not received any kind of incrustation or deposit, nor is there the slightest appearance of any precipitation from the water.

Its taste has been supposed to be peculiar and evident, though few persons are able to detect any. "The "Malvern water, when drank immediately as it comes out "of the hill, leaves a peculiar tartness in the throat." This however is not, I believe, generally observed.

EXPERIMENT 1st. The water of St. Ann's well was mixed at the place where it issues from the rock, with a clear *alkoholic solution of soap*. The mixture was at first quite clear, but in a few moments it became slightly opaline, in the course of half an hour the tint became more evident, but without any floculi or sediment.

EXPERIMENT 2nd. The water was tested with *tinct. of litmus*, and a like quantity of distilled water was tried also, as a standard of comparison, but no effect was produced in either.

Half the above mixture with the well water was heated, by immersing the glass vessel containing it in some boiling water. A number of beautiful beads of air coated the interior of the glass, but not the slightest effect was made upon the colour.

EXPERIMENT 3d. *Tincture of turmeric, muriate of barytes, prussiate of potassa, lime water, oxalic acid, oxalate of ammonia,* and *succinate of ammonia,* had no effect upon the crystal transparency of the water unreduced by evaporation.

EXPERIMENT 4th. A solution of *nitrate of silver,* a little acidulated with an excess of acid, was dropped into a glassful of the water at the well; it produced in a few moments a light cloud, which diffused itself in a short time through the liquid, producing however a tint so light, that it could hardly be discovered without comparing it with the clear water from the spring. The *superacetate of lead* produced a slight change, but less, if possible, than that effected by the nitrate of silver. After standing some hours, the bottom of the vessel was thinly spread over with a white precipitate, but in such a small quantity, that, upon shaking it, the supernatant fluid was hardly rendered turbid.

These experiments indicate the great purity of the Malvern water; for the above tests detect only a minute portion of the muriatic acid, and of the sulphuric or carbonic acids in it. Its purity may also be inferred, from the power which it is reputed to have of dissolving those earthy or stony depositions often found in tea-kettles, and arising from the use of other waters, which are usually impure.

EXPERIMENT 5th. Forty fluid ounces of St. Ann's water were evaporated to about three, in an open Wedgewood ware dish; they were then transferred into a shallow glass vessel, being still clear. The whole of the water being evaporated, there remained a brownish deposit, weighing, as nearly as possible, one grain, and which deliquesced after a short exposure to the air.

EXPERIMENT 6th. A quart of the water (thirty-two fluid ounces) was evaporated down to three ounces and a

half, and then one grain of the crystallized muriate of barytes dissolved in it: the clear liquid being decanted off, the precipitate which was not affected by the nitric acid was dried and exposed to a dull red heat, and found to weigh very nearly half a grain, which gives the proportion of sulphuric acid in a quart of the water from St. Ann's well, .16 grains.

To the liquid remaining after the separation of the sulphuric acid, a solution of nitrate of silver was added, which threw down a copious precipitate. On its being collected and dried at a heat above 212, it weighed nearly two grains, which gives .38, the quantity of muriatic acid separated by these means; but of this, .22 belonged originally to the grain of muriate of barytes, leaving about .15 as the quantity of muriatic acid contained in a quart of the water.

EXPERIMENT 7th. A quart of the water from St. Ann's well was evaporated down to one ounce, without any precipitation ensuing. On adding to it a solution of oxalate of ammonia, a white powder was thrown down, which weighed, when dry, a little more than $\frac{1}{8}$ of a grain. To this were added two or three drops of strong sulphuric acid, and the whole then exposed in a small platina spoon to a full red heat; the sulphate of lime thus formed weighed not quite $\frac{1}{8}$ of a grain, which gives .051 as the quantity of lime contained in a quart of the Malvern water.

EXPERIMENT 8th. One quart of the Malvern water from St. Ann's well was evaporated to dryness, and the solid matter carefully collected when quite dry, weighed .75 grains. Towards the end of the process, a transparent film formed on the surface of the fluid, giving it a gelatinous appearance, indicative of the presence of silicious matter. The solid matter thus obtained, was agitated with a little distilled water; a white insoluble powder now subsided, which was collected and dried; the quantity,

however, was so small, that I could hardly find its weight with any accuracy; as far as my scales would permit me to determine, $\frac{1}{8}$ of a grain nearly seemed to be its weight. Part of this powder was soluble in nitric acid with a slight effervescence, and the solution gave evident traces of lime; the principal part however was silicious matter.

To the aqueous solution, muriate of barytes was added, which produced a white precipitate—not affected by the nitric acid—and weighing, after exposure to a red heat, .50 grains, which gives the proportion of sulphuric acid in a quart of the water, .16. The fluid was now tested, and found to contain neither sulphuric acid nor barytes; on being again evaporated to dryness, the solid matter was found to weigh nearly half a grain. Upon this, alkohol of the sp. gr. .810 was poured, and frequently agitated for some hours; the portion insoluble in the spirit, on being dried, weighed .20 grains.

The alkoholic solution was now evaporated to dryness; upon the dry mass strong sulphuric acid was poured, and on the addition of a little distilled water, a white insoluble powder separated, which, after having been exposed to a red heat, was found to weigh less than $\frac{1}{8}$ of a grain, perhaps $\frac{1}{10}$, which gives the quantitity of lime in a quart of the water, .041, and this added to the little separated with the silicious matter will make about .05, sufficiently agreeing with Experiment 7.

The acid solution was now evaporated to dryness, and the excess of sulphuric acid expelled by raising the heat to redness; a white matter was thus obtained, weighing $\frac{1}{2}$ a grain; not entirely soluble in distilled water: the soluble portion however gave evident indications of magnesia on the addition of carbonate of ammonia and phosphate of soda. I infer, therefore, that a quart of the Malvern water contains nearly .16 grains of magnesia; no alumine appearing to be present.

The matter insoluble in alkohol was again agitated with distilled water, but now a small quantity of a brownish powder separated; the clear solution being evaporated to dryness, left a powder weighing .15 grains. Muriate of platina gave no trace of potassa. From this experiment, I concluded that a quart of the water from St. Ann's well contains .075 grains of soda.

EXPERIMENT 9th. A quart of the water from St. Ann's well was heated to the boiling temperature, and the air obtained from it measured nearly $\frac{1}{4}^{\text{ths}}$ of a cubic inch, (Thermometer 50° F. Barometer 29 $\frac{9}{10}$ inches) it was not absorbed by a solution of caustic potash, nor was lime water at all affected by agitation in contact with it. Other experiments evidently shewed that it contained oxygen gas, but not in greater quantity than a like measure of atmospheric air contains.

From these experiments I infer, that a gallon of the water from St. Ann's well contains

Atmospheric air, *nearly* 3. cubic inches.		
Sulphuric acid -	.66	grains
Muriatic acid -	.64	
Soda - -	.30	
Lime - -	.205	
Magnesia -	.528	
Silicious matter	.50	nearly.
Precipitate obtained with the sulphate magnesia insoluble in water, and loss	.167	
Grains	3.000	

NOTE. That these results approach very near the truth, I have satisfactorily determined by various other experiments; but in operating upon such small quantities, some errors will, perhaps, unavoidably creep in.

Thus it appears that the water at Malvern contains the same bases and acids as sea water, only in such extremely small proportions: according to Professor Brande, *one pint* of sea water contains

23. grains of muriate of magnesia
180. grains of muriate of soda
15. grains of sulphate of magnesia
17. grains of sulphate of lime

while *one gallon* of the Malvern water contains only

Muriate of magnesia -	.5
Muriate of soda - -	.6
Sulph. of magnesia -	.576
Sulph. of lime - -	.5
Silex - - - -	.5
Insoluble and loss -	.324
Grains	3.000

Several experiments were made upon the Holy Well water, but they indicated nothing different from those salts found in the water from St. Ann's well; nor did any greater quantity of solid matter appear to exist in a like measure of it.

END.

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