

THE
WORKING MAN'S COMPANION.

THE PHYSICIAN:

I. THE CHOLERA.

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London: Printed by WILLIAM CLOWES, Stamford-street.

UNDER THE SUPERINTENDENCE OF THE SOCIETY FOR
THE DIFFUSION OF USEFUL KNOWLEDGE.

THE WORKING-MAN'S COMPANION.

THE PHYSICIAN:

I. THE CHOLERA.

LONDON:

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CONTENTS.

	Page
Notice	7
Introduction	10
CHAP. I.	
Of Diseases supposed to arise from certain states of the Air	38
CHAP. II.	
Description of Cholera	49
CHAP. III.	
Climate and Habits of India	67
CHAP. IV.	
Progress of Cholera in the East	88
CHAP. V.	
Progress of Cholera towards Russia	103
CHAP. VI.	
The Cholera in Russia	112
CHAP. VII.	
The Cholera at St. Petersburg	126

CHAP. VIII.		Page
Progress of Cholera in Poland and Prussia . . .		140
CHAP. IX.		
The Spasmodic Cholera in England . . .		149
CHAP. X.		
How to escape the Cholera . . .		156
CHAP. XI.		
Treatment of Cholera . . .		186
Postscript . . .		201
Appendix . . .		207

THE
PHYSICIAN.

NOTICE.

THE Society has for some time had it in contemplation to publish, in a cheap form, under the title of '*The Physician*,' such plain and useful information relating to Medicine as may be serviceable to the working-classes of readers, who, together with too many of the higher classes, are the objects of delusion from pretenders to a knowledge of the art of healing; and, in the course of their ordinary occupations, incur many inconveniences, and often much suffering and loss, from which a little knowledge of the nature of different diseases would tend to protect them.

The extreme interest attached at the present moment to a disease which, after spreading over almost every degree of latitude, has actually appeared in the north of England, has made it desirable to devote a considerable portion of the present volume to the description and history of Cholera, and to plain directions for avoiding it. The use of such directions will not be confined, however, to

Cholera alone, as they will necessarily comprehend observations connected with the preservation of the general health of working-men.

To render even this subject at all intelligible, and to show that the advice given to the working-man regarding his health is founded in reason, it is necessary to begin with a view—of course, a very brief view—of the structure and functions of the principal parts of the human frame. Such a prefatory explanation being essential to the comprehension of the causes and symptoms of maladies, forms also an appropriate introduction to the whole of the proposed work.

In future volumes of 'The Physician,' it is designed to treat more particularly, but with as much plainness as possible, of the structure and actions of different regions of the body,—as of the organs contained in the chest, in the abdomen, in the head,—and to describe the nature, the usual causes, and the general principles of the treatment of the diseases or accidents most frequently affecting each. The maladies occasioned by different occupations and trades may be usefully introduced into this plan; for there is much reason to believe that the unwillingness with which workmen have availed themselves of the several contrivances intended for their protection when engaged in work destructive to health, has sometimes arisen from their not clearly understanding in what manner the hurtful agent to which they were exposed produced its bad effects upon them.

Unlike the common books of popular medicine, so eagerly purchased by the poorer as well as richer classes of readers, this publication is not meant to supersede an application of the sick to persons competent to cure them, but to show them that it is only in such persons that they can safely trust. It is as far from the intention of 'The Physician' to encourage an incautious use of medicines. By showing the tendency of different circumstances or things to produce disease, and by explaining the nature of the diseases thus excited, and the manner in which remedies are intended and may be expected to act, it is meant to produce greater caution in incurring the calamity of sickness, and more prompt application to skilful men, instead of reliance on ignorant and unprincipled persons, who, with fraudulent promises and impudent pretensions, gain the patronage of the rich, and often contrive to obtain a large share of the honest earnings of the poor and uneducated, leaving them at last with empty pockets and a ruined constitution.

INTRODUCTION.

THOROUGHLY to understand the nature and treatment of any malady whatever, requires a previous and an exact acquaintance with the sciences of Anatomy and Physiology, which describe the structure and the actions or functions of the human body. The structure and functions of all the parts have so mutual a dependence, and so many connexions, that no part can be studied entirely separate from the rest. But a very useful degree of knowledge, both of anatomy and physiology, may be acquired by any one who is able to read, and who possesses ordinary powers of observation; and it is to be regretted that so few persons of liberal education, or so few who are fond of something more than light reading, comprehend these sciences in their plan of reading and study; and that there is, as an almost necessary consequence, so little accurate popular knowledge diffused concerning them. Enough might be learnt, without great trouble, to enable any one to form a tolerably clear conception of the character of many of the most common disorders; and this kind of knowledge, whilst it would protect the public from the frauds of quackery, would also abolish many hurtful customs and habits, and substitute others for them more conducive to

the public health. It would prevent the foolish fears which are every now and then observed to be needlessly excited in the public mind; and, at the same time, show where real danger was to be expected, and how it was to be provided against.

Most people of ordinary curiosity have seen a human skeleton. Connected in the mind, from an early age, with ideas and images of death, the eye of the unprofessional spectator is perhaps turned away from it with a feeling approaching to fear; or, reflecting that such is all that remains of beauty or activity, with a painful sense of degradation. But whoever will give ten minutes to a closer examination of it, in the company of one acquainted with its structure, will find these unpleasant feelings give place to curiosity and to admiration. At once extremely solid and extremely light, the separate bones are seen to be contrived both for strength and for motion. The manner in which the separate bones are united by joints or otherwise, is as curious as anything in mechanics; and the structure of the arm and hand, and of the leg and foot, is singularly delicate, and even beautiful.

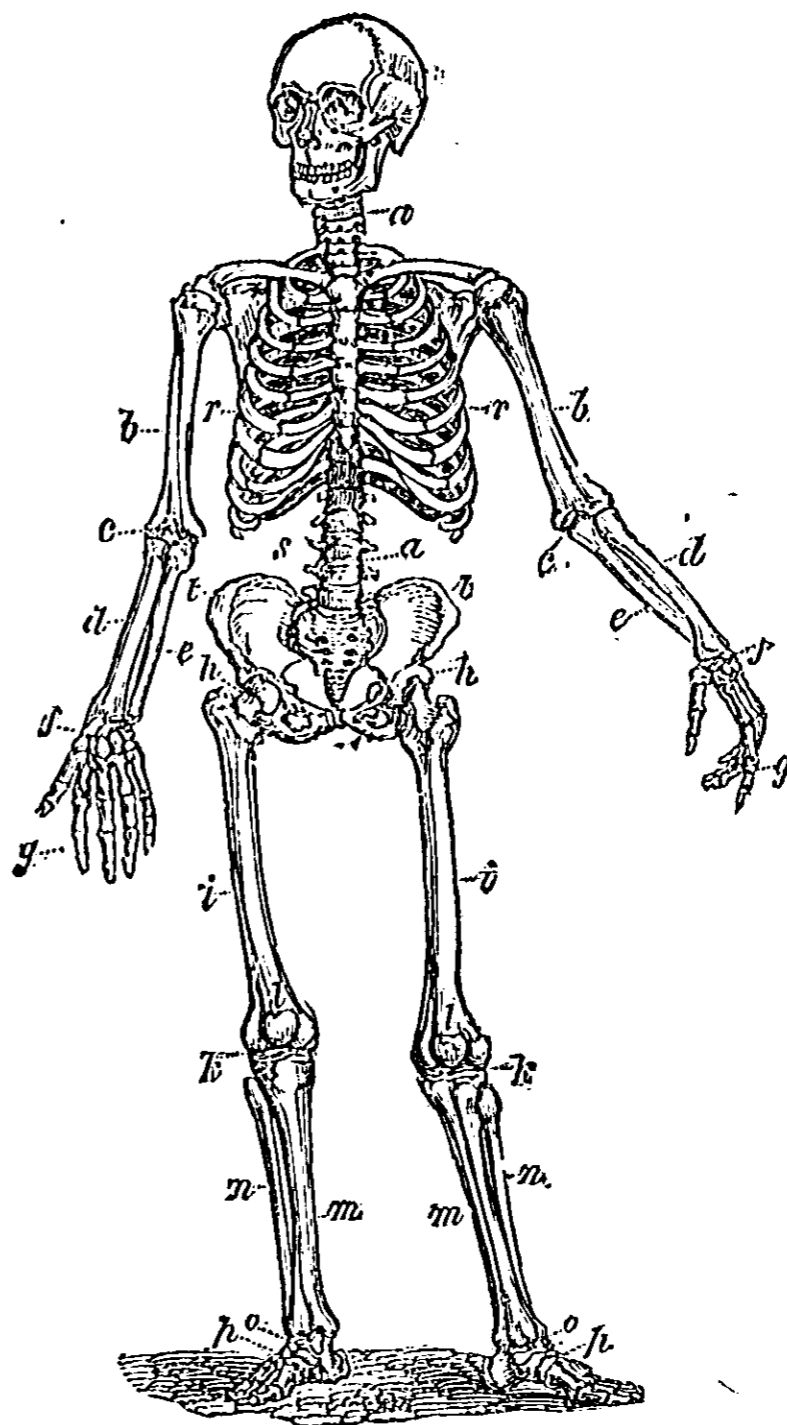
One reflection, in particular, seems very obviously to arise from a first survey of the skeleton. It cannot but be matter of some astonishment, that so many hard bones of such various shapes,—round bones and long, thick bones, and bones like a shell, with all their points, angles, and joinings,—can ever be set in motion without great effort, without pain,

and even without noise. We, who contemplate the skeleton, have within us the same bony supports, the same frame-work, the same scaffolding; yet we move without the least jar or disturbance; we walk, we run, we dance; the bones do not rattle or strike together, even in the leaps and contortions of a tumbler. The arm swings round, and the body bounds upon the feet, and all without noise or shock. This effect, so curious as well to deserve notice, although so common that its notice seems almost ridiculous, is produced by soft substances introduced between the ends, or at the joints of those bones which are not firmly attached to each other. Wherever there is a joint, there is this cushion prepared in some shape or other; and the cushion is elastic or springy, and kept continually moist. It no less exists at the joints of the fingers and toes than at those of the shoulder and thigh. Nowhere is it more beautifully seen than between the bones of the spine, of which, indeed, the separate bones, twenty-four in number, with the various muscles which move them, the various bending and turning movements they produce, and the complete security from injury either of the bones themselves or of the very important part they contain, namely, the spinal marrow, in all common, and in many uncommon movements, present an especial subject of wonder. There never was a machine invented answering so many useful ends, and performing so many actions, with so little wear and tear.

Yet this is only one part of the skeleton. Examine the bones of the arm and hand, and you find a long and very firm bone extending from the shoulder to the elbow, resting its round head in so shallow a socket, for the purpose of performing wide and free motions, that if it were not tied down by the strong muscles which move it, together with all the weights ever grasped by the hand, it would always be slipping out of place. The bone is round, or *cylindrical*, in shape, or nearly so, and has the strength of an arch. At the elbow you see another joint, quite different from that at the shoulder, and exactly like a hinge; not permitting such wide motion, but very free motion in one direction only. When this free motion is exerted, the fore-arm and hand are raised, and the muscle which raises them may be felt to swell almost like a ball, on the fore part of the arm, between the elbow and the shoulder. Two long bones extend from the elbow to the wrist, one from the hinge, and the other, which allows the twisting or rotating of the fore-arm and hand, somewhat loosely tied to the side of it. At the wrist you find a curious collection of small bones, eight in number, like so many pebbles, compactly tied together; and these little bones compose the wrist-joint. Down to the very ends of the fingers you find joints permitting all the motions which are wanted: and the little bones of the wrist, the hand, and the fingers, with those of the fore-arm and arm, moved by contrivances presently to be men-

tioned, contribute very much to give man superiority and dominion over animals, and enable him to accomplish many of his best performances, and to preserve his existence where animals without hands would die in helplessness.

The bones of the thigh, the leg, the ankle, and the foot, are equally deserving of notice. You find the ball or head of the thigh-bone in a deeper socket than that in which the head of the shoulder-bone rests; and the motion at this joint is well known to be more confined: but then the strength of the joint is much greater, for the whole weight of the body and head is collected on the thigh-joints, and moved upon them when we walk. Then there is the long cylindrical thigh-bone; the joint or hinge of the knee,—not so close a hinge as the elbow, but carefully tied and guarded by ligaments or strong bands, and protected in part by a little patch of bone, touching no other bone, and called the knee-pan, or *patella*. Below the knee you find two bones something like the two bones of the fore-arm; at the ankle you see one of them riding on an arch of bones beginning with the round heel bone. How all these parts are used in the exercises of leaping, running, dancing, or even in ordinary walking, it is needless to remind you. How the leg is advanced, how the feet are bent and turned, and how the balance of the body is maintained on so narrow a foundation, is only to be understood by looking at the machinery by which the movements of the bones are effected.



a, a. The spine, or back-bone.
 b, b. The upper arm.
 c, c. The elbow-joint.
 d, d. The lower-arm.
 f, f. Joint of the wrist.
 g, g. Fingers.
 h, h. Ball and socket-joint of the thigh,

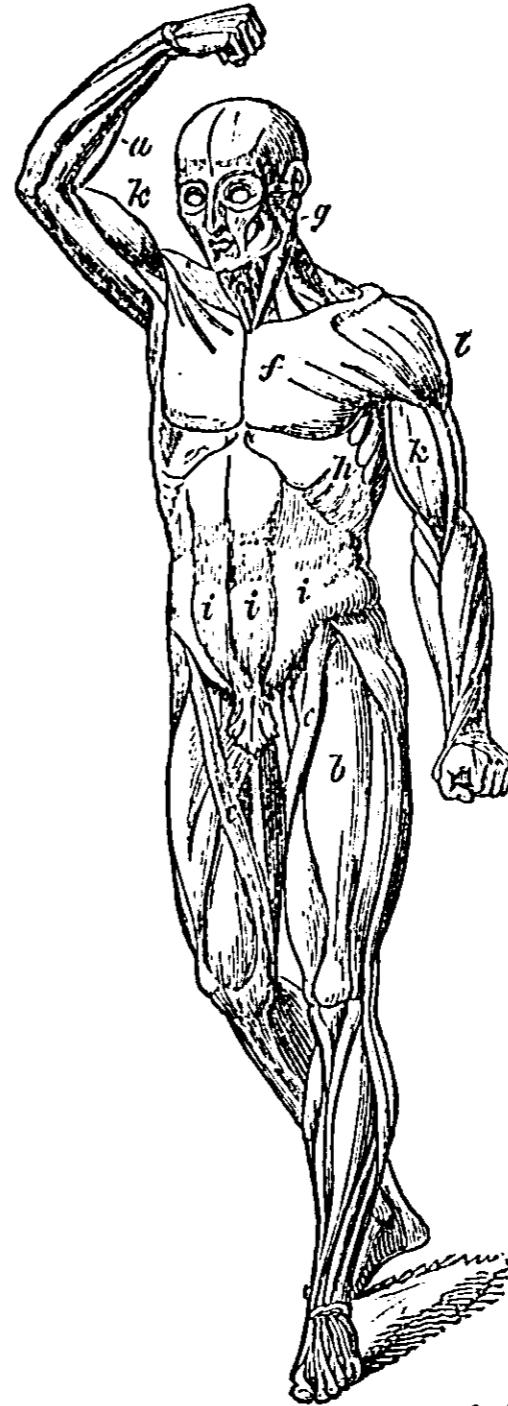
i, i. The thigh.
 k, k. The knee-joint.
 l, l. The knee-pan, or patella.
 m, n, m, n. The leg.
 o, o. The ankle.
 p, p. The foot.

A remarkable part of the human anatomy, generally quite unknown to those who do not study to qualify themselves for medicine or surgery, is that which serves to cover up and to move these firm and supporting bones: comprehending what are called the *muscles* of the human body. These are partly composed of what is commonly called flesh, and partly of a strong, white, shining substance, called tendon. Most of them are tendinous at one extremity, and the tendons of some are very long and slender, and yet possessed of great strength. If one arm, the left for instance, is grasped by the hand of the other, midway between the wrist and elbow, and then the fingers of the left hand are moved, the fleshy portion or fibres of the muscles situated in the left arm are felt to move or to contract, and they may be seen to draw up their long tendinous extremities in the wrist: these tendinous parts are bound down at the wrist, and pass on to the very extremity of the fingers, to move them. Everybody has noticed the tendons which move the toes of a bird,—white and strong strings, by pulling which the claws are made to bend:—in the living bird these tendons, which have now been divided, were moved by the contraction of the thick and fleshy part of the bird's leg above them; the contraction of such part answering to the pulling of the hand at the tendons of the dead bird's foot. Some of the muscles of the arm, shoulder, and thigh may be very distinctly seen throughout almost their whole extent.

Along the front of the thigh there is, for instance, a long and well defined muscle, called the rectus, or straight muscle, broader at its upper part, and gradually narrowing down into a tendon which ends at the knee; this muscle may be seen to act when the leg and foot are stretched forwards. A curious muscle may be seen also in the thigh of those who are not very fat, crossing over like a ribbon from the outside of the thigh to the inside of the knee: as this is the muscle which is brought into action when we sit down cross-legged, it is called the *sartorius*, or tailor's muscle. What is called the 'calf of the leg' is chiefly made up of a broad and thick muscle which passes down and becomes tendinous, and is fixed into the back part of the heel: this muscle is in full action when we rise on the toes, and is very actively employed in dancing. The tendon at the end, bearing or pulling up, on these and many other occasions, the whole weight of the body, is sometimes snapped asunder. The tendon itself is called the tendon of Achilles, because the mother of that ancient hero held him, it is said, when an infant, by the heel, whilst she dipped him in water which was to render him invulnerable.

It would be impossible, without going much more into the description of the different muscles, to convey an idea of the great number that are employed in the simple act of walking. How rapidly they may be moved, and with what exactness, may be perceived by any one who takes the trouble to watch the

THE MUSCLES, Fig. 1.



- a. The muscles of the fore-arm, by the contraction of which the fingers are moved.
 b. The *rectus*, or straight muscle of the thigh.
 c. The *sartorius*, or tailor's muscle.
 f, g. A muscle called the sterno-cleido-mastoid muscle, employed in turning the head.
 h. Muscles which raise and depress the ribs in breathing.
 i, i, i. Muscles which compress and guard the bowels, and assist the actions of breathing.
 k, k. The *biceps* muscle, which raises the fore-arm and hand.
 l, l. The *deltoid* muscle, which protects the shoulder, and is chiefly employed when the arm is raised upwards and outwards.

fingers of a person playing on a musical instrument, or engaged in many of the commonest occupations.

There are also muscles which move the head from one side to the other, muscles which raise it or enable us to hold up our heads, and muscles by which we nod. The nodding of sleepy people is merely the dropping of the head in consequence of certain muscles not continuing to hold it in its proper position. The long muscles at the side of the neck, passing up from the top of the sternum, or breast-bone, to behind the ear on each side, are very plainly seen; and it is these by which a graceful turn of the head is accomplished. Besides these, there are muscles which raise and depress the ribs or chest, and muscles which compress and guard the bowels; there are many muscles for the organs of speech, muscles to open and shut the eyes, and to move the eyes themselves, and various other muscles for various other offices. Those of the face are very numerous, and it is the employment of these, under the influence of the feelings and affections, which creates what we term *expression*. Whoever has diverted himself by watching a monkey, must have seen that in all low, cunning, and mean kinds of expression, that comical animal is almost man's superior:—the face of a horse or a dog is capable of expressing affection, particularly of affection for offspring; but it is in the human face alone that the affections acquire their fullest indication, and that the higher and nobler feel-

ings are depicted,—the external manifestation corresponding with the internal endowment.

The business of muscles being to contract, at the command of the will, or for effecting various purposes not generally directed by the will, any irregularity in their contractions, or any deficiency, or any excess of contraction, is attended with inconvenience. These irregularities may arise from various causes; and when we come to speak of the disease to which the greater part of this volume is devoted, the reader will be particularly reminded of this circumstance.

Looking again at the skeleton, we may observe that it is so formed as to contain, within different cavities, more or less perfect, many organs of the body. The closest, the strongest, and the most complete, is the cavity of the skull, made up of many bones, united in various and singular ways. This cavity is made to hold and guard the brain, by which it is completely filled. The several holes or perforations seen in the sides and lower part of the skull are for the passage inwards and outwards of blood-vessels and of nerves. There is a long canal all down the bones which form that very firm and yet very moveable column of many bones called the *spine*: within this canal is safely lodged the spinal marrow; it is connected at the upper part with the brain, and between the bones of the spinal column nerves pass out from it for various purposes.

The next cavity, not quite so closed and complete in the skeleton, but still very secure,

THE MUSCLES, Fig. II.



- a. The same as in figure I.
 d, d. The muscles called *gastrocnemii*, forming the calf of the leg.
 e. The tendon of Achilles.
 h. The same as in figure

- l, l. The same as in figure I.
 m. A muscle called the *triceps*, by the contraction of which the fore-arm is extended.

and made for motion as well as security, is that of the chest or thorax. Here are contained the lungs, which fill up the whole space except what is occupied on the left side of the chest by the heart. There is a sort of floor to the chest, by which it is divided from the part of the body called by anatomists the abdomen, comprehending all the trunk below the ribs. This floor is composed of a muscle which has somewhat the shape of an arch; it is called the diaphragm, and helps to contract and enlarge the chest in inspiration and expiration, that is, when we take in or breathe out air. It is the leaping or sudden contraction of this muscle which causes the troublesome sensation called *hiccup*.

The next and last cavity is the abdomen, still more imperfect as regards its bony walls, except at its upper and lower parts. Immediately under the diaphragm are placed, nearly in the centre, the stomach, on the right side the liver, and on the left side the spleen. Beneath these are arranged the long and intricate folds of the intestines; first, a very long tract of narrow intestines, and then a sudden enlargement, and a transverse intestine of greater size, crossing over from right to left. The narrow portion is called the small intestines; the wider is sometimes called the large, and is more particularly distinguished into the colon and the rectum. These parts of the body will also be particularly mentioned when we come to speak of the cholera.

Close to the spinal column, answering to the

part commonly called the loins, are placed the kidneys, one on each side. At the lowest part of the abdomen, protected by those solid bones which form what is called the *pelvis*, or bason, are the bladder, and in the female the womb.



Front View of the Heart and some of the large Blood-vessels.

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| <p>a The vein which brings blood to the heart from the trunk and lower limbs, as well as from the stomach, liver, bowels, &c.</p> <p>b The vein which brings blood to the heart from the head and upper extremities.</p> <p>c The auricle on the right side of the heart.</p> <p>d The auricle on the left side.</p> <p>e The right ventricle.</p> <p>f The left ventricle.</p> | <p>g The aorta, or great artery which carries the blood from the heart; it rises from the left ventricle.</p> <p>h and i, The vessels by which blood is sent from the heart through the lungs on each side; they are seen to rise by one trunk from the right ventricle.</p> <p>k The aorta, which, after forming an arch, is descending towards the stomach, &c.</p> |
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The substance and structure of these organs is very various. The brain is in its interior of a white colour, in its exterior reddish or ashy; and there are curious folds and cavities within it. Its substance may perhaps not improperly be described as soft or *cheesy*. It is covered or wrapped up in three membranes, the outer one very firm. The lungs are soft, spongy, exceedingly light, and of a greyish blue colour. The heart is a very strong muscular organ, and has four cavi-

ties; two upper cavities, called auricles, and two lower cavities, called ventricles; an auricle and a ventricle on each side: in its interior there are valves and other arrangements for circulating the blood through these cavities.

The spleen is an organ not much firmer than the lungs, and of a dark blue or reddish colour. The liver is larger, and much firmer, of a reddish brown colour, and having at its lower part a small bladder, called the gall-bladder, for the accumulation of bile. There is a canal or duct from the liver into the upper part of the small intestines, for conveying bile, which has an important office to perform, connected with the perfect digestion of the food. The kidneys are also firm organs, and of a greyish pink colour. There is a canal from each into the bladder. Close behind the stomach, and lying very close to the spine, is a long, narrow, and pale gland, or collection, or congeries of glandular bodies, called the pancreas, or sweetbread; there is a duct from it into the upper part of the small intestines; and the fluid which is formed by the pancreas also contributes to digestion.

But the stomach, the small and large intestines, the bladder, and the uterus or womb, are entirely different from these. They are hollow organs, capable of distension and contraction, and their walls are partly formed of thin and firm materials, called membrane, and partly of a coat consisting of muscular fibres. The stomach and intestines have three coats,—an outer one, composed of what anatomists term

membrane, like a smooth, glossy, delicate, but firm skin, and called the *peritoneum*; a second, muscular, a coat of very delicate muscles; and an inner one, very smooth, called the mucous coat, a lining, in fact, like the lining of the mouth. Now it is to be kept in mind by the reader, that these coats are liable to disease, the inner one more especially; and that the muscles composing the muscular coat are subject, like other muscles, to fits of irregular action, or spasms.

In the living and healthy body, all the inequalities of these bodies, and all the actions going on in them, and all the fluids moving through them, are concealed from sight by the covering of the body, which is so contrived as, without tension, to produce smoothness, and, without being rugged, still to afford very secure protection from ordinary accidents. The outer surface of the general covering of the body is composed of *cuticle*, a substance without vessels or nerves, a mere production for a kind of shield, like the nails, perpetually wearing and renewed like them, and falling off like them after death. Under this is the *true skin*, much thicker, very full of vessels and nerves, and performing important offices. There is, it is to be remembered, a great sympathy between the skin and some of the internal organs,—as the lungs and the intestines,—so that one is seldom affected without the other. Below the skin is a soft substance, called, from its structure, cellular, which fills up hollows, and conduces much to soften the unsightliness

of muscles: this is what we see clinging to the inside of an animal's skin, when the skin is removed by the butcher; who sometimes blows air into its cells to improve the appearance of the meat.

In the dark races of mankind, the skin is covered with a kind of web or coat (*rete mucosum*), which is the seat of colour, and lies just under the cuticle. It is considered to exist, but is not so conspicuous, in the white races also.

It is not easy to give a brief and yet a clear account of the functions performed by all these organs. The attempt lays a writer open to the charge of trying to make a royal road to knowledge. Yet something may be done for the instruction of those who have not time to study the subject more at large. The difficulty is, in such a chain of associated functions, each contributing something to the other, all forming parts of one living whole, to know where to begin.

All the parts which have been alluded to, even the hard bones themselves, are supplied with blood-vessels, or long, flexible, elastic, membranous canals, which take blood from the heart for the supply of the different organs, and to furnish the materials for their continual nourishment, and for all the substances created, or, as it is termed, secreted in them—as bile in the liver; and with another set of vessels, which take the altered blood back to the heart; thus performing what is called the circulation of the blood. The vessels which carry blood *from* the heart

are called arteries; those which carry it *back* to the heart are called veins. The blood which is carried back by the veins is received into the auricle on the right side of the heart, from thence it is passed into the ventricle of the same side; from the ventricle it is driven through the lungs, where, by the air received at the same time by inspiration, it is changed from venous blood, of a dark colour, and unfit for the purposes of general supply, into arterial blood, of a florid colour, and fit to be circulated again. The blood is well known to be *warm*. Wherever blood flows freely, there is warmth; whenever it flows slowly, there is less warmth. This warmth, or animal heat, is supposed partly to depend on the nerves, and partly on what takes place in the lungs.

Very minute circumstances do not enter into the plan of this description, but there is a peculiarity worth observing in the circulation of the blood of the stomach, intestines, pancreas, and spleen; for the blood which is carried to these organs by their proper arteries does not return by direct veins, as from other parts, but is collected into a large vein, and carried by it to the liver, where the vein divides into many small branches, so as to circulate the blood which has already been to the stomach, intestines, pancreas, and spleen, through the liver also before it goes back to the heart. This is very curious, and will be seen to be important, as relates to some diseases.

In future volumes of 'The Physician' an attempt will be made to explain, without the

employment of many technical expressions, some parts of the process of circulation, respiration, and other functions of the body. In this preliminary sketch nothing more than the most general notice of them can be attempted.

When the blood has undergone the proper changes in the lungs, it is sent to the auricle on the left side of the heart, from thence into the left ventricle, and from thence through the aorta, or great artery, into the countless branches which supply all parts of the body. There is hardly any portion of the human body into which blood is not carried. The prick of a pin, or the slightest wound on the surface of the body, produces a drop of blood. The smaller vessels are so minute and numerous as to form a kind of universal network. By processes carried on in their fine and invisible extremities, the structure of every part of the body is kept perfect. The materials of every part are supplied to every part. Bone is deposited in bone; muscle in muscle; membrane in membrane: bile is formed in the liver; gastric juice in the stomach; milk in the female breast. If a part receives injury, these fine vessels conduct the work of repair, cause the adhesion of parts divided, or fill up, with an admirable masonry of fleshy granulations, a hollow wound, or conjoin and cement by new bony matter the fractured portions of the bones.

It is clear that all this borrowing from the blood must be made up again in some way. The supplies being so many, there must be some source of renewal. As the tree, which

from its sap renews all its parts, and puts forth leaves and fruit in season, is supplied through its roots from the never-failing earth, so is the constant exhaustion of the blood, in forming bone, muscle, and the various secretions, supplied by food exercised upon by the organs of digestion. But as man is not, like a plant, intended to grow and decay, to live and die, on one spot of ground, and cannot, like a plant, be supplied without exertion, he is endowed with the appetite of hunger, as well as with the means of moving about; and hunger, with other appetites and desires, keeps him in perpetual activity. The great variety of food in which he indulges is rendered suitable to him by the various arts of cookery, unnecessary and unknown to any of the lower animals. To seek food, to procure it, and to prepare it, constitute no small portion of the business of his existence. It is for this that he braves every climate, ventures upon and converts every eatable part of animals and vegetables to his use, tries every kingdom of nature in search of variety, and incurs or submits to every kind of labour, danger, and fatigue. The sense of exhaustion is insupportable, and to the call of hunger he can never, under any circumstances, be deaf.

When food is received into the stomach, the process of digestion is soon commenced; when the part of the process which the stomach performs is completed, the mass, now converted into what is called *chyme*, is passed into the commencement of the small intestines,

where, by the operation of bile received from the liver, and of other secretions, including a bland secretion from the pancreas, it is changed into *chyle*. As the chyle is slowly passed along the many windings of the small intestines, by the successive contraction of all the portions of them, throughout the whole of their folds, a space equal to many feet in length, it is taken up or absorbed by certain vessels which open into the intestines, called, from the colour of their contents, *lacteals* (from *lac*, milk), and by them carried into a larger vessel, called the *thoracic duct*, which runs up by the side of the spine as high as the neck, and there pours its contents, as a new supply, into the veins, which carrying it, mixed with the blood they contain, to the right side of the heart, it becomes, there and in the lungs, mingled more intimately with the blood, or rather converted entirely into blood, to be circulated through the arteries and veins with the rest.

This supply, it has been said, is intended to make up for the waste or expenditure of blood, incurred by the formation of various secretions, and by the renewal of all the structures of the body. In the body, as, indeed, throughout all the works of nature, nothing is at complete rest. Even the greatest and most solid masses of which the earth is composed are undergoing a slow but silent change. The waters of the ocean are continually yielding up vapours, and these, again, fall in rain and dew, and return by rivers to the sea. The seed becomes a plant, and the leaves and stem fall away when the fruit is

gathered, and mingle once more with the earth, to nourish other seeds. So, also, in the frame of man, the materials are ever changing, new parts forming, and old parts removed. For this removal there are several obvious provisions, and also a peculiar set of vessels, ramifying over every part of the body, called absorbents, which carry away, in a fluid state, those solid materials of the body that were at first formed and deposited from the circulating blood.

This slight survey of some of the functions of the body is sufficient to show how very important is the assistance given by the organs of respiration and of circulation to those of digestion and nutrition; and this may serve to illustrate that inseparable chain of connexion which was before alluded to.

There is, however, yet one very important part of the human body to be spoken of, which is commonly called the Nervous System. It comprehends the *brain*, (subdivided by anatomists into brain, cerebellum, or little brain, and medulla oblongata,) the *spinal marrow*, and all the *nerves*. The office of a large portion of the brain is to perform the working of the mind. Digestion is performed in the stomach; *thinking* is performed in the brain. Certain nerves, capable of receiving impressions from certain external objects, convey them to the brain. The fingers are supplied with nerves, which receive and convey the impressions of touch. The retina, an inner coat or lining of the eye, has a nerve expanded over it, or rather, is formed of nervous mat-

ter, which receives and transmits to the brain the sense of colours. By means of other nerves, the desires, or the will, which are formed in the brain, communicate their intentions to the muscles, and the muscles contract in obedience to the commands thus sent to them. These, however, form probably but a small part of the functions of the various parts of the brain, some of which may be more intimately concerned than they are yet known to be in the government of different kinds of motion, and of the circulation and secretion. The nerves of the body proceeding from the brain, and from the spinal marrow, which is connected with the brain, and another system of nerves in the interior of the body, sometimes called the sympathetic system, being connected with all the rest, are so very numerous, and so variously conjoined, that without drawings or preparations, which are to be seen in museums and in books of anatomy, no description of them could be understood. As every organ is supplied with blood-vessels, so also every organ is supplied with branches of nerves. How universally the surface of the body is supplied with nerves of *sensation* may be known by the pain that may everywhere be produced by slight causes.

We know that a connexion with the brain is necessary to the continued functions of the nerves by this, among other proofs, that if the connexion is severed, the function of the nerve ceases. We know that there are nerves for sensation, and nerves for motion; for we can

put an end to sensation, or to motion, at will, by dividing them. How sensation is effected—how transmitted to the brain—in what manner the will is formed—how its orders are conveyed along the nervous chords to the muscles; all this we know nothing about. But if we are ignorant how thought is carried on, we are no less ignorant how the action of the heart is kept up—how respiration produces the changes which we know it effects on the blood—or in what manner, from one material, the blood, so many materials are so continually produced in the body.

The chain of connexion already mentioned more than once, may here be mentioned again. Strong impressions, of various kinds, upon the nervous system will disturb the actions of the heart, and of all other muscles; will interrupt secretion, embarrass respiration, disorder digestion, and suspend nutrition. Thus fear or joy produce palpitation, or perhaps an hysteric fit: a sense of shame, or an indelicate word, will drive the red blood into the smaller vessels of the face and neck, and produce a *blush*. Bad news suddenly communicated will take away the appetite, and also, to use a common expression, “take away the breath;” and continued low spirits cause the body to waste away and become thin. An imperfect respiration, again, will disorder digestion and nutrition, and thus weaken the secreting power, and debilitate the nervous system itself. An irregular circulation cannot but disturb the lungs and the brain. A depraved digestion

will gradually involve in disorder every organ of the body; impoverishing the blood, lessening the supply in proportion to the waste, without which supply no organ can long continue vigorous; and thus even the brain itself will lose its power.

We cannot but admire the regularity and the tranquillity with which all the processes that have been mentioned are performed, from the hour of birth to that of death, except when interrupted by disease. The changes going on in the lungs, the perpetual action of the heart, the streams for ever flowing through the arteries, the digestion of food,—excite, under ordinary and healthy circumstances, no sensation. When they *do* excite sensation, the sensation becomes a most useful warning of disease—like the bell attached to the steam-engine, giving notice that there is something wrong in the machinery.

If we have succeeded in placing the few facts to which we have limited ourselves clearly before the reader, he will be at no great loss to understand the influence of some of the causes of disease to be spoken of in the following pages. Many of the appearances or symptoms of the disease itself will also be clearly comprehended; and the reasons for recommending certain precautions and means of relief will appear, as we wish them to appear, perfectly intelligible and plain.

The reader may here, however, be usefully reminded, how often those who pretend to cure all diseases incidental to the human frame

by quack-medicines, are without any knowledge of the frame which they undertake to mend. They profess to cure disorders affecting organs, of the appearance and actions of which they are quite ignorant. Regardless of the circulation, the respiration, or the digestion, how they are performed, or in what parts of the body, they undertake to keep all in perfect repair; and the bone-setter follows in the same track, pretending, by violent methods, to cure dislocations and other injuries of the joints, without so much as knowing how one joint differs from another. Surely, no man of common sense, who has had the means of getting a little insight into these particulars, should trust his body to be repaired by a man ignorant of its make and actions, with any more readiness than he would trust his watch to a workman who knows nothing of its spring, its wheels, and its motions.

A single example will make it evident enough that the proper management of diseases, whether they are but beginning, or have made serious progress, requires a knowledge of the form, nature, offices, and connexions of parts. Suppose a case, for instance—too common a case—in which a working-man, living in a large town, finds that somehow or other his health is altogether giving way, and that he seems to be “breaking up.” When he goes to his dinner he has little or no desire to eat; when he goes to bed he lies restless and tossing without the refreshment of sleep, and he feels sick when he awakes; his

fellow workmen tell him he is wasting away, and he observes when he puts on his best coat that it hangs loosely about him; his hand is becoming unsteady; he finds that his work causes him to perspire more than he did; and he sometimes thinks his memory begins to fail him.

Now, if a man feels all these awkward symptoms, in what ought to be the prime and vigour of his life, the best thing he can possibly do—the only wise or safe thing he can do,—that on which his comfort, his strength, his independence, his very life, depends,—is to go at once to the best physician in his neighbourhood.

The physician will hear, very patiently, all that he has got to say: he will feel his pulse, and find it quick and feeble; he will feel his skin, and observe that it is harsh, and perhaps dry and hot; he will look at his tongue, and find it white; he will examine the condition of those parts of the trunk of the body where the stomach, the liver, and the spleen are situated; and perhaps he will find a little tenderness, or a little fulness and enlargement there; he will see that the patient's complexion is pale, or sallow—that the arteries and veins of his eyes and eyelids are distended with blood—and that there is a flabbiness of his muscles, and occasional swelling under the skin, as of the eyelids, arising from a peculiar state of the *cellular* tissue under the skin.

In these and other appearances, the physician sees more plainly than any words can speak,

that his patient's ailments have been produced by GIN-DRINKING. The patient finds that the doctor understands his complaint, and perhaps makes no attempt to deceive him, but tells him how long ago it is since he first learnt to raise his spirits by a dram—how this became more and more necessary to him—and how many glasses of gin he has at last come to drink every day of his life.

It "needs no ghost," as people say, to tell the poor man that this will not do—that he must leave off drinking, or that he will soon be in his grave. This is as plain to be seen as possible: the doctor tells him so; but only tells him what any old woman would tell him who sees him walk along the street. Something more is wanted: health must be restored; life must be preserved. But how is this to be done? Only by a careful study of the actual effects of ardent spirits on the actions of the body, from which effects those outward symptoms of paleness, and bloatedness, and trembling, and those inward symptoms of lost appetite, and weakness, and a muddled brain, arise.

These effects are only truly and completely understood by one who has had several opportunities of seeing how such symptoms begin, and in what they end, and what changes are found to have been wrought by examination after death. All this the physician knows full well. He could tell the patient the very colour of his liver—what changes of colour and hardness spirits have made in it. He can under-

stand how the stomach has become feeble and irritable by the constant disturbance which strong stimulus has given to its nerves and its blood-vessels. He knows how the hardened liver must interfere with the proper return of blood from the stomach and bowels, and what general discomfort this must create, and what obstacles to proper nourishment. He perfectly understands how the brain itself has become troubled by the frequent excitement of its numerous blood-vessels; and can thus explain the restless nights, and the confused state of the understanding, and even the trembling of the hands:—he sees, too, the outward proofs of this excitement of blood-vessels in the blood-shot eyes.

Long attention to disease has taught the physician something more. He can tell the unfortunate patient, as surely as any prophet could tell him, how he will be, if he goes on as he is going on, six months hence, or a year hence. He can tell him, for he perfectly well knows, that he will in that time be unable to eat enough to nourish him; that drink will become more and more necessary to him; that he will become wasted to a skeleton; that the trembling of his hands will go on to complete loss of power to work; that the confusion of his mind will go on to the utmost mental weakness and stupidity; and that if he is not carried off by inflammation of the liver, or by fever, or by consumption, or by dropsy, or by the *cholera* (which carries off many of the drunkards), he will linger out his life in

the workhouse, poor, paralytic, and deserted—or, becoming insane, be sent to a lunatic asylum and die a madman.

For all this prophecy the physician could give the most exact reasons. There is nothing of fancy in it,—it is all truth.

Alarmed by hearing all this, or even part of it,—and having sense and strength of mind enough left to resolve to leave off drinking, the patient promises solemnly and sincerely to follow the doctor's good advice in all things. The doctor takes measures to lower the excitement existing about the stomach, or liver, or brain,—to improve the strength, and to restore all the functions that are failing; and such is the power of medicine, properly applied and diligently persevered in, and combined with strict attention to proper food and drink, that in the course of a few months a man may recover even from the lamentable state that we have described.

The other side of the picture will not require to be dwelt upon very long. Instead of going to a physician, the poor man goes to a quack-doctor, who knows little and cares less about either his stomach, or his liver, or his brain,—who is utterly ignorant and regardless of the nature of digestion and nutrition, and of all that relates to the vigour and steadiness of the muscles, and to the general functions of the body and mind. *His* object is very simple, being nothing more than to cause the patient to swallow as many bottles of his medicine as possible before he dies. He has but one me-

dicine; but it is proper for anything, for any disease; good for the stomach—good for the brain—good for the liver—good for the legs. Provided the patient will take this medicine, he may take as much gin as he pleases. It is probably a violent stimulant, and adds to the mischievous excitement,—adds fuel to fire; or it is a violent purging medicine, or acts violently on the skin, or on the kidneys, and lowers the patient very rapidly. At length the unhappy man, thus deceived and trifled with, feels that death is approaching; and when he sends for a physician from the nearest Dispensary, or applies at the Hospital, which he might so easily have done before, it is too late to do him any good.

It is part of the object of this little book to teach the poor man better; to guard the working-man by knowledge; to show him that man is 'fearfully and wonderfully made;' and to convince him that whoever undertakes to keep the body in repair, ought really to know something about the way in which it is put together, by what laws its working is governed, and how the working may be set right when anything has put it out of order*.

* The reader who is desirous of more information concerning the structure and functions of the human body, may peruse with advantage the Treatises on Animal Mechanics, and on Physiology, in the Library of Useful Knowledge. An edition of Paley's Natural Theology, a book equally instructive and delightful, will shortly be published by the Society; in which, also, many of the contrivances in the human body are placed in a very striking point of view.

CHAPTER I.

OF DISEASES SUPPOSED TO ARISE FROM
CERTAIN STATES OF THE AIR.

For reasons very imperfectly understood by man, human beings are exposed to various causes which disturb the actions that have been mentioned as going on in the frame of the body and mind, and produce disease. The most common cause of disease, however, is some kind of excess, which it is the business of the reason wherewith man is endowed to restrain, or some privation or want, which his instinct prompts him to supply. Thus disease is daily produced by excess in eating and drinking, by excess in exercise, or again, by want of good and nourishing food, and want of exercise. But there are causes of disease against which it is more difficult, if not quite impossible for man always to protect himself: there are changes continually going on in the atmosphere which surrounds him, and which it is essential that he should breathe; some of which changes invariably tend to disorder him. The temperature, or warmth and coldness of the air, for instance, is very variable in different seasons, in different climates, and in different hours of the day and night. Its dryness and moisture vary considerably. The quantity of electricity in the atmosphere is also liable to

variation, and the variation seems to affect the human body.

Besides these changes, which are constantly going on, there are other varieties in the air, not dependent, as far as we know, on any alteration of the materials of which the atmospheric air is composed, and yet which very seriously affect the health of man. Every one must have observed, that there are certain times in almost every year in which scarlet-fever and the measles make their appearance; almost all children who have not before had these diseases, becoming about the same time affected with them. Another disease, also, very different from the measles or scarlet-fever, being attended with little fever and no eruption, evidently depends on some peculiar condition of the air, which now and then prevails for a time, and then disappears,—namely, the whooping-cough, a spasmodic affection of the organs of breathing, supposed to depend on some irritation of the nerves which supply the organs by which breathing is performed. It is sometimes found that the three diseases just named are prevailing at the same time in almost every part of England. Sometimes they prevail very partially, being common in one town, and not seen at all in a town twelve or fifteen miles distant from it; and they are even sometimes prevalent in particular quarters of a large city, and not in others. After prevailing for a time, they disappear altogether; for although they are supposed to be communicated by those who have already caught them, to others who

have not had them, this communication seems to cease, also, when the peculiar state of the air is at an end in which persons may take the disease even without personal communication with those already affected.

The same circumstances are observable with respect to the common fevers of this country. In different years, they are more or less prevalent, and very different in their character; not only different in the degree of excitement which attends them, but in affecting, in their course, different organs of the body with inflammation rather than other organs. Sometimes there is very little excitement, and the fevers of such seasons are said to be typhoid, or low fevers; sometimes there is greater excitement, and the fevers are said—not very correctly—to be inflammatory; sometimes it is observed that the majority of patients affected with fever are attacked, in the course of it, with inflammation of the lungs: and after a few months it is found that very few of the cases of fever are attended with inflammation of the lungs, but almost every case becomes complicated with inflammation of the bowels.

There seems, occasionally, to be a connexion between mere temperature, the warmth or coldness of the weather, and certain of these varieties. In the East Indies, it is a general observation, that the greater heat of the climate has a particular action on the liver, stomach, and intestines, and constantly gives a particular character to the fevers prevailing in those regions of the earth. It is also observed, that

the yellow-fever, so common in the West Indies, and so fatal to the troops sent from England, only prevails in those years when the heat has for some time remained steadily above the summer heat of our climate. It is for this reason, perhaps, that at certain heights, even in the climate in which yellow-fever prevails, it never appears. The height of about 1800 feet above the level of the sea seems to be its limit*; but this has been accounted for by the supposed weight of the noxious air, or *malaria*, which keeps in the lower regions. On the other hand, the plague, which every year prevails on the eastern and southern shores of the Mediterranean sea, disappears as the summer advances; so that on a particular day, about Midsummer, a gun is fired by the Turks as a formal announcement of its departure.

In other cases, there is every reason to ascribe disorders to circumstances closely connected with the moist air of marshy places. In some parts of Lincolnshire, and Cambridge-shire, and Essex, the *ague*, which is an inter-mitting fever, coming on every day, or every other day, or, in some cases, every third day, and consisting of three stages,—a shivering or cold stage, during which the patient is affected with violent and universal tremor; a hot stage, in which his face becomes flushed, and he is sometimes delirious; and a sweating stage, with which the attack goes off;—is continually to be met with: and the parts of these counties where it is thus met with abound in marshes.

* Humboldt.

In Holland, a low and damp country, the same disorder is very prevalent; and, after the giving way of the dikes a few years ago, when a large tract of land was laid under water, the disease was nearly universal throughout that district, and almost every Dutch sailor who came to London brought the ague with him. In some parts of Italy, as in the famous Pontine marshes in the neighbourhood of Rome, the same disease extensively prevails, and has, we know, prevailed for at least two thousand years. There is no situation so abounding in ague and other fevers, as the *rice* grounds in Italy, in North America, in India, and on the coast of Guinea; in the latter situation, a European can hardly sleep a night on shore without catching a fever; but the negroes who are born there live and thrive. The rice-grounds are frequently allowed to be covered with water, and then to become gradually dried by the sun. Since inclosures and draining have become general in England, agues have become rare. There is hardly any part of England in which the older inhabitants do not tell you that when they were young, agues were common, and that now they are seldom heard of; and, about two thousand one hundred years ago, Hippocrates, an ancient Greek physician, who is usually called the father of physic, finding that the city of Abydos was very unhealthy, and much infested with fevers, advised the draining of the marshes near it, and the fevers disappeared; so that altogether the connexion between marshy grounds and fever,

especially the kind of fever called ague, is very evident.

It is generally believed that, in all these cases, whether of fever, yellow-fever, plague, or ague, it is neither heat alone, nor moisture alone, nor any variety of either, nor any combination of both, that is solely concerned in their production. Something hurtful is supposed to be added to the usual air,—something hurtful, but which science has not yet succeeded in detecting. It cannot be seen, or tasted, or touched, or smelt; it has neither palpable substance or colour; but we believe that it exists, because of certain effects which we know *not* to arise from those parts of the air which we *can* see and examine.

It is possible, although such a supposition is not countenanced by medical authorities, that the hurtful agent may, in all parts of the world, be one and the same; and that certain combinations of temperature, moisture, and electricity only give to fevers a variety of characters at different seasons, in different parts of the same country, and in different climates: sometimes causing a difference in the character of the fever itself, sometimes directing the principal force of the disease to some particular internal organ, and sometimes throwing it out upon the surface.

All that we can say at present is, that the varieties of the diseases called, from their partial prevalence as to *time*, *epidemic*, do not depend on any *known* changes in the consti-

tments or materials of our atmosphere*. The different kinds of air of which the atmosphere is composed, exist in the same proportion to one another, as far as trials have been made, in every part of the earth,—on the summits of the highest mountains, and in the deepest mines,—even at the greatest height to which balloons have ever ascended,—and are the same in crowded cities, and in solitudes where scarcely a living creature breathes.

Happily, however, experience has taught us many means of mitigating, and even to a certain extent, of avoiding, the effects of the unknown agent. By extensive improvements in cities and in modes of life, some of the worst effects are now very rarely seen in our country; and others unknown among us are mitigated, where they are yet known, by the science which medical practitioners carry into other climates. Even the common disorders of measles and the scarlet-fever, which used to be, in certain years, almost as destructive as the plague, are now so far controlled by proper management,

* The ague belongs to a class of diseases called *endemic*, being partial as to *place*; and the causes of endemic diseases are commonly pretty well understood. Some endemic disorders, however, as the swelled neck or goitre, or bronchocele, as it is called by medical writers, depend upon causes about which there is yet much difference of opinion. The swelled neck chiefly prevails in the low and damp vallies of mountainous districts; as in the Alps, which divide Italy from France and Switzerland; in the Pyrenees, which divide France from Spain; and in Derbyshire and other hilly parts of England.

that very severe cases form an exception to their general character. In some years, they show a more general disposition to severity than in others; but this disposition is so checked by proper care and treatment, that it never becomes uncontrollable. The fevers of this country only present their most terrible features among patients whose situation shuts them out from the means of prevention or cure which modern physicians know how to employ. The general character of our fevers has been so completely changed by alterations in the manner of living, and in the practice of medicine, that for the last hundred and sixty years, or since the great fire of London, the word *plague* has not been mentioned in the bills of mortality; although there are many reasons for believing that the disorder of which so many thousands died in London a few years before that event, and which is commonly known as the Great Plague, was but our common fever in its most severe and exaggerated form. So also the dreadful dysenteries (or 'bloody-flux,' so much spoken of by the writers of that period,) are now nearly unknown in this country; and severe cases do not occur in such numbers as to give to the dysentery the character of a dangerous epidemic.

These good effects arise, in a great measure, from our streets being drier and better paved, and cleaner, and from the houses and persons of all classes being kept in a greater state of neatness. In cities, or in parts of cities, where

the old neglect prevails, the worst diseases prevail also.

Among the descriptions left by Sydenham, a famous physician who practised in London at the time now alluded to, we recognize, existing at the same period, various forms of fever, from the slightest up to the plague itself, and also various forms of irritation of the bowels, including the dysentery, as well as some instances in which the symptoms very closely resembled the cholera itself.

The very severe cases resembling cholera, although spoken of by the older writers under the title of plague, have, like the very severe cases of fever to which the name of plague was so often given, nearly disappeared from England, or, at least, have become so rare, as not to excite any general alarm. Not a year passes without one or two epidemic fevers visiting this country, in the course of which those medical practitioners who see much of the patients in the most miserable quarters of large towns—as in Drury-lane, and the courts of Gray's Inn-lane, in London—and sometimes even those who practise in the country, meet with cases answering to the worst descriptions of spotted fever and plague, as they are described to have existed in England. Not an autumn passes without many cases of cholera being met with, *a few* of which present the most severe and frightful symptoms of the malady. But, generally speaking, the habits of the people, the state of our towns, the cleanliness of private

houses, and a judicious treatment, so control and modify these diseases, that the severe cases still continue but exceptions.

We have this year had what is called an 'old-fashioned summer;' such a continuance of fine weather as we have not for many years been favoured with. Nothing has seemed to indicate that any causes of disease were hovering over us. Yet, in the early part of the summer, there prevailed all over England, and almost all over Europe, a disorder affecting the lining of the windpipe, something like a common cold, but attended with pain of the head, and violent nervous disturbance, so as to acquire the appellation of an influenza. Hardly had this disappeared, when another form of disease arose, in which the lining membrane, and probably the nerves, of the stomach and bowels were affected,—some of the patients having sickness, others diarrhœa or looseness, a few dysentery, and many what we call the *English* cholera, but more severely than usual; whilst in some parts of Europe, a cholera unusually severe and fatal, advancing fast from one city to another, and from one country to another, has reached the north-eastern part of our own island.

It is to be acknowledged, that in the opinion of the greater number of medical authorities, the plague is a disease quite distinct from our common fevers, even of the worst kind; and the cholera of the East, and that now prevailing on the Continent, a distinct disease from any form of our English cholera. The deter-

mination of this question cannot affect the historical truth of the foregoing observations: but the general dread now existing of the appearance of cholera in its worst form—in a form which has proved alarmingly fatal for many months past in many cities of Europe,—gives to a description of this disease as it has at different times appeared in various parts of the world, and in this country, a great degree of interest; and an exposition of its nature cannot fail to impress on the minds of those who peruse it the best methods of avoiding it, or of controlling its ravages.

That the disease has actually appeared in England is no longer a matter of doubt. That it has already carried off many of the aged, the sickly, and the intemperate, at Sunderland, is stated by a physician who is well acquainted with the Indian form of the malady*. Its progress from Sunderland to other towns, although slow, has been certain;—and in one place, Gateshead (a close and dirty neighbourhood connected with Newcastle by a bridge across the river Tyne), it seized upon its victims with a frightful energy †. But whether the progress of this disease be slow or rapid, every man in his senses will do his best to guard against it, and spare no pains to understand what may be expected, and how it may be best overcome if it should attack him.

* Dr. Daun.

† See Postscript, p. 204.

CHAPTER II.

DESCRIPTION OF CHOLERA.

THE disease which is called *Cholera*, or Asiatic Cholera, or *Cholera Morbus*, or *Spasmodic Cholera*, is often spoken of as one which was unknown until about fifteen years ago; but it is evident, from the description of the older writers, both of India and of Europe, that the disease had frequently been seen before. Its appearance is shown to have generally been as sudden, and its attacks to have been as violent as in later times. Persons in full health became all at once seized with convulsions, and died in a few hours; the disease in these respects resembling one which the Indian writers describe, if not indeed the very same disease, and in which the whole case is often comprehended in the words "*Being seized with vomiting and purging, he immediately died.*" In the year 1781, a division of Bengal troops, under the command of Colonel Pearse, was attacked by the disease with as much fury and with results as fatal as if it had encountered the enemy: men who seemed to be in good health became suddenly ill, and dropped down "by dozens," dying almost im-