Lectures on medical pathology : delivered at the London Hospital in the summer session, 1885 / by Hy. Gawen Sutton.

Medical Pathology

H. Gawen Sutton

Baillière Tindall & Cox

LECTURES

ON

MEDICAL PATHOLOGY.

DELIVERED AT THE LONDON HOSPITAL IN THE SUMMER SESSION, 1885.

BY

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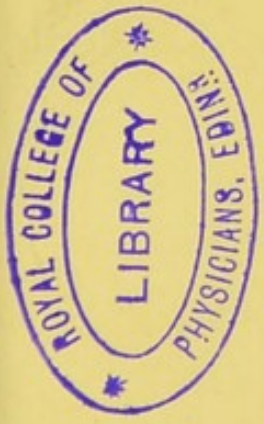

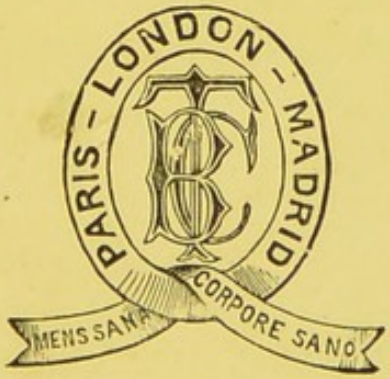

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PREFACE.

To the Students of the London Hospital.

GENTLEMEN,

At the outset you would, I feel, wish me to express our united thanks to Mr. J. Cavendish Molson for his intelligent and patient industry in taking the shorthand notes of these lectures, and subsequently reproducing them; by so doing he made their publication possible.

In accordance with your desire, I have revised the notes, and whilst so doing have often felt that I should like to spend years in their revision; but I cannot complain, for I have been granted many years to gather what I have therein told you.

The manner of expression is inadequate. I doubt if any person will recognise that more fully than I do; but I may add that I have endeavoured to do my best.

These lectures were, as you know, delivered spontaneously, so that you might learn from their merits and their defects. That spontaneous character I have tried to retain, and only added and altered where I thought extension called for, to make them serviceable in your daily practice.

Permit me here to tender you my grateful thanks for the gentle and patient encouragement that you freely

afforded me whilst I was delivering them ; in so receiving them you helped me much—in fact, enabled me to deliver them.

Throughout, you will have perceived that I have endeavoured to show that we study Pathology—the science of disease—in order that we may find out the way to go and become medical men. As we travel on, we discern that we must take the course in its natural order : be men to become medical.

In studying Anatomy and Physiology we are allowed to learn that the human body is magnificently constructed for great usefulness—adapted for achievements to an almost unlimited extent ; for its organized arrangements are designed to co-operate continuously, to progress continuously, and to be renewed with the elements and beautiful things of the outer world. So it is evident, and experience manifests, that success in Medical Art is attainable if the bodily conditions are allowed to go naturally.

In our labours we cannot fail to feel that the perfection of these means is beyond expression of admiration and praise ; we can only hope that they will lead us to give their Constructor our reverence and love, in order that we may become gentle servants.

In seeing how wonderfully the living body is made to work exactly in accordance with the conditions of the outer world and universe, we are brought to recognise that we have ourselves, as medical men, to go the way to become correspondingly exact in our daily doings. To become able to teach how weakness and failure, by processes of orderly exchange, pass into strength and success. In fact, we are brought, and have to bring others, to see that success comes

by failure, if the failure be properly regarded—the conditions really seen; for they are working together with the renewing elements around, thus interwoven with curative agencies.

Medicine, the curative proceeding, is an exact, because a natural science. The dog licks his lacerated limb, and it heals; we, as human creatures, may even apply cold water continuously to our torn flesh, and it heals, as if in spite of our efforts; but to make our 'medicine' an exact science, we must take to heart the truth that 'He who would command Nature must obey her.'

In our travel to become medical men, and at the beginning we take a surface view, disease is considered merely symptomatically and nominally, what may be spoken of as dogmatic medicine. We must first perceive the surface signs — view the disordered superficies of things. And with plausible manner we endeavour to lead; but, as we travel further and deeper, and often take a header into the Pool of Despond, we endeavour to get free enough from surface entanglements to see into the circulations; then the plausible leaves us: and as we cast our lingering regrets behind, we cannot but feel distressed that Plausible is handled so hardly by his friends for not knowing better than to go with us so far.

To reach the domain of perception and become reasonable, we must go through the rough—take the rough with the smooth—so that our eyes may be opened; otherwise we are soon caught by Giant Despair, and we wander all our days amongst dead men's leavings; and we are not present when we are wanted and called for. To get our eyes open, to be men, we must not fear to make mistakes;

the old teacher has urged upon us all not to be afraid to be fools, but to be a fool for man's sake. Let us take to mind what the mountebank said in the beggar's kitchen: 'The chiel that's a fool for himself, gude Lord, he's far dafter than I.'

Let us be fools, rough and ready as the treatment is; trenchant fools when needful. We have often to ask, 'What is the use of being too serious when we are in the sea of difficulty?'—to float we must be easy.

In so doing we come to feel, and thereby to know, what is indispensable to get through disease: we gain the tension to enable us to proceed; but to possess that tension we must trust our senses to the utmost: it comes by contact. And I may add that I daily increasingly learn the value of what Lucretius first taught me: 'In vain has man tried to prove that sense can ever err.'

The senses can no more err than the reality can err; but in the working of the senses we, by our pre-conceived notions, are illuded and deluded by the shifting conditions and appearances; and even old crafty counsellors are thus delayed by the sirens, for they do sing sweet lullabies. But if we go on trusting the senses, we come to perceive until we recognise that we vegetate and actually are animals with reason; that we are guided sagaciously and instinctively like animals, whilst we feel our way to reason through bewildering collections of disease and health.

So we come to know that by following the working of discord we are guided to harmony. As the engineer, by following the working of friction, is enabled to divert and appropriate energy, so, by following the workings

of disease, we are guided to know how to go for health.

We are thus led to show that a medical man has two great duties—to afford relief, and to guide persons to see how wonderfully capable in its functions human nature is, if it be naturally taken; and so endeavour to prevent disease and promote happiness. The very fitness of the bodily conditions reveals that happiness is the birthright of human creatures, and ancient teaching has shown beyond question that the soul is joyful in doing. All men long to be useful, and it is our business to guide them to succeed.

But success depends on unity. We, therefore, must work and feel as one in our own natures; be thoroughly one—thorough in our right, thorough in our wrong—until we come by progress to see the relativity of things, of truth. So rational medicine dawns upon us. We perceive that 'there is nothing either good or bad, but thinking makes it so.'

We are brought to recognise that disease in human creatures, as in animals and plants, comes from restricted views, untimely forcing, and limiting too much. If you would study that in nature at large, look carefully into Darwin's great works. Amongst other treatises, read his teaching on animals and plants under domestication. There is collected a mass of evidence revealing that disease comes from too limiting interference.

So we discern that disease is the result of unrest, rest being helpful, because it is the timely taking of a position of safety. In disease, living creatures are not allowed to take up a restful position—that is, a position of certainty, a sure footing—and travel onwards according to their

wants—natural happy progression ; their feeling of ease is interfered with : and I have laboured to guide you to inquire how ease comes and is lost.

You will, I have little doubt, be often impressed and instructed, as I have been, by hearing and understanding persons exclaiming how delightful is the internal feeling of rest. Let the light guide you.

The Social Economist, perceiving how distorted are Society's proceedings, how baneful to order, has openly said, 'Society prepares the crime and thus makes the criminal.' Similarly with disease ; and we need not look far in order to trace its antecedents and producers.

As we travel on and see how it is so, we come to recognise that disease, the distracted feeling in our wearied patients, is the outcome of society, and its individual disorder. However desperate the patient may seem to be, he may frankly tell us that we are mad and not himself, for he is doing his utmost to get out of the disorder—yet we are taught to recognise that he speaks truly. And as he struggles on fearfully through many tortures, and his agonizing sweats tell us how his tensions are strained, and we feel our own correspondingly strained, we come to realize how awfully cruel is the mistrust of human nature, what miserable failures are the systems invented to improve it. And I have had to say to the gentle mind, sitting sternly upright, silent in its madness, grim in its forbearance, 'The grand thing is to go off our heads when it is necessary.' We thus gain freedom, and come to see how worthless are the opinions we worshipped ; how different things are from what we thought them ; how much more sweet and merciful we ourselves become as we really know. And we are enabled

to go the way and deny ourselves, because we have knowledge of poor self; and as we know ourselves, we trust others because we trust ourselves. And whatever tempestuous proceedings we may be coursing through, we may prosper and every day learn from others, and feel in ourselves, that—

> 'As the morning steals upon the night,
> Melting the darkness, so their rising senses
> Begin to chase the ignorant fumes that mantle
> Their clearer reason.
> Understandings
> Begin to swell, and the approaching tide
> Will shortly fill the reasonable shore.'

You will have noticed that I often quote Shakespeare, for he knew human nature.

I have learnt to see, as the 'History of Civilization' teaches (Buckle), that the poet is the forerunner of the philosopher and the practitioner, because he is a maker by seeing how things are made and are enabled to progress.

H. G. S.

9, Finsbury Square,
September, 1886.

ERRATA.

Page 2, line 31, *for* 'past' *read* 'through.'
,, 3, headline, *for* 'FRICTION' *read* 'FUNCTION.'
,, 4, line 13, *omit* 'or conscious.'
,, 14, ,, 18, *for* 'form' *read* 'cause.'
,, 16, ,, 22, 23, *read* 'So that in inflammation of a mucous membrane there is,' etc.
,, 17, headline, *for* 'IN' *read* 'OF.'
,, 17, line 15, *omit* 'and' before 'ulceration.'
,, 18, ,, 20 to end of paragraph, *read* 'fibrous tissue, namely fibrin, and this may be organized into what is known as fibroid tissue. This is the great distinction between the inflammations of mucous and serous membranes.'
,, 20, ,, 2, *read* 'from the throat and tongue, and catarrh,' etc.
,, 22, ,, 29, *for* 'This serous' *read* 'The serous.'
,, 25, ,, 33, *for* 'lungs' *read* 'larynx.'
,, 29, ,, 6, *for* 'gland' *read* 'lung.'
,, 32, ,, 11, *for* 'ureter' *read* 'urethra.'
,, 44, ,, 5, *for* 'other' *read* 'often.'
,, 61, ,, 11, *insert* 'or' after 'supplementary.'
,, 69, ,, 21, *for* 'spirical' *read* 'spherical' in each instance.
,, 74, ,, 33, *for* 'pneumonia' *read* 'broncho-pneumonia,' and also on page 75, line 1.
,, 76, ,, 11, *read* 'Cases of vesicular pneumonia of children are found,' etc.
,, 89, ,, 3, *for* 'cases' *read* 'condition.'
,, 130, ,, 32, *for* 'Simple ulcer' *read* 'Simple chronic ulcer.'
,, 131, ,, 15, *for* 'these vessels' *read* 'the vessels.'
,, 132, ,, 25, *omit* 'more.'
,, 133, ,, 1, *for* 'deeper' *read* 'deep.'
,, 153, headline, *for* 'THEINE' *read* 'URINE.'
,, 153, line 4, *for* 'signs previous' *read* 'previous signs.'
,, 154, ,, 22, *for* 'rapid tension' *read* 'rapid increase of tension.'
,, 157, headline, *for* 'IN' *read* 'ON.'
,, 157, line 17, *for* 'passed by urine' *read* 'passed in the urine.'
,, 158, ,, 22, 23, *for* 'embolimapis' *read* 'emboli.'
,, 161, ,, 18, *for* 'surface fine' *read* 'fine surface.'
,, 161, ,, 21, *for* 'their cortex' *read* 'the cortex.'
,, 165, ,, 18, *omit* 'other.'
,, 165, ,, 26, *for* 'thrombolic' *read* 'thrombic.'
,, 167, ,, 23, *for* 'much persistent albumen in urine' *read* 'much albumen persistently in the urine.'
,, 168, ,, 11, *for* 'and' *read* 'or.'
,, 177, ,, 1, *for* 'within' *read* 'with in.'
,, 179, ,, 13, *for* 'from diseased vessels which occurred' *read* 'or that which occurred from diseased vessels.'
,, 180, ,, 23, *for* 'unconscious' *read* 'conscious.'
,, 205, ,, 2, *insert* 'by' before 'lungs.'

MEDICAL PATHOLOGY.

LECTURE I.

NATURE OF DISEASE.

PATHOLOGY teaches the maxims of rational practice. If a medical man does not know Pathology he must practise empirically.

We define for the sake of thinking further. By Pathology is meant 'a knowledge of suffering and disease.' Then comes the question: 'What is disease?' The great power f nature, unhindered by human ignorance, is always acting 'easy;' this is seen beyond dispute as we study the human body in the construction of the joints, serous surfaces, the heart and vessels; but we in our ignorance hinder the working, and bring about uneasiness, disease, incapacity—and that is the origin of pain. John Hunter taught that all disease and deformity is the result of the abuse of natural laws.

Health, then, is going 'easy' in everything. It is going safely, without dangerous friction, because it is going with great ease. 'We do that best which we do easiest.'

A German pathologist writes: 'Scientifically speaking, we cannot say that any person is healthy'; and that is obviously true, but real education teaches how to go and to work most easily and happily.

Disease may begin at birth, or even before. The child

cries when it is born, because it feels, as Shakespeare says, 'that it has come on to the stage of fools.' It has its mouth stuffed with butter and sugar, its belly cramped, and its legs not allowed to kick. It has come on to the 'stage of fools.' And the study of pathology reveals that one and all the functional blessings of man are abused into disease.

We make post-mortem examinations in order that our senses and reason may come in contact with what disease has done, and it is thus brought home to us how ignorant we are. And this seeing of our darkness is being on the road to light. The examination of the body after death has been of immense service in removing ignorance and superstition, and most certainly has brought us to be more charitable.

Morbid anatomy has taught us this important fact. Diseased processes divide the body into parts. They make, by softening or other change, a separation. When people are passing into disease, it is because they are losing that wholesome unity which constitutes health. Morbid anatomy further shows that these local separations multiply and multiply in the body until death. The disease may begin in any part of the body, but, as it increases, more and more local separations occur until death. Diseased processes destroy the harmony, and separate. Whilst one part of the body fails, another part compensates for that failure; thus, one kidney is destroyed—the other kidney gets much larger to make up for that loss. One lung is destroyed—the other lung is much larger to compensate for that. The aortic valve becomes faulty—the left ventricle becomes much stronger. The pyloric end of the stomach is contracted—the muscle of the stomach is much increased to get the food past the contracted orifice.

Morbid anatomy also teaches that those organs become diseased which are most worked if they are under the personal 'self,' will. Therefore, wherever volition comes

into action, we have to look for disease : thus, we don't find in paralysis that the automatic functions are so much affected as the voluntary ones ; and when we consider the failure of the lungs or the kidneys we have a similar illustration.

Whatever structure is in a high state of functional activity, is very liable to become diseased. It is abused : this is witnessed from infancy to old age. As soon as ever the new mucous membranes begin to absorb and to feed, we meet with thrush and stomatitis, due to foolish ways of feeding. In management there is a difference between rashness and boldness, and it lies in this—the rash person is timid, ignorant, and reckless.

Failure of function leads to organic destruction. It used to be thought that structure made function, but it is the reverse—just as the blacksmith makes the horseshoe, fitting the iron for service. In Nature it is evident that all function is making union—a 'living and loving'—while in disease there is disunion.

There are many causes of disease ; we can never say there is one cause of disease ; therefore it is exact to say 'This disease has arisen in these conditions.' As much as possible, in thinking about Pathology, endeavour to get rid of the word 'cause.'

Disturbance of function precedes any appreciable structural decay ; therefore study symptoms in the wards, and observe fixed conditions in the post-mortem room. In symptoms we may observe a swelling, a vomit, or other definite outpouring ; but there is also to be considered a ceaseless rolling on—a circulation within a circulation ; the salines within the colloids, the air within the water, the heat and light energies within all finer and finer still. In symptoms we have the signs of diseased disturbances in these media. This circulation is ever changing and infinite.

There are, therefore, two great effects always to be noticed —the living, ordered, changing, and the dead more fixed signs.

In inflammation we can further trace the relative difficulties which occur between these two. In the ceaseless passing of this circulation through and from the dead more fixed tissues, there is evidence of what diseased actions really mean. Therefore inflammation must occupy much attention.

The aim of a medical man is to restore ease, hence he learns Pathology, and soon he comes to see that Pathology teaches the maxims of rational practice, and does not overlook the subjective, or conscious, any more than the objective symptoms. If he stay in empiricism he sooner or later finds to his sorrow that whilst opportunities are fleeting, experience may be fallacious.

LECTURE II.

INFLAMMATION.

ALL pathological changes are merely modified physiological changes. There is no essential difference between the two: thus, serous effusion from the capillaries into the plasma is an ordinary process of healthy nutrition, but that serum in excess becomes œdema and dropsy. White corpuscles coming out of the capillaries among the plasma is also a normal process, but white corpuscles in great excess become the products of inflammation and suppuration. Red-coloured blood-corpuscles become modified, and make up the colouring matter of bile and urine. In disease we may see processes like these take place. Red blood-corpuscles appear in the urine; a little while afterwards they are broken up, and are replaced by hæmatin granules, and later these granules are replaced by the normal pigment of urine. A person may complain merely of 'nervousness,' then later of tremor, spasm, and then of epileptic fits. These gradations show how insidiously healthy pass into morbid processes.

In treatment we aim at restoration of unity.

The transitions from physiological to morbid processes are usually indistinguishable. There are, as common preludes to inflammation, morbid fixity of tissue-forms; and there are fluids circulating through these tissue-forms. That which we know as death is the fixed forms remaining, but the circulation has ceased. So long as the circulation continues there is life; that applies to the part and to the body as a whole; but the circulation is maintained by

that of the deeper and the outer world; and in the struggle for life there is a continual exercise and mental influence, a combining with the water which holds in suspension all that the tissues require. This union is kept up by what is known as 'vis nervosa.'

These connecting actions between the subjective and the water of the blood-circulation and the nutrition of the tissues are always rhythmical, *i.e.*, regularly repeated.

Blood-circulation is carried on by light and heat, and both are rhythmical.

Inflammation has long been recognised by redness, heat, pain and swelling; and when these qualities were found, the part was said to be inflamed. What is the redness due to? To the vessels being excessively charged with red corpuscles. What is pain due to? To the surrounding tissue being over-distended, stretched, and the nerves pressed upon. The increased tension gives rise to the pain, and as soon as the increased tension is relieved, the pain usually subsides. What is the swelling due to? To the pouring out of a lot of fluid from the blood, and the stretching of the tissues, and also the excessive accumulation of blood in the vessels. What is the heat due to? The heat is due to the excessive accumulation of energy in the part, an excessive accumulation of power which, if it does not get vent, will destroy. Inflammation essentially consists in this, that there is a dangerous accumulation of energy in a circumscribed part which must get vent, or destroy. In inflammation the first appreciable change that occurs is hyperæmia—the bloodvessels become dilated and excessively charged with blood. The next thing that happens is that colourless white blood-corpuscles collect about the endothelium, and the red blood-corpuscles roll on in the centre of the vessel. The next thing that is noticed is, that these colourless blood-corpuscles are passed through the

walls of the vessels, and are seen outside the vessels amongst the tissues, and that the tissues become cloudy from the excessive accumulation of blood-serum and colourless corpuscles. If the inflammation goes on still further, the red blood-corpuscles also ooze through the vessel wall, the circulation of the red corpuscles in the centre gradually ceases, and there is complete stagnation in the vessels; the bloodvessels die, for they are plugged by a blood-clot, which also is dead.

To account for these changes, some have said that there may be a spasm excited in the wall of a small artery, due to disturbance of nervous power; and that this spasm is followed by paralysis of the wall of the vessel and excessive distension. Others have said, 'No, there is not always spasm;' there may be other disturbance of nervous power in the vessel so that it is paralyzed. There is a basis of truth in both views, but both fail to take into account this condition, that the contents of the vessels and the plasma about the vessels continually and evenly work together; and so long as they do this, there is healthy nutrition. Therefore, in inflammation, there is some failure of normal attraction between the blood and the plasma of the tissues outside the bloodvessels, and the blood and the plasma cannot co-operate together as in health.

In inflammation, the dilatation of the vessels, the arteries, capillaries and veins may be overcome; the vessels may pass into their normal condition again, and then the exuded colourless corpuscles break up into a granular material, the serum passes on into the lymphatics, and the red corpuscles break down into a brownish-red pigment. There is recovery from inflammation. As this takes place the plasma of the tissues recovers its normal conditions.

The reverse of this: the vessels do not recover their normal size. What happens? They go on pouring out

serum and white blood-corpuscles; the tissues round about the vessels swell and soften. Inflammation softens all tissues; it softens bone, muscle, cartilage, and nerve—so that whenever you think of inflammation, always think of softening. How far can this softening go without complete destruction? It is certain to go to destruction if there be continually increasing swelling. Therefore our first duty in inflammation is to relieve tension. If the process of softening be slow, it is usually termed ulceration—a slow crumbling down of the tissues; and as the ulcerating surface crumbles down, we can see a sweat of serum through the part. Not only serum, but colourless blood-corpuscles come with the serum. That is called pus. Regarded physiologically, exudation of serum or colourless blood-corpuscles is a process of healthy nutrition. This, in excess, takes place in inflammation. Is there a healthy process in inflammation as well as a destroying process? Yes, certainly. This is why the old surgeons said, 'Wounds heal by inflammation.' Well, then, why don't all ulcers heal? Because these colourless blood-corpuscles perish before they develop into living tissues. They become granular, fatty, and die. Why doesn't the serum live? Because it flows out and cannot be saved. The healing of an ulcer consists in our management of these two factors—the corpuscles and the serum. The uses of salves and of Liston's cold-water and other dressings are as the conservators of these two agents. As the circulation ceases in the vessel, as the parts become excessively stretched and softened by increasing accumulation of blood and diminishing blood-flow, the vessel wall and the tissues round about are destroyed—become dead; that is sloughing—gangrene. If it takes place more slowly it may be termed an ulceration or necrosis, or a caries; the tissue has been eaten away. If such tissue be saturated with colourless blood-corpuscles and

increasing quantity of serum, it commonly passes into suppuration with the sloughing. Now all this time it is very common for the red corpuscles to ooze out in smaller or larger quantity—there is the hæmorrhage, which requires a higher tension to get the red corpuscles to flow out, so that when there is a flowing out of red corpuscles, we know that there is a greater inflammation. Therefore the most rapid and fatal forms of inflammation are accompanied by much hæmorrhage, and hæmorrhage and sloughing often occur together. As illustrations take hæmorrhagic pleurisy, pericarditis, peritonitis, which are very severe forms of inflammation. Hence, in scurvy, inflammation is such a dangerous condition.

What are the conditions that produce inflammation and lead to these excessive distensions of the vessels? Long-continued and extreme overfulness of the veins, so-called venous congestion; and whenever there is venous congestion, it is always an anxious inquiry as to how far the distension of the veins and the attendant œdema will go before it passes into acute inflammation. Illustrations: Varicose veins followed by venous congestion of the skin, œdema, inflammation, ulceration and suppuration, and may-be even sloughing; venous congestion of the pharynx, followed by œdema, pharyngitis; venous congestion of the kidney and lungs followed by œdema—thus we get some forms of pneumonia and acute nephritis.

Opposite condition: some progressive weakening of the arterial capillary walls. The weakening may be due to a chronic degeneration in the tissues; it may be due to great excitement in the arterial capillary system, as in nervous exhaustion and other allied states.

Another common cause is some unhealthy state of the blood, so-called blood-poisoning. The various contagia come in here—syphilis, typhus fever, scarlet fever. In

these we are led to believe that there is some death in the blood itself, and some corresponding death in the tissues antecedent to the inflammation. Again, there is another kind of poisoning, the poison originating in the body itself, as in so-called uræmic conditions, or where bile collects in the bloodvessels or plasma. Or the poison is some fæcal or other gastro-intestinal matter. Peritonitis may be caused by perforation : some of the most fatal forms of inflammation are where the gall bladder or urinary bladder is ruptured.

Another cause of inflammation is mechanical injury, such as a blow or laceration.

Again, some violent perturbation in the vis nervosa, such as injury to the sciatic nerve or to the spinal cord. That is the kind of inflammation that gives rise to herpes, therefore herpes follows the course of nerves, such as fifth or intercostal nerve. Therefore conditions like St. Vitus's dance may be accompanied by inflammation. Thus the insane are very liable to inflammation, and to most peculiar forms of inflammation, so much so that it is said :

'The flesh itself is mad.'

Their lungs, their stomachs, kidneys, joints, or organs of sense, may undergo destructive changes.

Again, it is usual to say that extreme exposure to wet and cold, or great variation of temperature, produces inflammation ; but this does not occur if the body be healthy, for persons are exposed to all extremes without getting inflammation. So long as the tissues of the body are not dying, they can withstand extreme changes in the elements.

Experience has shown beyond all question that acute inflammation does not supervene in the healthy body. What are the facts which have led to this conclusion ? It

has been noticed for many years that when death results from acute inflammation there has been antecedent disease, and the exceptions are so few that we cannot but consider that in these we have overlooked the antecedent disease.

Therefore in all chronic failure of health acute inflammation is commonly met with.

LECTURE III.

GENERAL CONDITIONS OF INFLAMMATION.

If we understand inflammation, we know a great deal of pathology; we repeat, inflammation fundamentally consists in the vessels becoming extremely engorged, and the blood becoming more and more stagnant in the vessels. What are the conditions that bring about congestion—*i.e.*, dilatation—of the vessels? To obtain clear views, think of what we have to deal with in a vessel.

A vessel is a tube made up of plasma, muscle and nerve. The plasmic tissue of a vessel is connected with the plasmic substance of surrounding structure called connective-tissue. It is called connective-tissue because it connects. Through and between these structures flows a fluid which is termed serum. That serum leads us to consider the contents of the tube—the blood. It is evident that the blood flows on, because there is a regulated pressure sending it into the vessel and drawing it out again. Now this pressure is known as tension, and there is an even and uniform tension in health. The pressure that sends the blood along a vessel comes from the heart—from the vaso-motor nerves, to say the least; and there is tension in the blood itself, the working of the coloured and colourless corpuscles, all of which are moving the water of the blood—the serum—onwards. The circulation as seen in a tadpole's tail is full of interest. In thinking of serous circulation always keep in mind the rhythmical action of the coloured and colourless corpuscles, moving the serum onwards, which may be

seen in the tadpole, or inflamed human conjunctiva. That which draws the blood out of the vessels is the action of the lungs and the right side of the heart. It is that which keeps the lymphatics clear, and the serum able to work along the lymphatics.

What are the 'causes' of inflammation? First, most common, venous congestion; *i.e.*, there is some failure of lungs or right heart, or some pressure or disease in veins, so that the serum cannot flow along the capillaries freely. In consequence the tissues must get swelled into inflammation: take this spinal cord and remember, the azygos veins and the intercostal veins carry off blood from the spinal cord. Make a section of it, and see how congested the veins are—the nerve-tubes swollen by exudation; there has been myelitis, that commonly comes on in the process of dying, or is liable to come on whenever there is great venous congestion. Then consider the acute nephritis that comes on in the course of fevers, kidney and heart disease, lung disease. Another cause of inflammation is seen in œdema of the legs.

Another extremely common condition producing inflammation, is degeneration of the tissues themselves, which acts by blocking the lymphatics; this is how fibroid degeneration brings on inflammation. Fibroid degeneration of the kidneys leads to nephritis; fibroid degeneration of the cord to myelitis; fibroid degeneration of the lung to acute pneumonia. Many more might be mentioned.

Morbid growths are another cause of inflammation—such as tubercle, which is degeneration of tissue; as is also cancer.

Next: perturbations in nervous energy, such as herpetic inflammation of the face or herpes of the throat, along the track of the fifth, herpes along the intercostals or sciatic. When herpetic disturbance is coming on, there is first pain and other manifest disorder of nervous energy, which leads

to inflammation. Another form of inflammation due to disordered nervous energy is arthritis in connection with disease of the spinal cord, and this may be difficult to distinguish from rheumatic inflammation; or, instead of a joint, the skin of the leg may be affected, and the difficulty then is to distinguish it from erysipelas; or it may take various forms, vesicular, herpetic, or bullous. In urticaria, due to nervous conditions, there is a congestive œdema of the skin, which passes beyond this into an inflammation in severe cases. Mental disorders are commonly associated with inflammation. Mental shock may bring on acute pneumonia. Pneumonia with herpes of the lip occur together after great shocks and strains of nervous energy; therefore pneumonia, brain disorder or insanity go together. Endocarditis in chorea is an illustration; pericarditis which comes on in Addison's disease, and the various forms of inflammation that come on in epileptics.

Another form is mechanical injury, bruising of the tissues, or concussion, which is one of the severest forms of injury. By concussion we mean an exceedingly fine molecular change by which the molecules have been shaken asunder, and this is probably how severe mental shocks operate. As illustration: a man was caught in some machinery, whirled round, and brought dying to the hospital, and when the post-mortem examination was made there was no external or internal marks of injury, but on microscopical examination there was an enormous amount of molecular change and exudation in the tissues of brain and other parts. That was simple concussion. Under mechanical injuries we may also class burns. Burns produce inflammation in two ways. Direct action of the heat, swelling up and destroying the tissues, as in a burn of the skin. But they act in another way upon the skin, by disturbing the nervous energy, and, arresting respiration, produce much venous congestion

and inflammation. Thus, a lad was admitted to the hospital with a burn, and was apparently doing well; but suddenly diarrhœa set in (enteritis), which was so severe that it killed him in a very short time.

The condition of the blood itself may cause inflammation. Let us see how we can know this, and remember 'Knowledge is certainty.' 'If there be not certainty there is not knowledge.' An excessive watery condition of the blood leads to inflammation, and is commonly attended by inflammation; therefore whenever there is an excess of serum, as there is in œdema usually, we may have at any time inflammation come on, as in œdema of the legs, dropsy of the belly, and so on. A loss of red corpuscles commonly leads to inflammation, for it produces anæmia and hydræmia; therefore inflammation comes on after hæmorrhage. Further, some unhealthy change in the salts of the blood leads to inflammation; now this is the case in scurvy, and may be in purpura. Some morbid change in the albuminous constituents of blood—what has been termed 'fibrin'—may cause inflammation. An excess of fibrin in the blood has long been recognised to be a cause of inflammation. An excess of colourless corpuscles in the blood is commonly attended by inflammation. Now that is so in scrofula, splenic leucocythæmia, and in the so-called Hodgkins disease. An excess of carbonic acid in the blood, with venous congestion, is commonly attended by inflammation. An excess of oxygen has been said to lead to inflammation. Formerly it was thought that an excess of red corpuscles gave rise to inflammation—plethora. Again, various 'fungous' changes in the blood may cause inflammation. Lastly, in considering the conditions that produce inflammation, remember that they never occur singly, but several of them act at the same time.

What forms does inflammation take? Bear in mind that

the body is made up of three surfaces. There is an outer, which we will call mucous; there is an inner, which we will term serous; there is a middle, which we will call vascular, or connective.

The outer or mucous inflammation differs in many features from the inner or serous inflammation. Mucous inflammation commonly takes the form of catarrhal inflammation, and commonly results from changes in seasons and extremes of heat and cold, and therefore often appears in spring and autumn: *e.g.*, laryngitis, catarrhal inflammation of the bowels, diarrhœa, gastritis, nephritis, jaundice, tonsillitis, conjunctivitis (all of catarrhal origin); and various catarrhal inflammations of the skin, as eczema and impetigo, etc. In all these forms we note that there is an excessive discharge of mucus, and this mucus becomes mixed more and more with colourless corpuscles of the blood. As it is thus more mixed it becomes more yellow, and is purulent; but we also notice that the epithelial cells themselves swell up, and their nuclei multiply; they swell so much as to burst by stretching, and the epithelium is more and more detached. So that is inflammation of a mucous membrane. There is only a difference of degree between catarrh and catarrhal inflammation; in the latter there is a more severe form of catarrh, but there is further an increase of the exudation of leucocytes. Epithelium is comparatively readily detached; it can readily be made to swell up, therefore ulceration is common with the inflammation of mucous membranes; therefore ulceration is a characteristic of mucous inflammation, but not of serous inflammation. If ulceration be found in the latter there is a more destructive condition behind it. Inflammation of a mucous membrane may be attended by a streaky blood-discharge, but usually not much hæmorrhage. Where much hæmorrhage does occur, there is more than inflammation, viz., some disease of

the vessels. If the inflammation of a mucous membrane become more severe, it extends into the submucous areolar tissue. This is the great danger of inflammation of a mucous membrane, because, if it extend into the parenchyma, the epithelium perishes, and gangrene is liable to come on; thus, it is in gangrenous and ulcerative stomatitis—noma—which attacks the cheeks and gums of children.

Inflammation of a serous membrane differs from inflammation of a mucous membrane in these effects: that a mucous membrane extremely rarely becomes adherent; inflammation of a serous membrane usually terminates in the formation of adhesions, because the plastic element is much more capable of organization; again, in inflammation of a serous membrane we have not pus so much as fibrine, and ulceration is rare, and gangrene is exceedingly so.

LECTURE IV.

INFLAMMATION OF SEROUS MEMBRANES.

A PATHOLOGICAL process is a modified physiological process. A mucous membrane is made up of a thick layer of epithelial cells and a comparatively thin layer of connective or fibrous tissue underneath; therefore it is a membrane which is mostly composed of cells which may be readily detached. If these cells are put under the microscope, it is difficult, under some circumstances, to distinguish them from pus cells; and, as matter of fact, in inflammation of mucous membranes, pus is very readily formed. Pleura, pericardium, or peritoneum, is covered by an exceedingly thin layer of cells, but has a thick layer of fibrous tissue. This endothelium of a serous membrane is exceedingly thin, with very few cells to be detached: serous membrane is fibro-vascular tissue. Now in inflammation a substance like to the inflamed tissue is thrown out; thus fibrous tissue throws out fibrin, and this fibrin becomes modified into fibroid tissue, and may form adhesions or thickened membranes. To repeat, the natural basis of a serous membrane is fibrous tissue; in inflammation it throws out and exudes a substance which becomes like the fibrous tissue, fibrin, and this may be organized into what is known as fibroid tissue. This is the great distinction between these two inflammations.

We have also to recognise as a practical fact that mucous membranes are much more under our influence than serous, and therefore mucous membrane inflammation is a more

common form of inflammation. It is not so open to us to irritate the pleura, pericardium, or peritoneum; therefore, whenever there is inflammation of these membranes there are more severe causes in operation.

There are three morbid conditions that we are continually meeting with in inflammations; these are anæmia, scrofula, and rickets. Here, then, we may begin the study of anæmia, which is met in crowded towns.

A great characteristic feature of anæmia is loss of the red corpuscles of the blood, and these are an immense means of giving strength to mind and body—of giving strength to human nature. One of the most common symptoms of anæmia is weakness. Patients say: 'I feel so weak, and I am so incapable of doing what I used to do.' With loss of strength there is loss of power of enjoyment. With this condition there is also disturbance in many physiological functions: digestion becomes weak, with fulness, flatulence, discomfort after food, so that many patients come complaining of dyspepsia; the function of the bowels becomes weak—constipation is very common. In some it alternates with diarrhœa which may be well-nigh uncontrollable; but much more commonly constipation occurs, therewith a great tendency to catarrhal inflammation of the bowel which may pass into dysentery. The function of the brain also becomes much disturbed; not only does the patient feel languid, but he has difficulty in carrying on processes of thought; it is difficult for these patients to hear, to see, or listen, for the sense-functions of the body are weakened. Young women may have perverse appetites. As brain function becomes more disturbed, neuralgia is common—neuralgia of the fifth, or gastralgia, or neuralgia of the sacral plexus, backache, also neuralgia of the lower part of of the abdomen; pain over region of the heart; intercostal neuralgia; irritability of bladder with increasing tendency

to nervous and catarrhal trouble; with mucous exudation from throat, from the tongue; catarrh of stomach with vomiting. Not a few about this stage pass into melancholy; they become more confused in their brain, and care for nothing, and have to be put into an asylum. If there be a tendency to epilepsy, it may take the form of fits; if to rheumatism, that of rheumatic fever; if to phthisis, phthisis. Therefore in every case of anæmia we have to think of what is the family disease-tendency, and treat it accordingly. During this stage uterine function becomes much disordered, and amenorrhœa supervenes. A patient with anæmia had melancholia, and I sent her into the country; for, though she menstruated, the menses were pale; melancholia disappeared when their colour returned. Leucorrhœa, or muco-purulent discharge, or endometritis may come on: very commonly the uterine ligaments and muscles lose their tone, and there is some amount of displacement. Respiration fails, shortness of breath comes on, and with this are weakness and loss of heat. Patients complain of cold hands and feet. With this loss of heat there is increasing failure of brain, until silence becomes a marked feature, and disinclination to move, because, the patient says, 'It tries my breath so.' Muscular weakness and breathlessness are two most marked symptoms of anæmia. This weakness leads patients to lie in bed. The weakness may increase until they die. We find, post mortem, that all the organs look pale; brain, spinal cord, lungs, liver and kidneys—all pale; and we may take up a fibroid clot from the right side of the heart and find it exceedingly pale.

With diminution of red corpuscles there is danger of coagulation of the blood; therefore anæmia and thrombosis go together—thrombosis most commonly of the leg, but it may occur in other parts. Therefore, when anæmia is pre-

sent, and there is aching in the calf of the leg, at once make patient rest. Have this case in mind. A young girl was at school, and became very anæmic; then she began to cough, and other chest symptoms came on, and pneumonia. She died from thrombosis of pulmonary vessels. A patient had been suffering from anæmia for some time, with pain in the head, and other symptoms supervened: she had thrombosis in the vessels of the pia mater. Therefore with diminution of the red corpuscles there is an increasing tendency to coagulation of fibrin; this may occur in chlorosis, idiopathic anæmia, or so-called pernicious anæmia. There is, in such cases, fatty degeneration of the muscle of the left ventricle, and it is this which usually kills the patient; the heart's power gets weaker and weaker, its action more and more irritable, so that one of the most distressing symptoms is palpitation. The fatty degeneration of the heart is usually detected by yellow zigzag markings across the columnæ carneæ of the left ventricle, and this is present in all kinds of severe anæmia.

Œdema is connected with anæmia; therefore œdema of the feet comes on in bad cases, and this increasing œdema renders patients liable to inflammation.

Experience has shown that no one cause can be assigned for anæmia; the 'causes' are multiple. It may attack a girl a year or two old and kill, and afterwards attack a sister of that child, and kill; there is something in female tendency. Again, it comes on at particular ages, whenever the body has to undergo some great change, or the mind has to become specially active. It comes on when children go to school, or it appears with menstruation. Again, it comes when the body is about to enter upon arduous work, and is often the forerunner of phthisis and other diseases of adolescence. 'Young men to labour; middle-aged men to give counsel; old men to pray,' the Greeks used to say.

Anæmia comes on when certain stages of life are passing. Fatal idiopathic anæmia often comes on in the middle periods of life, or in the very aged. 'He came to his end like a sheaf of corn—he was ripe.' 'He had a long life, a merry life.' You will see aged patients getting paler each year. As old age comes on, fire and wine are wanted.

One great object in studying anæmia is to foresee which special vegetative function will undergo acute change and produce death. What is meant by a vegetative function? There are a large number of organisms, cells, etc., having similar functions, so similar that they cannot be distinguished from each other, and they are characterized by rapid production and rapid decay. The office of the red blood is to support these functions. Special functions tend to fail which are most exercised; and as the heart is the organ which is most called upon to work, it is the organ that fails, and usually determines death.

In struma it has long been recognised that there is a general weak nutrition, and that many constitutions are characterized from birth, may be, to old age by that weak nutrition, with tendency in that condition to œdemas, and local congestions leading to suppuration. Strumous changes may attack any organ of the body, brain, spinal cord, testicle, lungs, kidneys, liver, spleen, commonly in children, less so in adults. It attacks more especially the lymphatic structures and glands. The foundation of animal nature is plasma. This is the fundamental tissue that is affected in struma. This serous circulation is carried on by heat and light—energy. The old writers were right in connecting darkness and scrofula. Through the plasma and lymph spaces passes a milky watery fluid, and, with this fluid, —lymph—corpuscles to a lymphatic gland.

This watery plasma takes in and gives out; in other

words, it is elastic—it receives and transmits a certain amount of power, and it is healthy so long as it keeps its elasticity. One of the great characteristics of struma lies in this, that there are local failures in that circulation, and local venous congestions tending to inflammation, which may recur until they destroy the part. This is the characteristic of the strumous condition. As the plasma loses its elasticity there is an increasing tendency to local œdema—the serum is not sent on into the lymphatics—an increasing tendency to venous congestion—until the tissue swells and takes on inflammation, and that inflammation recurs until it disintegrates the structure. Strumous conditions are distinguished by the tendency to recur, and by blueness of the skin. This venous congestion may be commonly seen in swelling of the tonsils, leading to suppuration and ulceration. The strumous inflammation is very insidious; it possesses a striking action of burrowing. That condition led to the practice of the insertion of a blunt-pointed bistoury under the mined skin, in order that the wound might heal up from the bottom. The disease spreads along the lymphatics. An illustration of the tendency to spread along the lymphatics commonly arises in inflammation of the tonsils, spreading to the glands of the neck, even to the glands of the bronchi. Again, the strumous disease begins in the glands of the abdomen, spreads upwards until it reaches the bronchi.

What form does strumous disease take in the brain? It takes the form of acute tubercular growth in the lymphatics of the pia mater. It attacks the lymphatics in the adventitious coats of the vessels of the pia mater. It may take the form of larger tubercles growing along the pia mater, which may be regarded as small tumours of the brain. It may take the form of sub-acute inflammation, occurring more commonly in the pia mater of the cerebellum, and affecting the posterior part of the cerebrum; sub-acute

inflammation followed by œdema and exudation, and thickening, and the exuded matter degenerating into a caseous substance. Strumous tumours of the cerebellum may remain latent for months or years. We get corresponding changes in the spinal cord. Another allied strumous inflammation affects the auditory organs, venous congestion is followed by local œdema and insidious inflammation of the internal ear, which may, sooner or later, be associated with inflammation of the brain itself. Ear affection may recur for years until it ends in abscess of the brain.

Strumous disease of the throat easily takes the form of enlarged tonsils, recurring congestion of the throat, and repeated tonsillitis. So much so, that medical men have regarded enlarged tonsils as indicative of a tendency to phthisis; but with these enlarged tonsils there is a corresponding weakness in the lymphatics of the neck, so that the glands commonly become enlarged, and take on inflammation.

To describe strumous disease of the glands. One of the early changes in strumous disease of the glands is swelling. In some patients it comes on so insidiously that there is neither pain nor tenderness, but it is noticed that other adjoining glands are becoming similarly affected; the swelling has a remarkable tendency to spread. The swelling is elastic, and the touch manifests that there is fluid in it, and we regard it as œdema of the gland. The disease may subside in this stage, especially if from throat affections. On the other hand, it may go further, and the outline of the gland becomes lost. The extended swelling around reveals that the cellular tissue about the gland has become œdematous; later the part becomes red, and we know that acute inflammation has set in. It gets more and more red, and the redness is attended by fluctuation, pointing to suppuration; the skin shines by pressure, and we can thus commonly

detect the pus, and the tendency is to discharge externally. Much of the gland may be destroyed by repeated suppuration in this way. A striking feature is the repetition of the suppuration, and although some portion of the gland may be so destroyed, there commonly remains some caseous matter which sets up further inflammation, and some of the deposit becomes converted into calcareous matter which may soften down, and be discharged through the skin. The removal of this calcareous matter is a curative process of the inflammation. There may have been for many years futile attempts to heal these sinuses until the dead accumulations were removed.

What is the appearance of a strumous gland when cut into? It may be extremely red and congested, but this is comparatively rare. More commonly pale, exceedingly anæmic-looking, tightly packed within the capsule, feeling firmer than is natural, and amongst the pale material some congested parts and some yellow caseous material, which may be seen broken down into irregular cavities filled with pus; and with this caseous material, if it be a long-standing case, there may be calcareous material. The capsule of the gland becomes thickened, and several adherent glands may be thus affected, with much thickening of the capsule. Where we meet with such a mass of glands we may have to inquire, 'Is this malignant?' Does this enlargement belong to so-called struma, to carcinoma, or to lymphadenoma or Hodgkins' disease? One aid in deciding the question would be the duration of the swelling: if the swelling have been present for years it is evidently not carcinoma, but struma.

There may be acute inflammation of the glands commonly extended through the body, and such glands will be deeply reddened by congestion. In strumous inflammation of the lungs with these glandular inflammations there is very commonly recurring catarrhal inflammation of the air-

passages. This is the meaning of the statement that phthisis commences by catarrh, spreading from the larynx downwards. Catarrh of the windpipe, lasting perhaps for weeks, after a year or so followed by evident phthisis. There is a strumous inflammation of the larynx which is characterized by spreading ulceration, the ulceration having large weak granulations without a very definite boundary, not unlike a tertiary syphilitic ulceration. This condition is commonly attended by phthisis, or is a precursor of phthisis. And phthisis can be diagnosed by the appearance of the throat. There is a follicular inflammation spreading extensively over the pharynx, passing into ulcerations and large granulations that may be the forerunners of phthisis.

LECTURE V.

STRUMOUS CHANGES IN A LUNG.

A STRUMOUS constitution produces phthisis. Scrofula and phthisis are inseparable. On examining a lymphatic gland one sees lymph-cells heaped up until they form a darkened opaque mass charged with small granules. Many have lost their nuclei, and consist of fat granules; they have undergone fatty or caseous degeneration, and in some portion of the mass there is not a trace of cell structure. It is broken entirely into a granular matter. In another part the cells are very much out of shape—cells irregular from pressure and disintegration form the caseous core of gland. By the side of these parts are clearer spaces—lymph-spaces—where the cells are much fewer and have undergone less change. As the lymphatic gland thus becomes swelled and packed with this large accumulation of cells which are rapidly dying, the vessels which enter the gland become pressed upon, and as they become pressed upon they must become dilated, and inflammatory exudation occurs. As the current through these vessels is thus blocked by pressure, the stream flowing from the veins must be weakened; hence the venous congestion. As the swelling goes on pressing more and more upon the vessels entering the gland, it must tend more and more to inflammation and destruction. Such is a strumous process.

On examining lung which has undergone strumous inflam-

mation or corresponding phthisical change, we may notice the capillaries are enormously gorged, and around the capillaries are a large number of cells that look like lymph-cells and colourless blood-corpuscles. These two bodies are similar, if not the same. The capillaries are buried up in large quantities of lymph-looking corpuscles, which have undergone fatty degeneration, so that the alveoli are charged with these lymph-like cells or colourless blood-corpuscles, and the air-passages much filled by them; these strumous changes destroy the epithelium of the air cells and passages. They occur around the bronchi, and around the vessels, and in the lymph-sheaths, and thus the blocking up of the alveoli is made easy of comprehension. In the lung also it is observed that the lymph-cells are broken up into a granular material, mixed no doubt with serous granular material. On section it is more difficult to get the light through an accumulation, owing to the loss of cell-structure and the tight packing of the granules, and therefore very little sign of cell-structure remains; organization is lost, and we see a number of cells, shrivelled and irregular from packing, which were called 'tubercle-corpuscles.'

These irregular corpuscles occurring in caseous material are not confined to the lung. What is a specific, or tubercle, corpuscle? An irregular shaped corpuscle that has disintegrated and got tightly packed with granular material. This corpuscle is characteristic of, but not limited to, tubercle. There is another material, which Niemeyer calls frog-spawn cells (a granular substance), in which cell organization is much lost. Therefore, if asked, 'What is the tendency of tubercle?' say, 'To loss of organization.' A tubercle-cell is no sooner formed than it begins to perish and lose its form. As the capillaries are thus pressed upon by accumulating strumous material, the arterioles get charged with blood; certainly congestion occurs, and that

congestion leads to inflammation, and what do we find there? Large quantities of corpuscles which have not had time to undergo fatty degeneration. These are termed leucocytes, and are indicative of a less morbid change. As the cells retrograde and accumulate, cavities form in the gland, the congested vessels are surrounded by serous exudation which still more softens the tissues; hence destruction is due to two changes—the disorganizing dying condition of the cells and corpuscles and inflammatory effusions.

'It is helpful to know the changes that go on, in order that we may treat disease better.'

Blood coagulates in the vessels compressed by deposit, so the nutritive fluid is cut off from the tissues; this is another agent in the destructive process; the red corpuscles also undergo degeneration: hence strumous tuberculous material is always pigmented in some degree—in the lung extremely so. Don't forget the plugging in vessels of the lung, as one condition that may prevent death by hæmoptysis in phthisis; for the same reason profuse or fatal hæmorrhage is not common with strumous changes elsewhere. Thickening fibroid tissue around strumous disease is very common, and in phthisical lungs it is notably common; it is the attempt to repair—an attempt to limit the morbid change.

Strumous Disease of the Windpipe.—This is connected with phthisis. Some have said there is a form of phthisis which is known as laryngeal phthisis, and which may affect the windpipe only. Well, whether it may begin in the windpipe before the lungs are affected or not, I am not in a position to deny or affirm. Though the windpipe is affected, there is evidence to show that in these cases the lungs are not entirely unaffected—catarrhal inflammation of the windpipe occurring winter after winter until at last there

is phthisis; and this is the reason why people who are going into phthisis say, 'I am always catching cold.' Therefore the first thing we may notice in strumous disease of the windpipe is this: the mucous membrane is congested, the mucous membrane around the arytenoid fold is congested, and pouring out an excess of mucus, and we say that there is catarrhal inflammation of the windpipe. Another common change is a little superficial ulceration occurring in the back part of the arytenoid fold, just above the vocal cord. If the disease extend still more, we notice that the arytenoid fold is much more swelled, and less red-looking, and the difficulty is to see the vocal cords on account of this swelling. We further notice that that swelling consists of a gelatinous substance. Later we may notice this substance is being broken down by ulceration; a vocal cord, or the arytenoid folds and epiglottis, may be much destroyed. When the Throat Hospital was first established, and laryngoscopy was studied, it was said, 'Ulceration of vocal cord and epiglottis we may be sure is syphilitic.' I had some drawings made to show that this was not always so. It may be syphilitic destruction, but it may be due also to phthisis.

The next change to consider is strumous disease of the kidney. This may occur in the form of simple catarrhal inflammation, albuminuria with malaise, lasting for two or three weeks, and passing away like an ordinary cold; or it may take a more insidious protracted form, and pass into a condition known as large white kidney. Coming on insidiously, the patient may be walking about with much albumen in the urine, but getting paler and paler, increasingly anæmic; after weeks, dropsy sets in, and we say it is large white kidney occurring in a strumous subject, because the patient suffers from lung, bone, or other strumous disease. In a third typical form of strumous condition, pus is dis-

charged from the urine day after day and week by week: like inflammation in an inflamed gland, with some feverishness and pain in turns, the pain evidently varying according to the inflammatory tension. Therefore, just the same with the kidney as in the gland, if the processes are proceeding rapidly, there is much pain in the loins, and we may feel a tumour. If the inflammation be very acute, the patient may pass much blood; therefore, if a patient come to you with protracted hæmaturia, with great wasting and pain in the loins, immediately think of strumous disease of the kidney. As these patients go on passing quantities of pus, and the urine is charged with it, we say it is not ordinary Bright's disease, and as a rule they do not have dropsy; in fact, dropsy never occurs with acute suppurative nephritis—at least, I have never seen dropsy where a large quantity of pus has been thus passed week by week. Strumous inflammation spreads down into the urethra. Be sure and not to jump to the conclusion that gonorrhœa is present because pus is so passed. Smarting when passing water is one of the common symptoms in kidney disease. These diseases may recur for years, the kidney healing and becoming diseased again; or the patient may die with acute strumous disorganization of kidney. And what do we find post mortem? The kidneys, like the glands, swelled and infiltrated with morbid material, some of which is anæmic, some partly pigmented of a drab and bluish colour, some of it caseous, and here and there strumous abscesses in the kidney. We find the pelvis of the kidney thickened, the mucous membrane much swelled by granular material and by pus. We find that the ureter, bladder, and urethra may be in a similar condition; caseous matter studding it here and there. This is known as strumous or tuberculous disease of the urinary passages, and this may extend from the kidney to the urethra as we said. The kidney may be

entirely destroyed in this way, leaving only a shell—the capsule. This condition may affect one kidney only, but it commonly attacks both. Strumous inflammation may attack the bladder first, before the kidney, and spread up to the latter.

As the testicles are near, I may as well describe to you strumous disease in them. It usually begins near the epididymis, the back of the testicle, and the morbid appearances are very similar to those of the kidney. There may be simple strumous conditions of a catarrhal kind, with some amount of catarrh extending up to the ureter, which may subside like catarrh of the kidney, or it may be repeated until there is a very swollen and firm testicle, which later may break down into abscesses and discharge externally, and it may go on discharging until much of the dead material has been destroyed, and then it may heal up, or fibroid or caseous deposits, with atrophy, may remain.

We will next consider strumous disease of the bone. This is met in anæmic and badly nourished children, living under unhealthy conditions. In such, acute inflammation of the bone may rapidly kill; diffuse suppurative periostitis and ostitis that we sometimes see involving the whole tibia and leading to death. Post-mortem examination reveals pus spread over the bones. Strumous inflammation may attack a very small portion of bone, simply taking the form of ostitis corresponding to the catarrhal inflammation of the parts already mentioned; if there is not a clear history of a blow, it denotes a weakness in constitution. The pain and swelling and tenderness is followed by increasing signs of periostitis and suppuration, with external discharge. On passing a probe, dead bone is felt, and this is caries, which means the bone has been 'eaten away' by strumous inflammation. The process is very similar to that which

has been described in the cases of the other organs. As the inflammation proceeds, it dissolves up the calcareous matter. What is caries usually? A subacute inflammatory process of a strumous nature, which spreads and spreads and disorganizes the bone, softening it down into a cavity; it therefore looks as if it had been 'eaten away.' Around this cavity we find pus and pigment, it may be studded with caseous matter. The origin of caries is always tuberculous caseous matter. The strumous change may occur in a part and spread, or it may begin in a number of isolated centres.

Inflammatory exudative material from blood, like any other fluid, makes its way in the direction offering the least resistance. Therefore it always tends to some surface, hence mucous membranes suffer much. We will not attempt to say that the strumous inflammation begins always in the submucous tissue, nor will we deny that it may commence in the glands; but it is beyond all question that the epithelial cells of mucous membranes soon become invaded by hyaline and granular material, and the nuclei of their cells may be seen to have swelled up and multiplied, being leucocytes mixed with them—and how far the muco-purulent material consists of leucocytes, and how far of divided nuclei of epithelium, we do not attempt to define. On examining blood of strumous patients, a diminished number of coloured corpuscles and an excessive number of white ones have been found.

LECTURE VI.

SCROFULA AND RICKETS.

WHAT are the conditions that long experience teaches us have given rise to scrofulous malnutrition? First, inherited weakness in the tissues of the body. This weakness is associated with unhealthy hygienic conditions; therefore scrofula is prevalent in large towns, with over-crowding, and damp, confined bad air, and insufficient light, along with inadequate and improper feeding and clothing. By inadequate is meant, not according to the necessities of the body, which has to grow and develop, and to make healthy progress. What is meant by 'improper'? Not in accordance with the properties and wants of the tissues and circulation; and the same applies to the clothing. Hence the immense difficulties are put upon the heart and respiration when the clothing is improper and people live in close confined cities. Patients suffer much from cold and heat. An enormous number of infants die under one year of age from diarrhœa and other mucous diseases; and as history has revealed that national character is much dependent on proper food and clothing, food must be according to the work that has to come out of the body. Scrofulous children are mostly sensitive and too much 'on the go,' and so they require much food; and they require food that will absorb oxygen quickly, such as animal food, and plenty of water.

Another cause of scrofula is excessive excitement, which hinders rhythmical action of heart and breathing; and in scrofula there will be found combined numbers of causal conditions.

Rickets and scrofula have some intimate relations. Whatever there may be opposite in the conditions of tubercle and rickets, there is a relation between rickets and scrofula. In rickets also we have very instructive evidence that there are some unhealthy conditions which hinder the healthy progress of the water and serum through the body; and in rickets there is a remarkable illustration that the nutrition in bones, the nutrition of mucous membrane, the action of nervous system, and the rhythmical action of the windpipe must work harmoniously. That fact we have to bear in mind when we come to the treatment of rickets.

Years ago rickets was attributed to a deficiency of lime in the bones, therefore lime-water and phosphates of lime were given; but failure was the result. In the early stage of rickets one of the symptoms is excessive sweating, evidently showing that there is some failure in the government of the water of the body. Another early symptom is hyperæsthesia: the child dreads to be moved; it cries even when it is lifted. These conditions clearly show some unhealthy action of the nervous tissue. At this early stage we may meet other disturbances in the nervous system, and the child may die suddenly. Dr. West says that in many cases of supposed overlaying, death is really due to laryngismus stridulus connected with rickets. In every case of rickets we should inquire if there are any symptoms which point to affection of the windpipe. For suddenly a child may be seen to fix his eyes, a look of alarm suffusing his face, and a passing shade of blueness, followed by pallor and probably lividity; then a croupy crowing inspiration, and the spasm has gone: but one of these spasms may prove fatal, or these spasms may return many times for months; but we are on the look-out for convulsions in any of the spasms; if the seizures are severe, there may be convulsions, ending in recovery or death. The anterior

fontanelles are widely open, the posterior are usually closed; the sutures are not closed up, and the forehead projects unduly, and the top of the skull is flattened on account of the retarded ossification. The head looks large in proportion to the face, and the question is asked, 'Is there water on the brain?'

How is it to be known from hydrocephalus? Chronic hydrocephalus is a malformation which is present from the time of birth, whilst, on the other hand, rickets comes on usually about the sixth or seventh up to the twelfth month. We must further notice that in rickets the extremities of the long bones are thickened, enlarged about the epiphyses. With the enlargement, it is evident that the bones are softened; they cannot bear the ordinary pressure, therefore many kinds of curvature come on. The clavicle and ribs are softened; the latter sink in, and forming a cavity with each inspiration, press the sternum forward, and thus is produced the 'pigeon-breast malformation' of rickets. The curvatures of the extremities and of the spine are increased, so that the chest is so much thrown out of shape, that, perhaps, a child is unable to sit up, being bent like an old man, and dreads to be moved because its breathing is so short. The shortness of breath is due to various conditions; one is, the ribs sink in and press upon the lungs with inspiration, squeezing the anterior part of the lung forwards underneath the cartilages, and rendering the anterior edge of the lung emphysematous. Secondly, bronchitis is very common with rickets. Whenever you meet with a child under two years of age suffering from bronchitis, examine for rickets. Thirdly, the circulation is feeble; the muscles of respiration and other muscles, including the heart, are weak. Fourthly, there is disordered rhythmical action in the vocal cords, with more or less spasm. The bronchitis of rickets is suffocative in its tendency, accompanied by a

great pouring out of exudation ; hence you are warned not to give antimony and alkalies, because there is this suffocative tendency. In rickety children bronchitis recurs and recurs, and that condition may go on for many months ; but, as the malnutrition of the rickets disappears, the patients lose their bronchitis ; there is wonderful recovering power in rickets, therefore hold out hope. But, to assist that recovering power, you must go on treating the rickets, which is the cause leading to the bronchitis. All this time there is much sweating of the skin, and sweating of mucous membranes, catarrhal diarrhœa, which may alternate with bronchitis ; and skin affections are often present, as eczema, lichen urticatus, or impetigo ; but these various conditions disappear under the treatment for rickets—cod-liver-oil and iron.

The morbid changes of ossification are where the cartilages join the processes ; there is some irritable weakness in the cartilage-cells which swell and multiply excessively, hence this thickening of the cartilage. The alveoli around the cartilage-cells are much enlarged. Those alveoli are connected with the medullary cavities of the long bones ; they are really serous cavities having connection with the medullary cavities of the shafts of the bones ; there is congestion in the vessels which come from the medullary cavities and spread into the cartilages. Therefore some regard this morbid change as a kind of sub-acute inflammation of cartilage and bone—and there is much thickening of cellular material outside the vessels ; and, owing to these changes, the hyaline matrix is diminished, and the cartilage becomes riddled. As this occurs, the bony growth coming down between the rows of cartilage-cells, the hyaline substance i lessened and removed, and the cartilage softened. The conditions of rickets are due to inherited weakness, to im perfect and faulty feeding, the being kept too much indoors,

not enough in association with the open air. If you keep indoors for a week, see how nervous you will get. Outdoor work and health combine to develop healthy vis nervosa.

Phthisis.

What do we mean by phthisis? The old meaning was wasting away, hence it was termed 'consumption'—that is, a loss of substance and a loss of strength; and that is what 'phthisis' means. The best way of regarding phthisis is to recognise that there are external and internal morbid actions taking away the health and substance of the body. Phthisis is a rascally robbery of the vilest kind; it is an insidious stealing away. This taking away was for years seen to be associated with coughing-up, with profuse sweating, with the passage of excess of fluid-substance from the bowels. Phthisis was for centuries recognised symptomatically before it was known that there was disorganisation of lung, and that there were holes or cavities and ulceration in the lung; later, that these cavities and ulcerations were associated with little lumps in the lungs which they called nodes; and still later, that these nodes were associated with still smaller masses, which received the name of tubercles: further, it was noticed that with these changes in lungs and this wasting away, there were feverish outbursts, and that the expectoration increased and got more sticky, like the expectoration of pneumonia, and morbid changes in the lung-substance very similar to those seen in pneumonia. Hence it was said: The destroying agency in the lungs is pneumonia, and that is the cause of phthisis. But those who had noticed more particularly the tubercles said: It is not pneumonia, but tubercle. These two contending views divided pathological opinions, and continue to do so. Further observation has revealed finer morbid changes leading to tubercular inflammatory destruction of

lung, and that these finer morbid changes of nutrition in general and special structures are the essential conditions producing phthisis.

This is the growing impression, the lung destruction being the final effect. A poor woman was dying, wasting away and losing strength. The friends asked: Is it not consumption, doctor? Yes! How is it, then, that she does not expectorate? Only at the last a little lung disease was detected. There are some cases of phthisis in which it is surprising what a small portion of lung is affected. It was looking for finer morbid changes that brought forth the bacillus investigation, and revealed those feeders on the dead.

LECTURE VII.

CONDITIONS LEADING TO PHTHISIS.

PHTHISIS is characterized by a loss of substance and strength, and in the course of centuries it has been noticed that with this loss there is disorganization of lungs; but this regarding phthisis as due to lung destruction is a useless view not tending to cure, nor sufficiently to its prevention. There are finer destructive actions going on antecedent to the lung disease. And, in fact, a person may die of a consumption with very little lung disease. It is necessary to recognise this fact, because we had to recognise phthisis in a curable stage. Some doctors who had devoted much time to auscultation were mainly guided by pulmonary signs; others, men in general practice, who saw phthisis from an early stage, saw it attack one member of a family after another; and they looked upon the general symptoms as the best guides. Never go to an asylum if you want to see early stages of insanity; and do not go to chest hospitals to study the early changes of phthisis.

In the early periods of phthisis there are various special disorders and various general disturbances, showing a failure of physiological functions. These have been collectively termed the pre-tubercular change. One condition which has been noticed is that there is a build of body which disposes to phthisis; a long, narrow chest—narrow especially from behind forwards, where the antero-posterior diameter is less than normal; and with this narrowness an extreme obliquity of the ribs, which are much depressed;

with this also flattening under the clavicles, and an evident tendency to sinking in of the supra clavicular spaces, all of which point to a diminished calibre in breathing organs—in other words, a weakness in these organs. That form of chest is usually associated with slender bones, and these slender bones are associated with an excessive sensibility in nerve-tissue, and with slender muscles. This excessive sensibility in nerve-tissue affords much quickness in feeling, but also much restlessness. This quickness in feeling and restlessness tends to exhaust the weak muscular energy, and in so doing it may lead to much malnutrition in the bony structures—and bone disease may come on. Bone has to bear the pressure of excessive sensibility and muscular action, and commonly becomes diseased. This excessive sensibility and quickness of feeling lead to many troubles in conscious, so-called ideal actions; therefore these constitutions are much troubled with imagination, and in dealing with the world's actions they usually get 'overstrained'—exceedingly anxious; and this tends to tightness in breathing and weakness in blood-circulation. Their restlessness deprives the body of energy and of heat, and they have usually cold extremities; and this tightness in breathing early affects venous circulation, hence you will notice in them fine skins and blue veins standing out—the venous circulation is hindered. Owing to this weariness and this exhaustion the mind is much disquieted and much bewildered. There is that thought which always comes up whenever the human feeling is not comfortable and resting, 'What does it mean?' With that comes alarm and timidity; and one of the most important things we have to do in 'phthisis' is to keep patients out of this dread and confusion, because there follows a terrible depression, and the blood commonly gets whiter and whiter.

Some of the nicest people we come across are those who

have the phthisical tendency, but they are some of the saddest people; melancholia and tendency to phthisis go together.

Following these remarks, it becomes clear that a large proportion of phthisis is inherited; but in the inheritance there are conditions that are removable if healthy surroundings are established—*i.e.*, they are curable, for they are merely disturbances of function, and of structure dependent upon that disturbance of function. Time has shown that many of these people become strong and healthy. With the excessive sensibility you will learn that they feel changes in the weather very much, and are usually very liable to catch cold.

They have frequently a difficulty in deciding how to dress suitably. This condition of sensibility comes up very curiously, and with it the most important question, 'Do you think he is properly clothed?' The object in clothing is to provide an artificial skin. Feathers and wool are beautiful instances, which guard the air from moving too quickly and so keep the body warm. The test of clothing should be that the mind is neither harassed by cold nor worried by heat. It has further been noticed that with this tendency to catch cold nutritive disturbances in various mucous membranes occur: catarrh of the stomach, catarrh of the windpipe and throat, catarrhal diarrhœa are common, so that recurring diarrhœa is of itself a warning of phthisis. Repeated indigestion with pain after food, with nausea or actual vomiting—bringing up mucus, with loss of flesh—may warn us that there is some constitutional weakness underneath which should make us look out for phthisis, and suspect such recurrences. Palpitation is also another symptom, and in some cases of early phthisis is the symptom which patients complain most of. With this palpitation and restlessness we have to deal commonly

with disturbed nights and excessive dreaming, and usually with this disturbance of the mind in sleep there is much mental depression. In some such cases vomiting and sweating recur for months, so that the medical man cannot stop them, and are early symptoms of phthisis. In others there is weakness not only in heart but in vessels; epistaxis comes on, and may be profuse. One of the most common symptoms is anæmia. There may be loss of red corpuscles with a yellow whiteness of skin, or extreme whiteness of skin, or there may be a loss of red corpuscles with much pigmentation of skin. Some of the most pigmented skins I have seen have been in phthisis. If asked, 'In what conditions do we meet extreme pigmentation of skin?' say, 'Phthisis, Addison's disease, and Malaria.' The loss of red corpuscles leads to more and more disturbance in breathing, in heart, in digestion, and in brain; and as this takes place there is increasing weakness in the mucous membranes, and the serous circulation fails also.

With the failure of muscular tissue and nerve tissue, we observe failure of another transmitter of energy, 'elastic tissue.' This comes on most markedly in the lung, especially at the apices, though it may be all over the lung; it is usually the earliest physical sign of coming phthisis. Loss of elasticity in the upper parts of the lung: if phthisical change be spreading, the loss of elasticity extends into the middle of the lung; if tending to kill, this loss of elasticity reaches down to the bases of the lungs. What are the early signs which precede consolidation, and which indicate loss of elasticity? There is a long expiratory sound. With vesicular emphysema there is also prolonged expiratory sound, denoting that the elasticity of the lung has failed, but this, about equally in both lungs. With loss of the vesicular action, vesicular breathing is lost, and is replaced by harsh tubular breathing. Sometimes the vesicular

breathing is lost to such an extent that we hear very little indeed; breath-sounds are said to be muffled. With this there may be various disturbances in mucous membranes, attended by clicking sounds—or what used to be termed a 'cogwheel sound'—other bronchial râles supervene. Whenever a function is failing, the structure wastes; therefore atrophy comes on as the lung function fails, so that we say the percussion-note becomes flat—then we do not say that there is consolidation, but that there is less air. This flatness is usually more marked at one apex than another. Remember, phthisis never attacks both apices equally, generally one before the other, or one more than the other. For there is an atrophy of the apices which comes on with emphysema as well as that due to phthisis; and we may have to decide whether the atrophy is due to emphysema or phthisis.

There is commonly another symptom, and this is feverishness. In connection with that, let me give you this as a guide: If there be feverishness without local signs of infectious disease to account for it, the temperature rising at night and falling in the morning, a difficult question may arise as to whether there is any lung disease; for there may be a small patch of pneumonia, which we may fail to detect by physical signs, and yet it may be attended with much fever. It is a notorious fact that early phthisis may be attended by much wasting and loss of strength, and go on for months before we can pronounce the lung diseased, and this may send the patients into a feeling of despair. 'I am in heaven,' were the words of a young woman who before death lost this fearful feeling. With these feverish outbursts, usually in the course of a few weeks, or it may be of a few days, we notice increased dulness, some bronchial râles, and increased voice-sounds—signs of consolidation; we also observe that expectoration

and cough have become marked symptoms. The muco-purulent expectoration denotes catarrhal inflammation, and we may often measure such acute inflammation by the expectoration; if it is very viscid, sticking firmly to the vessel, and mixed with pus, then it points to pneumonia.

But it should always be recollected that pneumonia may attack the apex and upper part of the lung in a patient much disposed to phthisis, and yet clear up and the patient entirely recover. Do not overlook that fact. Perhaps a sister has died; another sister has been attacked, and the parents think of phthisis. In these cases the symptoms denote pneumonia; the consolidation has come on rapidly, with feverishness and cough; there is dulness, bronchial breathing and bronchophony. Usually in the earlier course of phthisis the general symptoms subside, but signs of consolidation are left behind; patients recover their strength and appetite, but after a time there is a recurrence, another feverish outburst, and more signs of consolidation; with these signs of consolidation we may notice much large crepitation. Is the lung disorganized? Is there a cavity? That is not easy to determine in the early stage, because the large crepitation may be due to exudation into the bronchial tubes and larger bronchi, which later on may entirely disappear; but we may be unable to say that there is not a cavity, because there may be very small cavities away from the pleura that we cannot detect. After a while, however, we notice with this large crepitation undoubted signs of cavity: cavernous sounds; we may hear the hollow ring of coughing in the cavity. If we ask the patient to speak, we hear the sound of the words intensified, reflected from the walls of the cavity—so called pectoriloquy—and the crepitation is usually much larger—gurgling—so that if we ask the patient to cough, we hear the gurgling and the cavernous sounds together. What conditions must be present to

enable us to determine that there is a cavity? The cavity, the vomica so-called, must have a free communication with the bronchial tube, must have a bronchial tube opening into it, to let air pass to and fro in the exudation, to let the voice be conducted down to the cavity; and it must be situated—if small—near the surface of the lung. Can you always diagnose a cavity? No. If the cavity be small and in the middle of the lung, or if the bronchial opening be closed, we cannot diagnose it; it may entirely escape notice.

LECTURE VIII.

SYMPTOMS AND CONSEQUENCES OF PHTHISIS.

In the course of phthisis we are never surprised to find that pleurisy comes on, and that at any stage of phthisis; again, whenever we find signs of pleurisy, we always examine for phthisis; and our reason for doing this is the fact that pleurisy, in some cases, is commonly the first indication of phthisis. It is one of the earlier warnings of phthisis. If we find a patient is attacked with acute pleurisy, and has been losing flesh and strength, then we are apprehensive of phthisis; but the physical signs may not be such as to warrant us saying that there is phthisis. In such cases we may only hear prolonged expiration, harsh breathing, and flatness on percussion at one apex; but from the fact that there has been loss of flesh and strength, slight as these signs are, we should take precautions against phthisis. If the phthisical change in the lung be breaking down with suppuration, and is close to the pleura, the pleurisy commonly passes into empyema, *i.e.*, suppurative inflammation of the pleural cavity; so that whenever we have to deal with empyema, we look for phthisis. Once on a time we used to direct our efforts to stop the pleurisy. Now suppose we could stop the pleurisy (we cannot), when there is suppuration close to the pleura, what would happen? The two sides of the pleura would not become adherent. What happens then? Pneumothorax. Pus from the lung perforates the pleura and escapes into the pleural cavity, and we have to deal with empyema and pneumothorax.

Therefore we seek to guide the plural inflammation safely, so as to prevent empyema and pneumothorax. The best thing that can happen is for the two sides of the pleura to become adherent; if they do, pus cannot accumulate there, nor is there any risk of pneumothorax.

Other intercurrent inflammation is common with phthisis. Nephritis is liable to come on, producing catarrhal inflammation, leading to large white kidney, which may come on very insidiously. Another inflammation is cæcitis or peri-typhlitis, and the cæcal inflammation, in some persons, precedes the lung signs of phthisis. Never fail to examine the lungs in cases of 'fistula in ano,' for these conditions commonly go together. Acute changes also occur in connection with the brain. They may take the form of tubercular meningitis, or epileptic attacks, or melancholia. But in the course of phthisis we are often impressed by the increasing anæmia, and it would be a fair question to put, 'What is the relation of anæmia to phthisis?' First. Members of families disposed to phthisis are very subject to anæmia. Anæmia is a constitutional feature with these—recurring anæmia with more or less wasting. Secondly. Anæmia may persist with wasting, and resist all treatment, and during that time phthisis may be insidiously creeping on, so that for weeks or months it is the disputed point as to whether there is or is not lung disease; hence, whenever there is anæmia and loss of flesh, flatness on percussion, and harsh breathing under clavicles, we should always consider that the anæmia may have some relation to threatening phthisis. A mother brought her daughter with anæmia, and asked what made her so exceedingly weak. The symptoms had evidently resisted all treatment. I could not discover any acute disease; but on examination, I found prolonged expiration and harsh breathing at one apex, with loss of flesh. There was no

certain phthisis, but there was loss of flesh with persistent anæmia. This patient was admitted to the hospital a few months later, where she died with acute pleurisy and acute phthisis. Again, a young woman was in hospital for anæmia; her temperature rose a little in the evening, and there was prolonged expiration under the clavicles. This patient was observed for several weeks before phthisis could be diagnosed. These are the gloomiest cases of phthisis, because, where there is anæmia, the disease usually increases, and commonly extends rapidly. With anæmia we always notice weakness of pulse. What is the worst feature of all others in phthisis? I should say weakness of general circulation. You will see people with signs of cavities (the subjects of phthisis, beyond all question), and with much disease of the lung; the processes having gone on for years—so long, in fact, as there has been energy enough in the general circulation; but you will also see the reverse of this — persons threatened with phthisis with exceedingly weak general circulation; such die rapidly. In such cases anæmia tends to kill by causing failure of muscle in heart. Three symptoms appear early in these phthisical cases—very feeble pulse, cold extremities, and tendency to venous congestion and anæmia. Then with those conditions there is another symptom—loss of healthy feeling and inclination, which is generally manifested by loss of appetite. You will find, when you consider people complaining of loss of appetite, that you cannot regard it merely as tongue or stomach failure, but as due to mental depression; and, therefore, sometimes a little firmness on our part will do more than medicine. These patients want clearness and certainty given to their minds as to the way they ought to go. Encourage hopefulness in a patient, and a healthier feeling usually comes. With the loss of appetite, which is extremely common in phthisis, patients become weaker,

until they cannot even take food. You may have to use the stomach-pump if the patient refuses all food. When food is introduced, gastric and other functions become more healthy. What is the natural means to get stronger breathing? Food! Food quickens and strengthens breathing. What are the natural means to get stronger circulation? Food! If necessary, therefore, do not hesitate to pass a tube down the gullet, and so feed the patient.

In the course of phthisis we are never surprised to find blood in the expectorated matter. Hæmoptysis in some degree is met with in about eighty per cent. of cases, but it only kills in about five per cent. Have these facts in your minds beyond all question. When I was physician at Victoria Park, I asked Mr. Power, the resident medical officer, to examine the records of many years, and ascertain the proportion of fatal to other cases of hæmoptysis. This was done, and the result given as above. These particulars were recorded in one of the journals; in Sweden they made a similar examination, and they came to a similar conclusion. By far the majority of people who have hæmoptysis and phthisis do not die of hæmoptysis, and we can therefore relieve their minds immediately by saying that they need not be apprehensive. What are the features in hæmoptysis which will lead us to be apprehensive of a rapid death? When bleeding from the lungs kills a patient, it is by the great rush of blood filling up the bronchial tubes, shutting out the air before the patient can take a deep inspiration and cough it up. How is this known? Post-mortem appearances show these parts choked with blood. Some patients cough up blood, and suddenly die, and the bronchial tubes are found choked up with blood-clot. When a patient is bringing up blood in large quantities, very rapidly, *i.e.*, in a gush, perhaps half or nearly a pint of blood in a very few minutes, we cannot but ask our-

selves, 'Will this patient, with the next gush, be suffocated before he can get the blood up?' Now this only occurs when there is old disease in the lung and cavities; we never need be apprehensive of it in the early stage of phthisis. I have only seen one case of death from hæmoptysis in the early stage of phthisis. It is a terrible thing for a poor patient to be coughing up blood. One of the bravest men I knew, a captain in the army, had profuse hæmoptysis, and I had to quiet his fears. I was anxious to get him home alive. I did that, and helped him by saying, 'Cough it up, captain!' Fear tends to paralyze breathing, and paralyze the right side of the heart;—what chance has a poor fellow if he is coughing up blood and is taken with fear? To another man, with livid face and with a fearful pallor, I said, 'Cough it up all you can, for it will help you.' We need not be apprehensive, fearful, unless the blood is being brought up in large quantities. In fatal cases there may be an aneurismal condition—a vessel bulging into the wall of the cavity, which bursts, having no support. I will give you a striking illustration of this bulging. A man was admitted to the Victoria Park Hospital, bringing up large quantities of blood rapidly. He had not phthisis; but he had a cavity in the lower part of his right lung, which had been produced by fracture of the rib, and this old cavity I found choked with blood, and a ruptured aneurism in its walls. This man was known to the resident medical officer, who had seen him at the time of his accident years before. Hæmoptysis sometimes is the early symptom of phthisis; it occurs before there are any well-marked physical signs. This has led some medical men to speak of such cases as phthisis caused by hæmoptysis. Some weakening condition, they consider, leads to hæmorrhage, and this sets up a 'low' form of pneumonia, which ends in phthisis. As phthisis advances, one thing

above all we notice, that is, increasing rapidity and weakness of pulse—in other words, increasing loss of power; and it is this failure of general circulation that kills in phthisis. Years and years of examination have confirmed that fact beyond all question. So that treatment resolves itself into our ability to obtain greater power in the general circulation.

In considering phthisis and treatment of phthisis, do not think of the lungs so much, for it is simply harassing to one's self, and leads to the death of the patient, and no one benefits by it. How can a lung be repaired if there is not sufficient blood going through it? The one object in the treatment of phthisis is to get more blood through the lung to repair it; hence the importance of rest, food, and fresh air; poor patients benefit so much by coming into the hospital. If people are shut up indoors too much their circulation gets weak; if outdoors sufficiently their breathing is freshened and their circulation strengthened. All experience proves that phthisis comes from excessive indoor life. This applies to plants with too much forcing and heating; they waste away, as well as animals and men. Go to the knacker's, and examine the horses' lungs. It is the same in the Zoological Gardens, and with the cows. Horses do not get inflammation of the lungs when they are out in the fields in all weathers—it is when they are stabled. Who ever was associated with a lot of people indoors without being made anxious and restless? When indoors too much we become exclusive, we know everything. Ancient Egypt shut out the world at large, and rotted out from care and ignorance, with vitiated air, liability to cold, and phthisis. Phthisis is said to be due to bacillus, but of what use is that view in curing phthisis? Do not be content to love knowledge for the sake of knowledge, but for what you can do with it. The view is inadequate to cure

phthisis, and on this account we must look on phthisis as made up of many physiological disturbances, and it can only be cured by bringing these disordered physiological changes into order again; and here hope in the cure of phthisis can be entertained. Are there any changes in the lung that will warrant us thinking that phthisical conditions can be cured? That question brings us to consider next the morbid changes in the lungs.

Phthisis has been divided or grouped according to the character of the morbid changes in the lungs. It has long been recognised that in a large number of cases there are so-called tubercular changes, while in others there are not; there are in some cases pneumonic consolidations which have disintegrated and destroyed the lung, with but few or no tubercular changes. This group has been called pneumonic phthisis. Then in other cases it has been noticed that the lung is studded with groups of tubercle, with comparatively slight signs of pneumonia; such cases have been called tubercular phthisis. But in the majority of cases there is a mixture of tubercle with the products of anæmia, and such cases are called tubercular pneumonic phthisis. That is a clear natural grouping. In the pneumonic cases the symptoms come on much like pneumonia, which recurs and cannot be arrested: that is galloping consumption—so called. This pneumonia takes the form in some of lobar pneumonia, beginning at one apex and spreading downwards towards the base, attacking first one lung and then the other; the temperature, expectoration, cough, are very like ordinary pneumonia, but the lung disintegrates. In other cases it begins in the form of small patches of broncho-pneumonia. These cases are, for a time, exceedingly difficult to diagnose. During the first few weeks or months there is recurring cough and expectoration, with high temperature and loss of strength; and sooner or later undoubted physical signs of

phthisis appear. The post-mortem appearances are those of red and grey hepatization. In the tubercular cases the symptoms are much more insidious, and the lung signs are fewer for weeks or months: wasting, cough with expectoration, and loss of strength, being the prevailing symptoms, those go from bad to worse. Addison, when examining this condition of phthisis, used to say, 'No repair.' We find in such lungs grey and pigmented semi-opaque, aggregated, tubercular masses—the tubercle that Laennec especially refers to—accumulated, and forming large masses so that they consolidate much of the lobes; but with no sign of repair. That is the phthisical change that especially occurs where there is the phthisical build of body and the phthisical condition generally. There are mixed cases in which similar tubercular changes are associated with red and grey hepatization and caseous masses, the remains of pneumonia. In these cases there are periods in which the symptoms diminish, the patient gains strength and flesh, but signs of pneumonia soon reappear; and so the disease extends and extends, and may last over two or three years. In these lungs it is not uncommon to find signs of repair. What are the signs of repair? Scar-like material, such as we find where an ulcer has healed, or where a hydatid has been buried up and rendered harmless. We speak of it as the fibroid material of repair. These are the changes in the lungs when phthisis has been arrested and the patient been comparatively well for years, and they warrant us in saying that phthisis may be arrested and the lung repaired.

LECTURE IX.

FIBROID PHTHISIS AND EMPHYSEMA.

BRIEFLY let us ask, What are the conditions that precede the consolidation in phthisical lungs? Such consolidation primarily attacks the upper lobes. Pathologists have spoken of tubercular infiltration as the cause of the consolidation, and I used to wonder what they meant, for they described it as of vitreous appearance. Occasionally we see this glassy-looking substance, but it is the exception; the consolidation is made up largely of tubercles which have aggregated together, and by pressure lost much of their tubercular shape, and they form a uniform bluish-grey, semi-opaque mass. Much of this consolidated material undergoes a yellow fatty degenerative change, forming the yellow or mature tubercle; blending those two conditions is a third which is more or less granular, red and grey, and pigmented—in other words, the product of pneumonia. If you are further asked, 'What are the microscopic appearances of consolidation?' remember what I said when speaking of strumous material: granular matter, imbedding irregular-shaped shrivelled cells, with a quantity of fat granules, of pigment granules and altered blood pigment, and also plugged vessels; and always with this condition there are corpuscular and cellular bodies that we cannot distinguish from pus-cells, or leucocytes, scattered amongst the parts.

We will now pass on to consider the remaining forms of

phthisical lungs, viz., the fibroid conditions. There is a class of phthisis in which there is not only tubercular matter, but also some results of repair. In the course of years of experience we notice that some patients are attacked by phthisis, and go from bad to worse; and then the disease seems to be arrested, and they may remain much better in health perhaps for months, or for two or three years; and then they have another outburst of phthisical symptoms, which may be repeated and repeated for years. During this time these patients are liable to be attacked with bronchitis, and we may notice that bronchitic signs are spreading and spreading through the lungs; and further, that the patient is becoming exceedingly breathless, and the symptom that rivets our attention is the excessive breathlessness; the bronchial râles increase daily, and are heard all over the chest, the action of the right heart is increased, and we conclude that there is acute tuberculosis. With these chronic phthisical conditions patients are liable to acute tuberculosis, and we may find miliary tubercles in nearly every organ of the body. You will further remember that these are the cases in which sudden death from hæmoptysis does occur. These are the rapidly fatal cases which we commonly meet with in acute pneumonia. I always look out for old damage in the lung, when I have to make a post-mortem after acute pneumonia. Don't forget that acute changes supervening upon this chronic phthisical condition have a great tendency to spread. These cases go on for years, and another peculiarity is that they may have recurring hæmoptysis for years. So much has this been so, that the doctors have said, 'These cases with hæmoptysis do better.' In the course of years physical signs may diminish in these chronic cases—where we heard dulness, there may be resonance. Indeed, some of us might listen and question whether this had ever been

a case of phthisis. In fact, the medical man then in attendance usually puts the case down to emphysema. I have often said, whilst examining the chest and hearing the opinions, 'We cannot always diagnose an old phthisis, for the old phthisical deposits in lungs are buried by emphysema. The air-cells round the consolidation are dilated, and, owing to the emphysematous change, the lungs are more resonant, the dulness less detectable, and even a cavity may be much concealed in this manner.' If a patient happen to die with such conditions, you might call it fibroid phthisis So when there was a discussion upon this subject some years ago, one party said, 'Here is fibroid material and a cavity; I call this fibroid phthisis.' But the other replied, 'Yes; but when that morbid condition was in an early stage, it was ordinary tubercular phthisis, therefore what is the practical value of calling it "Fibroid Phthisis"? If terms are worth using, they must be true.' In one case the examination showed more destruction—one of the lungs cirrhosed from end to end, the other studded with tubercle. There is no doubt that there is a large number of cases which do begin like ordinary phthisis, but in the course of years pass into a fibroid condition. So that the two conditions merge into one another. In the course of many years it has been further noticed that a patient may be attacked with pleurisy, or with pneumonia, which may linger for months, though followed sooner or later by signs of pneumonic consolidation of lung. It is usual to say that the pleurisy or pneumonia has set up a fibroid induration of the lung. For example: a man came into the hospital with pleuro-pneumonia; he died years after, and the lungs were found in the fibroid condition.

Fibroid degeneration of the lungs is met with in the lungs of men who have been strong and well-built, with teeth remaining sound at middle or advanced age, and with well-

developed muscles—in men who have lived hard and drunk hard. If such a man get acute pneumonia, and this linger on, and he remain in hospital many weeks, and the physical signs of consolidation continue, you may fairly consider that the morbid deposit is passing into a fibroid condition. That is how cirrhosis of the lung comes on. I found that men with this build of body died with cavities in their lungs, and the disease was looked upon as phthisis; but the cavities were little, or not at all, associated with tubercle. When I examined the so-called 'tubercles' by a microscope, I found them made up of spherical and spindle cells, which were part of the fibroid material; and it was evident that such tubercle material was nothing more nor less than young fibroid tissue. These lung-changes generally extend over many years, and these fibroid changes come on usually secondary to bronchitis. These patients suffer from emphysema and bronchitis for years, and then they begin to waste; so that whenever a patient has suffered in that way and is wasting, examine the lungs for phthisis: more and more dulness is detected at the apex, and ultimately signs of a cavity are found. Then here is the practical bearing of this—they do not usually die by asthenia, but by capillary bronchitis; and there is another great practical feature in these cases, they may go on for years so long as the right ventricle of the heart does not dilate much. Unlike ordinary phthisis, these cases are attended with dilatation of the right ventricle; lividity may supervene, and with the lividity, sooner or later, œdema of the feet and ascites, and all this may be associated with granular kidney, cirrhosis of the liver, and so on. Now this is quite a different history from ordinary phthisis. Further, these patients may die rapidly from gangrene of the lung or sudden profuse hæmoptysis. This condition commonly occurs in men who have drunk hard or had syphilis.

This fibroid degeneration occurs in another form in one or both lungs, associated with general fibroid disease. In such case the patient has suffered from bronchitis, which has recurred for many years. We percuss, and find under one or both clavicles dulness and more or less crepitation. There are signs of general bronchitis, and there may seem to be bronchitis with phthisis, though there are not any signs of cavity. The face becomes livid, the right heart dilated, with or without œdema of the feet, and death occurs from bronchitis. When we make post-mortem examination, we find that the lung-substance is partly consolidated by a thready, pigmented, tough material which pervades the lung like a fibroid network, and there is generally more or less emphysema.

Relation of Phthisis to other Disease.—To speak summarily of the conditions which produce phthisis: any disease that weakens the body. What are these diseased conditions which weaken the body? First, weak inheritance; and it is not only that the body when born has its nutrition weak, but the associations under which it is brought up are diseased; and if the weak training can be altered, nutrition improves in an astonishing way. Another weakening condition is the supervention of some organic disease. I know of no diseased organic change which may not be associated with phthisical destruction of lungs (this is speaking of post-mortem examinations). In all forms of organic disease, therefore, look for such destruction if the body be wasted.

Years ago I thought that there were some diseases which were antagonistic to phthisis; but my mind has completely turned round with regard to rheumatic fever, the presence of which was said to exclude phthisis. Struma, rheumatic fever, phthisis, cancer—these diseases have been

regarded by family medical men as antagonistic. They said, 'We seldom see a patient with well-marked signs of phthisis suffering from rheumatic fever.' Therefore they inferred that there is an antagonism. Further observation has shown that where there is a tendency to phthisis in a family, one brother or sister may have rheumatic fever, another phthisis, one struma, another epilepsy. There is some curious relation between epilepsy, phthisis, and rheumatic fever. At the Victoria Park Chest Hospital we found from the records that many patients had had rheumatic fever before, but in no instance in which these patients were said to have had rheumatic fever was there valvular heart-diseased discovered. That and other experience led us to recognise that acute rheumatic gouty conditions, especially in young people, are not uncommonly the precursors of phthisis. I have very rarely seen contracted mitral orifice and phthisis together. Heart disease and phthisis are considered to be antagonistic, but they are certainly found together in some cases. John Hunter taught that:

'If a morbid change becomes very active in one part of the body, it diminishes in another. Energy is not expended equally in every direction. If it be intensified in one direction, it is lessened in others. I have seen phthisis in association with cancer, cirrhosis of the liver, Bright's disease, dysentery, brain disease; in fact, I know of no disease in which phthisical change may not supervene, so that practically it comes to this—whenever the body is much weakened, if there be progressive wasting, we should examine the lungs for phthisis, and endeavour to get the patient out of doors as soon as possible. Never overlook that anæmia is a common cause leading to phthisis, and that redness of blood is due to light. I take every now and then some blood—purple and venous blood—and expose it before the students to the air and light; in a few minutes it becomes

an exquisite scarlet. If we do not care for "nature," nature cares for us. . . .'

We may now leave phthisis, and consider other lung diseases.

By Vesicular Emphysema is understood dilatation of the air-cells. The air-cells are excessively inflated, and they usually dilate in groups; and in dilating in groups they form little bladders or large vesicles on the lung-surface. If they occur along the margins of the lungs, they are called marginal emphysema, and little or no importance is attached to them. If the air-cells become dilated in the vicinity of masses of consolidation, it is termed supplementary compensatory emphysema. We reason as follows: as some of the air-cells are choked up by the solid material and the air is excluded, adjoining air-cells become distended by increased air-pressure, and thus dilated. To this form of emphysema much importance is not attached—it is said to be merely accidental; but it is noticed in other cases that there are groups of dilated air-cells scattered over the surface of the lungs. This condition is known as lobar emphysema. This excessive stretching of air-cells is connected with loss of elasticity, and we infer that as we see these groups of cells on the surface, they indicate that there are probably many lesser dilatations which we cannot detect; therefore what we do see is indicative of a much more general morbid change, and that there has been loss of elasticity widely spread through the lung. Now what will this loss of elasticity lead to, when present in its most extreme form? When we cut into these lungs in which the elasticity has been much lost, we find them exceedingly pale; it leads to the blood being unable to pass into and through the lung. As the elasticity of the lung fails, the blood has greater and greater difficulty in passing into the capillaries of the lung. That is the most important fact to remember with regard to emphysema. As the blood is cut off from

the air the blood must perish, and it becomes extremely venous. When—post-mortem—the pale emphysematous lung-substance is exposed to the light and air, it becomes bright scarlet again. In thinking of emphysema we have to ask: 'What are the conditions that are hindering the circulation through the lungs?'

1. Loss of elasticity of the lung.
2. Increasing stagnation of air in the dilated air-cells, obstructing the circulation through the lungs.
3. The wasting of the lung-substance.
4. The thickened capillaries of the lung.
5. The bronchial tubes choked by muco-purulent matter.
6. The right ventricle dilated, with less and less blood pumped into the lungs.
7. Ossification of the rib cartilage, and loss of the rotatory action which takes place in health.

LECTURE X.

VESICULAR EMPHYSEMA.

CASES of vesicular emphysema have been arranged by long experience into two groups:—1. Those in which the lungs are smaller than natural; this is called 'atrophic emphysema'—emphysema with much atrophy. 2. Those in which the lungs are much larger than normal. This state has been called 'hypertrophic emphysema.' This is a confusing term, as hypertrophy may be healthy—only being a large lung—a big healthy lung. Where the lungs are smaller than natural, we observe the chest to be flattened, and there is an increasing tendency to this flattening. The infra and supra clavicular spaces have sunk in. Such emphysema is commonly attended with general wasting, so that it is particularly marked in some old shrivelled people, and usually, when this form of emphysema occurs at middle age, it means premature old age, with wasting of muscle, excessive sensibility of body, restlessness, and shrinking from the world — wasting away. With atrophic emphysema, on listening to the lung, we usually hear harsh tubular inspiration, and prolonged tubular expiration, a flat percussion note over the upper part of the lungs, and hyper-resonance in the lower parts of the lung. With hypertrophic emphysema we have an enlarged form of chest. This is the barrel-shaped chest described in books—a rounded chest with supra-clavicular spaces bulging out; and when the patient

coughs you may see the apices of the lungs bulge up. Many times I have been asked by patients, 'What is that swelling?' It is the inflated lungs lifting up the supra-clavicular fossæ. The dilated lung overlaps the heart, and the heart dulness is diminished in consequence; and as the dilated lung overlaps the heart the heart-sounds are muffled and sound distant. The dilated lung also pushes down the diaphragm to some extent, the liver is partly covered by dilated lung, and the liver dulness is diminished. In this form of emphysema we have usually extreme resonance. There are other cases in which these two conditions are much blended—the atrophy and the enlargement. As the dilatation of the air-cells increases, as the elasticity of the lung fails more and more, we notice that the tubular breathing becomes more and more marked, the vesicular breathing is lost. As the emphysema further increases we notice that the tubular breathing becomes harsher and coarser; we may hear scarcely any air passing through the lungs; we are struck on listening to the lungs by the absence of breath-sounds—the air is so stagnant. And though the breath-sounds are absent the chest is very resonant. We recognise that the lungs are excessively distended with air, and that the air is not moved in and out; it is stagnant to a large extent. By post-mortem examinations also we have been led to conclude that stagnant air was the immediate cause of death.

What happens when there is an increasing quantity of residual air in the lungs? The patient is observed to be weaker and weaker, duller and caring less; his power for liking and thinking is diminished, his mind droops, his appetite fails, and his muscular power diminishes. It has been thought, and it is demonstrated, in cases of croup and diphtheria, that if the air be excluded from the lungs, the blood is hindered and then arrested in its passage; therefore

the right side of the heart gets excessively distended, and the left side of the heart more and more anæmic from diminished supply of blood, until the circulation completely fails. There are many instructive cases teaching this most important fact—that so long as the right side of the heart does not become dilated nor excessively distended, persons may live comfortably with extreme emphysema of the lungs. A person having emphysema may go on with his work for years; but if the right ventricle becomes dilated, he is unable to continue doing his work. There are some persons who have comparatively little emphysema, but are fat, with big bellies and large accumulations of fat under the skin, sluggish in bowels and kidneys, and they begin to turn livid; there is dilatation of the right ventricle early in the disease, and now and then the right ventricle of the heart is dilated and covered with fat, and the fat may grow in, and replace the muscle of the right ventricle. These people suffer much from breathlessness. In connection with emphysema, do not overlook this most important fact, that as the air circulation is obstructed and the shortness of breath increases, there is marked excessive retention of gases in the abdomen. It is an important thing to relieve patient's bowels before they get over-distended by fæces and gas, because if they get over-distended they become depressed.

In studying emphysema you must recognise other conditions than the statical condition of the lung. We do not breathe by lung-substance, for this is merely the framework; we breathe by blood, so that the condition of the blood in cases of emphysema is a most important matter. If the blood becomes anæmic, then the lung becomes much atrophied. Always, when thinking of blood, go right down and think of water, which is the great basis of blood. As you watch cases of cholera you will notice this—that as the blood gets thicker and loses its water, the breathing fails

more and more. The blood was thick and tarry, and the patients craving for water.

In cases of emphysema we notice there is from time to time some failure of the excretory water function; the urine is scanty and loaded with lithates, and there may be uric acid or other gravelly deposit. These patients suffer from mental depression, and other cerebral disturbance; all desire and appetite fail, and taking less food also, their breathing tends to become weaker. A peculiar nervousness steals over these patients, with much restlessness, alternating with much drowsiness, and they are commonly subject to attacks of spasmodic asthma, especially in the night. These attacks seem to depend much on nervous disturbances, and severe disorders in the nervous system may hinder or entirely arrest respiration and blood-circulation.

Similar effects occur with severe nervous shock or other great irritation — as, for instance, where there are compound fractures, or severe burns, etc. Again, with much mental anxiety and worry, patients commonly say they are sleepless, and their breathing is affected; we are therefore obliged, in considering emphysema, to take into account the vis nervosa and to strengthen the nervous energy of patients; to guide them to be much in the open air, as these patients usually get weaker, with increasing suffering of many kinds, if they be not enough out of doors.

To turn next to the post-mortem appearances, we may gather by naked-eye examinations, in cases of emphysema, that the air-cells have been extremely dilated, and that they have pressed against and destroyed each other, so that vesicles and bladder-like dilatations are seen, which are the remains of destroyed air-sacs.' With this we notice scattered through the tissues, especially over the apices of the surface of the lungs, a quantity of black thready material condensing the lung-substance. If we look at it with the

microscope, we find that this thready material is thickened connective-tissue around the areoles, capillaries and bronchi; this thickening, in emphysema, is a kind of fibroid degeneration of the lung, and this fibroid change is commonly associated with fibroid conditions in other organs; so that vesicular emphysema and granular kidney are common associates. Further, it has for many years been recognised that vesicular emphysema and hypertrophy of the left ventricle are associated.

The older observers remarked this, and you may often prove it in the post-mortem room.

This hypertrophy has been attributed to morbid conditions of blood. Now we know that this hypertrophy of the left ventricle is connected with granular kidney and disease of the general vascular system; also there is commonly fibroid change in the pia mater, etc., of the brain, spinal cord, etc.

All these diseased alterations have to be counteracted. To do this, keep the patient as much as possible in the great circulations of light and air: give him sufficient food, and promote excretory actions.

Leaving now the condition of the lung, let us go on to consider the usual attendant of vesicular emphysema—bronchitis. It used to be taught (and still is) that vesicular emphysema is caused by bronchitis. Why was that taught so dogmatically? Because such emphysema is very often found together with bronchitis; but in the course of years of experience I observed many persons with emphysema and no bronchitis.

I asked them, 'Have you ever had an attack of bronchitis?' and many said, 'No.' I went further, and found that in some extreme cases of emphysema, the patients had suffered little from bronchitis. I at last came to recognise that this degeneration of lung-tissue was a part of general tissue

degeneration. Vesicular emphysema may be an inherited condition; it is thus met with in families, and it may thus attack the young members of those families. This probably accounts, to some extent, for severe forms of emphysema occurring in connection with whooping-cough. If it were due to the whooping-cough alone, it would, we should think, be much more commonly met with.

Gout and emphysema go together, and the children of gouty parents are liable to emphysema—that is, to premature lung degeneration. The condition, or cause, which brings about vesicular emphysema is the degeneration in the lung-tissue. You may observe it in young people, but much more often in the middle or more advanced periods of life; we may therefore plausibly say the cause of emphysema usually is the wear and tear of many years. You may be asked, 'Don't you think that blowing wind instruments would cause emphysema?' Answer, 'Yes, if badly blown.' Again, 'Don't you think that excessive inspiratory and expiratory actions may cause emphysema?' You may fairly answer, 'Such increased air-tension is doubtless the immediate cause of the dilatation of the air-cells; but where the tissue of the lung has much degenerated, that view is more serviceable, for it guides us to counteract the tendency to degeneration.'

It is ordinary experience that as the expiratory sounds in these lungs become more prolonged, the medical attendant finds from time to time signs of bronchitis. After a few or many years the prolonged expiration is accompanied by bronchitis. The bronchial inflammation may have been preceded by attacks of catarrh of the wind-pipe, and these early attacks of bronchitis are usually slight; but each winter they become more severe, and there is a yearly increasing difficulty in getting up the phlegm. As the lung further decays the crepitation becomes more abundant, and

the expectorated muco-purulent matter less and less charged with air-bubbles; also the cough diminishes, and the patient may say, 'You need not give me anything for my cough, as it is nearly gone.' The crepitant râles become smaller and smaller, and the expectoration more like pus and air-less. These signs show that the patient is about to die of capillary bronchitis.

But even then, if the right ventricle of the heart can send more blood through the lung, expectoration may increase, and the patient rally again. The most gloomy signs are loss of cough with diminished expectoration, the pus containing little or no air, and with crepitation less audible, until completely lost. With breathing becoming feeble there may be little or no crepitation, and it may only be heard on deeper inspiration.

On making post-mortem examination in these cases we find the minute bronchi are choked with pus, and in some of these cases we may further notice that the bronchial tubes are dilated, and especially those near the surface; the dilatation may be lengthwise, reaching to the surface of the lung, or spirical or moniliform: a number of spirical longitudinal dilatations. We observe also that the transverse muscular fibres of the dilated bronchial tubes are much thicker in some parts than in others; in fact, they are exceedingly wasted in parts, and very difficult to find.

We have to recognise that in these lungs elasticity has failed; that there is a great excess of residual air, and that the muscular fibres of the bronchial tubes have wasted away. In these patients, therefore, there is increasing failure of breathing and expectoratory power, with increasing failure of the vis nervosa; but sometimes a few nights' rest will relieve them wonderfully; or sometimes the administration of spirits and hot water, and some expectorants, will give them much relief.

Of bronchitis it is useful to know that inflammation of the larger bronchial tubes is attended with little or no danger, provided the general circulation be not failing. Inflammation of the larger bronchial tubes occurring with typhoid or other fevers, etc., may be a source of much danger if the circulation be exceedingly weak. The mucous accumulation in bronchi may be enough to prevent the air getting into the lung.

Bronchitis becomes dangerous in proportion as the smaller tubes are affected. With bronchitis attended by much harassing cough and expectoration, there is usually no danger; also where the expectoration has a large quantity of air in it.

If you are asked, 'What do you mean by bronchitis?' Say, 'There is hyperemia of, and exudation from, the capillaries of the bronchial mucous membrane; an exudation of an albuminous mucous substance swelling up the epithelium, and as it is swelled, it is more or less destroyed; its nuclei divide and become mixed with leucocytes and form pus; the muco-purulent matter expectorated.'

Is this morbid change a recoverable condition? Certainly! Does it tend to ulceration? No—except where the tubes are dilated, or where there is phthisis, cancer, etc. What are the morbid conditions that lead to or produce bronchitis?

1st. Degeneration of the lung-substance is usually attended by bronchitis; such degeneration, for instance, as fibroid degeneration of lung in its various forms with emphysema.

2nd. Morbid growths in the lung-substance—notably, tubercle (acute tuberculosis usually kills by capillary bronchitis); cancerous growths in the lungs; hydatids of lung or syphilitis.

3rd. Excessive accumulation of serum in a lung may give

rise to bronchitis; this is very common in Bright's disease. In connection with this, don't overlook the fact that there may be extreme struggling for breath, and no signs of bronchitis to be heard for some hours, whilst œdema of the lung is rapidly coming on. This is accumulation of serum, due to failing heart; and that is especially marked in the early stage of heart-failure; then the lung is most œdematous, and not in the later stages. With hœmorrhage and other cerebral disease, with injuries to the head and spine and disease of the spinal cord, we meet with œdema of the lung, leading to more or less bronchitis.

4th. Foreign bodies getting into the bronchial tubes, or inflammation extending down from the larynx to the bronchial tubes. Croup, diphtheria, or syphilitic inflammation of the wind-pipe, or swallowing boiling water, or food getting into the bronchial tubes, as in cases of perforation in stricture of the œsophagus, may set up bronchitis.

Poisoned blood is also a cause of bronchitis, as well as measles, typhoid and various other fevers. Inflammation may extend from the pleura or parenchyma of lung to the bronchial tubes, as in pleuro-pneumonia, or it may be excited by caseous or other phthisical changes in lung.

I know nothing about bronchitis produced by cold in healthy people. Some would say, 'Don't you find primary bronchitis in children?'

Where I have found bronchitis in children, I have usually been able to trace rickets, struma, or tubercle.

Idiopathic bronchitis I know nothing about. Further, does not bronchitis usually prevail in the wet and cold weather of spring and autumn, and is it not produced by those conditions? Yes, no doubt that is so; but it is in persons who have clear evidence of other disease.

LECTURE XI.

WHAT DO WE UNDERSTAND BY CHRONIC BRONCHITIS?

By chronic bronchitis is understood a bronchitis that recurs and recurs, usually every spring and winter, for years; and the question comes, how is it that the bronchitis does recur? Let us consider the conditions which give rise to this recurrence.

When we examine, after death, such bronchial tubes, we usually find them thickened, their mucous membrane has lost its transparency, and it is more opaque and granular, its epithelium is much destroyed; instead of seeing columnar epithelium there are a number of imperfect epithelial cells with pus-cells, and much granular matter. Tracing further the thickening, we find that it extends into the sub-mucous tissue; in other words, the capillaries of the mucous membrane are thickened, and doubtless the serous passages blocked to a great extent. It is almost inconceivable that the capillaries can be thickened and yet the areolar spaces around them not be blocked.

Owing to that, the serous circulation through this mucous membrane must be weak, and liable, from time to time, to be much impeded, and it may be completely arrested. This being the weak part of the body, if the general serous circulation becomes embarrassed and disordered, then the weak bronchial circulation will be the first to fail; and thus there comes in the influence of cold and wet—for the serous cir-

culation is very liable to fail, when weak, in cold weather, and œdemas to come on, thus showing the serous circulation to be dependent on heat.

Further, think of the serum. It is mostly water, and the water in the serum and tissues may be regarded as one continuous whole. In evidence of that: a man is attacked with profuse diarrhœa and he shrinks from head to foot, or with profuse sweating and he shrivels, so that when cold weather and east wind lessen the function of the skin and the escape of water from the lungs, there comes the difficulty in the serous circulation.

If this be considered, it is obvious that we may fail to protect persons from the effect of east winds even by keeping them in bed, as persons are sensible to its influence whilst there is wind.

All this becomes of immense importance when we have to treat these cases.

These considerations help us to consider how it is that the more we keep these people indoors, so much the more sensitive they become to changes of weather, etc.

A healthy vis nervosa and a healthy working of serous circulation go together.

PNEUMONIA.

You might be asked to describe the varieties of pneumonia.

Classify them naturally. Pneumonia is grouped into—1st. Lobar pneumonia, where it attacks a large area of lung, *i.e.*, one or more lobes. 2nd. Lobular pneumonia, where it attacks a much smaller area of lung; the appearance it presents is due to the form of the lobules. 3rd. Vesicular pneumonia, where it attacks a still smaller area, so small that for convenience it has been termed vesicular.

Lobar pneumonia comes on very commonly sthenically—that is to say, strongly—and many patients recover quickly.

Lobular pneumonia comes on asthenically, and more commonly ends fatally. That is the typical form of pneumonia that occurs in pyæmia or phthisis. Vesicular pneumonia comes on where lungs have much degenerated, or where vitality is feeble, as in children; it is the typical pneumonia of children.

There is still another natural group. We find by post-mortem examinations isolated patches of lung consolidated by pneumonia; and on looking at these solid parts, bronchial tubes are observed filled with pus, amidst the solid material. The clinical history also reveals that the inflammation began like bronchitis—with the signs and expectoration of bronchitis. Then it is usual to say the inflammation began in the bronchial tubes, extended into the air-cells themselves, and became 'broncho-pneumonia.'

In such cases the inflammatory exudation begins as in bronchitis; but the inflammation extends to the air-cells, they become filled up with solid inflammatory material, and so it is termed 'broncho-pneumonia.' The appearances after death leave no doubt of what has happened; for when we cut across the lung the bronchi are seen filled with pus, and around the pus solid granular inflammatory deposits.

Such pneumonia occurs in small or in larger patches. Some of them are so small they seem to be limited to a few air sacs—then it may be termed 'vesicular pneumonia;' whereas in other parts of the same lung we may find the solid patches are larger, yet retaining a circumscribed form about the size of the lobules, and it is called 'lobular broncho-pneumonia.' The above are the varieties of broncho-pneumonia.

Whenever we attend a child with bronchitis, we recognise that there may be this tendency in the bronchitis to pass into pneumonia; and whenever we attend a child we should always keep our minds open to that, and we generally know

that pneumonia has supervened by the much increased temperature, and by the crepitation having become much finer—more like what is heard with pneumonia in general.

Further, it is seen that the inflammatory solid deposit is spread over a much larger area, and broncho-pneumonia may extend—maybe from lobule to lobule—until one or more lobes of the lung are consolidated ; but that is not what we generally speak of as 'lobar pneumonia.' Again, the pleura may become affected and involved by extension of broncho-pneumonia; and these cases, generally called lobar pneumonia, have a distinctive clinical and anatomical history. This is spoken of as broncho-pleuro-pneumonia.

The patients are said to have been in their usual health when attacked with shivering, by pain in the side of a catching character—so much so that they dreaded to take breath—after that cough and expectoration came on ; but the cough was not very troublesome, thus being unlike that of broncho-pneumonia. There was high fever, accompanied by a characteristic expectoration—not muco-purulent as in broncho-pneumonia, but fibrinous, sticky, translucent, tending to coagulate, and charged with altered red blood corpuscles.

Thus it is that pleuro-pneumonia is a different disease to broncho-pneumonia. If we examine the lung by microscope in these cases of pleuro-pneumonia, there is seen lymph and leucocytes in and on the tissue of the pleura, and the serous membrane much swelled by this deposit ; the vessels are exceedingly charged with blood, and inflammatory deposit extends from the connective-tissue of the pleura into that of the lung.

The capillaries of the air-cells are immensely charged with red corpuscles and leucocytes, exudations of leucocytes with a granular matter around the air-cells ; also swelling of the interlobular structures—that is, the parenchyma of the lung.

Therefore this form of inflammation is termed 'interstitial pneumonia.'

If we examine the inflammatory deposit of broncho-pneumonia by aid of the microscope, what do we find? The air-cells similarly choked up with leucocytes, with granular albuminous matter; but the interstitial part of the lung is comparatively little affected. We may leave, for the present, these anatomical morbid effects of lobar and lobular pneumonia, and learn more of the clinical pathological history.

In cases of vesicular pneumonia of children, it is found commonly in association with rickets. In precocious children, with a tubercular tendency—beautiful creatures that have been made restless and unduly sensitive, until at last they are sacrificed on the altar of wretched conceits. Dickens has depicted such a nature in little Dombey. A precocious child, over-sensitive, over-observant, restless, made exceedingly imaginative, until 'dreams murder sweet sleep.' These children are so restless, their flesh wastes, and their respiration is hurried and abnormal. In watching them from month to month you will soon be impressed that excitement and fatigue are death's agencies.

Such children are prone to catch cold, liable to feverish outbreaks, and commonly become victims to pneumonia. In some families so-called healthy children are disposed to plastic inflammation, maybe to croup or to pneumonia; you may also meet with rheumatic pneumonia in children, and do not forget it may be due to measles or whooping-cough.

Lobular Pneumonia.

This may supervene because a vessel of the lung has been plugged, as in anæmia; or from thrombosis or other disease—it may be pyæmic. Some medical men have taught that

this pneumonia may be produced by emboli detached from a clot in the right ventricle of the heart. Lobular pneumonia is often due to failure of vis nervosa, therefore usual with brain disease of all kinds.

Lobular pneumonia and asthenic conditions co-exist. This form of pneumonia occurs in typhoid fever, and in syphilis. It is the pneumonia of old people, of those, in fact, who are much exhausted. Another form of lobular pneumonia is that which comes on in connection with croup, from irritation of air-passages, with cut-throat, with diphtheria, with scald of the glottis, with an aneurism pressing upon the air passage, or with cancer.

I have mentioned to you, and often shown you on the post-mortem table, lobular pneumonia secondary to bronchitis and emphysema, with the pneumonia occurring in small patches scattered through the lungs. Now with reference to this, I may delay you a few minutes by the clinical features.

When a patient is suffering from emphysema and bronchitis, we may find to-day merely bronchitis, but to-morrow that the resonant note is flat, especially over the lower part of one lung; and we may find also that the crepitation is finer, and we say that the bronchitis is passing into capillary bronchitis. And why is this more particularly marked in one lung than in the other? Because this lung is passing into pneumonia; which is spreading in this lung, and the air-cells are getting filled. At these times the temperature may be higher. The temperature in adults in bronchitis, to say the least, is very little raised above normal; so if we find in an adult that there are signs of bronchitis and a temperature above 100°, we should always suspect inflammation of the lung-substance. Of course the raised temperature might be due to inflammation of some other part of the body, and that question should be considered.

As the pneumonia spreads, the dulness becomes more marked, and the voice-sounds increased in intensity. Then we know for certain that there is the consolidation of pneumonia. It is not always easy to diagnose broncho-pneumonia. It is often much more easy to diagnose pleuro-pneumonia.

From what I have told you of the microscopical conditions we might infer that the broncho-pneumonia would be a recoverable condition; and it is so, and that even in weak emphysematous lungs. Therefore we must be very careful not to give too gloomy a prognosis in such cases, and for the reason that when the bronchial tubes contain much muco-purulent matter, there is doubtless deficient oxidation. The patient is much depressed, and respiration consequently further weakened.

Let us next consider pleuro-pneumonia. The best way of regarding such cases is to study them as they naturally occur: (1) sthenic, and (2) as asthenic forms of pleuro-pneumonia. We thus are guided to see the correlative morbid changes and their bearing to death or recovery. What is understood by sthenic pleuro-pneumonia?

It has long been noticed that 'full-blooded' people who had worked hard and had been regarded as strong were stricken down with pneumonia: attacked with rigor, pain in the side, cough, and high temperature. On listening to the lung at the onset of the seizure, merely harsh breathing may be heard. These patients are seldom saved, and the lungs are rapidly and generally diseased; but I have ventured the statement that only harsh breathing may be heard, whilst the temperature is very high and the face flushed.

In days gone by we had to ask in those cases, are those symptoms due to typhus fever or pneumonia? And now that typhus fever is rare, such patients with pneumonia, in

whom we merely heard harsh breathing, looked like people stricken with fever.

Generally there is detected a loss of breath-sounds and fine crepitation, and very commonly a pleuritic rub at the same time.

To understand pneumonia in its actual changes, we ask for the expectoration, we want to know what has been and is being done, we look to see what has come out of the lung; for that reason we take up the vessel containing the expectoration, and find the contents consist of a watery fluid, very frothy—serous remains mixed with air, the result of and outcome of œdema of the lung. What harm is the œdema doing? In this early stage of the inflammatory symptoms, post-mortem examination has led us to infer that the lung-tissues are swelled by this serous exudation and softened by it, so that in this stage of 'engorgement' the lung is exceedingly engorged, and œdematous and softened. The fine crepitation is due to air mixing with and pressing through this serous exudation, which has accumulated in the air-cells and capillary bronchial tubes. It is further noticed that this fine crepitation disappears gradually, and is replaced by exceedingly tubular breathing; this is revealed in the breath-sounds having a very marked tubular character; the air is heard evidently going in and out of small tubes, but little or no vesicular breathing is detected, and the sound of this tubular breathing is much intensified — it denotes increased air-tension in the tubes, and conductibility is increased by the solid material pressing in the air-cells against the tubes. At this stage the percussion-note is exceedingly dull, and the voice is much intensified through this solid material. Here, also, we may usefully inquire, what is the condition of this lung? Its air-cells are choked up, but not with serum: the lung at this time contains little fluid. How do we know that? We find it when we cut across the solidified lung; it is

comparatively dry, the air cells are filled with fibrine, leucocytes, and coloured blood-corpuscles, and the interstitial tissue is similarly altered. But the bronchial tubes are not so filled up; their tubes being open, the voice and the breath-sounds can be transmitted, though soft, in an intensified manner. Thus the 'bronchial breathing' as spoken of clinically, is the sound intensified produced by air passing to and fro in the bronchial tubes, and 'bronchophony' by sounds transmitted through the solid matter. There is another condition which is apt to come on in pneumonia: a condition which prevents the bronchophony and bronchial breathing being heard. The exudation flows up from the air-cells along the bronchial tubes and plugs them. These plugs may be traced between the rows of columnar epithelium. Then the bronchial breathing and bronchophony disappear.

Here let me add, you must not overlook the fact that the bronchophony and bronchial breathing may be absent, because much fluid has collected between the sides of the inflamed pleura.

We have considered the stage of so-called 'red hepatization.'

The expectoration at this period is rust-coloured, containing fibrine, with leucocytes and coloured blood-corpuscles; but by-and-by we notice in the expectoration remains of corpuscles charged with fat-granules, and the red blood-corpuscles have disappeared. When death occurs at this period the lung is found no longer to be in a state of 'red hepatization,' but passing into a state of 'grey hepatization.' The solidified portion of lung has lost much of its red colour; it contains but little blood, and the exuded corpuscles filling up the air-cells are much broken up and charged with fat-granules. These corpuscles look very similar to pus-corpuscles; and a celebrated teacher used to

contend that the solid material of pneumonia was removed by suppuration. He was guided by the appearance of these corpuscles. It was not a useful way of regarding these changes, because when we do find pus in lungs it is under different conditions. We may also notice on squeezing this grey hepatized part that fluid is oozing in every direction. Then we say, Yes! that is grey hepatization, with purulent infiltration, and that suppuration may break the lung down into cavities, which are not due to phthisis.

Such purulent infiltration results from pneumonia which has occurred under exceedingly asthenic conditions. That form of pneumonia, passing through those various stages, is commonly met with in men who have drunk hard; also at the middle period of life when the body has been under other exhausting conditions (much worn out). Pneumonia is in some cases so virulent that it attacks persons as if they were fatally poisoned—from the first they look as if poisoned, in a few hours become so exhausted and prostrated they cannot raise themselves in bed. I will leave the subject here for the present, because I intend speaking of asthenic pneumonia later.

PNEUMONIA.—In the individual experience of disease, the question arises from day to day, how can I most usefully regard the morbid state with a view of affording relief and to gain more health? Therefore pneumonia is (1) most serviceably studied in cases which recover; (2) in cases which prove fatal. And it is necessary from the outset, when remedies have to be adopted, to recognise the natural bearing—whether the patient is likely to recover or to die.

Experience has shown that those cases are likely to prove fatal in which there has been extreme weakness before the pneumonia set in—speaking exactly, such are cases of asthenic pneumonia. Pneumonia proves fatal where there have been slow destructive changes, collecting with unerring

fatality, until the inflammation ends all—a slow death spreading through the tissues before the inflammatory outbreak. In such cases of pneumonia the earlier changes may have been due to excessive drinking, to extreme weakness owing to excessive fatigue and hurry—a maddening fatigue, until the body is killed by sleepless suffering. In others, extreme weakness and excessive sensitiveness and a want of out-door exercise prevent them withstanding cold and damp. Usually persons recover from acute pneumonia if there be no antecedent tissue degeneration of the lung, extreme blood-poisoning, or violence.

I only see about two or three deaths a year from simple acute pneumonia where I can find by post mortem examination no evidences of antecedent disease. Cases do not recover generally in which there is much antecedent tissue degeneration, blood-poisoning, or violence. We mean by tissue degeneration, fibroid or caseous degeneration of the lung-substance, or great atrophy of the lung. Asthenic pneumonia is frequently met with secondary to Bright's disease, secondary to emphysema, secondary to syphilitic fibroid thickening of lung, or to cancerous conditions of lung. To repeat, I always look for evidence of antecedent disease in the lung, and I usually find some old thickening in its tissues which tells me there has been a chronic hindrance of the circulation in the vessels of the lung.

When pneumonia is secondary to blood-poisoning, to erysipelas, measles, malarial fever and typhoid, rheumatic or other fever, the patient will be likely to recover, if the heart be acting healthily. As a third cause we have violence, such as a blow on the chest, with little or no external evidence of injury, or fracture of ribs. In speaking of a blow, and as a direct effect, mental shock must be considered: an accumulation of depressing influences weakening respiration, until a few words may inflict a

deeper blow than a knife. There is no doubt that words may have an immense influence when they are joined to depressing circumstances. Hence a fright may be a cause of pneumonia, especially if attended by wet and cold.

In considering these exciting agents we cannot but recognise that they are multiple and various; but the fact is beyond doubt and worth repeating, that if the tissues of the body have not degenerated, the patient usually recovers. But never overlook that feeling and respiration are continually working together, and that if the 'feeling' has been extremely depressed, patients may die with comparatively little tissue degeneration. Hence we must direct our treatment accordingly.

LECTURE XII.

HEART DISEASE.

ALWAYS think of heart disease as heart not working easy, its rhythmical movement being very different to that of a healthy heart. If ever you want to know what is easy working, listen to a child's heart, and be impressed by it.

A heart may have much morbid alteration in its structure, and yet it may go so easy that the patient works and enjoys life for many years. What right have we in such instances to say he has a diseased heart? I attended a young person for rheumatic fever and mitral affection, and the mitral bruit has continued for twenty years; yet she has been able to go about like ordinary people.

What would have been the use of frightening that patient by considering her heart as diseased? A middle-aged man once consulted me about his heart, and told me what led him to do so. One day, after hurrying to catch a train, he felt distressed about his heart. Consequently he went to several medical men; they had all prescribed digitalis, as I saw by the prescriptions, yet I could gather no evidence of his heart working uneasily. He was able to do his work as a commercial traveller, to eat, and sleep, and feel comfortable; he said there was no difficulty in his breathing. Therefore I could only tell him to take no medicine, and go on as usual. How could I treat him for heart disease?—there was a mitral bruit, but I could not treat the sound.

So long as the heart is able to carry on the circulation and breathing, whatever sign of damage we may find in the

heart, we must avoid discouraging the patient. To reveal to you what a heart can work with, I may mention that in making a post-mortem examination on the body of a young man, I found the remains of a large abscess firmly connected with the anterior surface of the heart. It contained concrete pus, enclosed in a thick fibroid wall, which extended through the pericardium into the muscle of the left ventricle; and yet that man was a rigger, and working in the rigging of a ship when he fell and was killed.

Further, several times I have found dense, thick, calcareous hoop-like masses extending round and in the substance of the left ventricle and auricle, yet the patients had evidently lived for many months, to say the least, with all that structural alteration.

Aortic regurgitation is a condition that impresses our minds gloomily; yet I remember a man coming backwards and forwards to see me at the hospital for about ten years with that condition. Contraction of the mitral orifice is an extreme morbid change; yet it is wonderful how many years people live with undoubted signs of mitral contraction. I have known cases with such disease go on for years.

Again, a heart may be rhythmically much 'diseased,' whilst its cavities and valves present no indications of structural morbid change. Disturbance in nervous system may very much disorder the rhythm of heart; so, whenever we think of heart we should always think of it in this manner: nervous power working in the heart, light and heat, air and water-power (albuminous and saline powers) in the onflowing blood, life in the blood, enabling the heart to go easy. Many people who come to a medical man about their hearts, suspecting heart disease, want food; others want more water and air, because they have to work hard; and these elementary powers are urgently needed to ease the heart.

Heart's structural damage is best studied from two points of view—valves and cavities. The heart's cavities may be altered—dilated, for instance—without there being appreciable valvular deficiency; not until the ventricle becomes extremely dilated are the valves rendered incompetent, secondary to, and consequent upon, the dilatation of the cavities—ventricles.

The valves of the heart may be primarily diseased, and so long as the cavities of the heart remain about normal, it is of very little consequence to the patient that the valves are injured. Heart's structural disease becomes dangerous in proportion to the extreme degree of dilatation of the cavities. So that we have here to ask, what are the morbid conditions that give rise to dilatation? and let us begin with the cavities of the right side of the heart.

The most common of all is 'vesicular emphysema,' or some fibroid consolidation and contraction, or atrophy of the lung, permanently impeding the passage of blood through pulmonary vessels.

A rare condition is pressure upon the pulmonary artery, aneurysmal or other, or fibroid contraction of the pulmonary artery, which I found in one instance.

I remember the particulars of a case in which the right auricle was extremely dilated, and it was produced by a strumous growth in the wall of the auricle, extending from a strumous mass in the bronchial glands adjacent to the auricle; usually the auricular dilatation on the right side of the heart is consequent on the ventricular dilatation and its attendant tricuspid regurgitation, or to contraction of tricuspid orifice. And another common form is dilatation of the right side of the heart, secondary to disease of the left side; therefore, whenever we want to measure the severity of disease on the left side of the heart, we turn to the right side and ascertain if it be dilated; because, if the

blood be unable to pass freely through the left side of the heart, it sooner or later distends the right side excessively. Do not forget that fact.

Cases are seen in which no disease on the left side can be detected by physical signs; but there are signs revealing that the right side of the heart is excessively distended and dilated: there are no signs indicative of disease primarily in the lungs to account for the dilatation on the right side, nor of disease primarily in the pulmonary artery; so we are led to conclude that the dilatation of right ventricle is consequent on disease of the left side—some valvular failure on the left side of the heart; but in such cases no bruit may be heard—it may have disappeared. That experience is not uncommon in cases of extreme mitral contraction; the characteristic mitral bruit may no longer be heard, and during the last few weeks of life it not uncommonly disappears: and the only evidence denoting that the heart is much diseased, is the fact that the breathing is difficult, there are signs of lung congestion, and that the right side of the heart is much dilated. It is not always easy in these cases for us to avoid great error; the most extreme and fatal morbid changes in the mitral orifice and valves may be overlooked, unless we bear in mind the dilatation of the right ventricle and auricle.

What are the causes of dilatation of the left side of the heart? If the left auricle be dilated, it has become so consequent on contraction of the mitral orifice, or thickening, deformity and incompetency of its valves; or consequent on exteme dilatation of the left ventricle, the valves themselves not being thickened, but, owing to the great distension of the ventricle, unable during systole to close the mitral orifice, and unable to prevent regurgitation into the left auricle, and which leads to its dilatation.

What are the causes of dilatation of left ventricle?

Commonly it is consequent on disease in the aortic valves; may be secondary to adherent pericardium: pericarditis may lead to dilatation of the left ventricle. Fibroid degeneration of the wall of the left ventricle leads to dilatation; this may be syphilitic or other fibroid degeneration, such as is associated with granular kidneys and fibroid changes in vascular system, or with vascular degeneration without granular kidneys. Some of the most extreme forms of dilatation of the left ventricle are associated with granular kidney; but I have seen enormous dilatation without the kidney change, and no evidence that the dilatation was due to valvular or pericardial defects.

In rare cases, fatty degeneration may lead to dilatation of left ventricle, as in cases of anæmia.

Dilatation of left ventricle, as a result of rheumatic fever, occurs without any primary valvular disease, especially in children, and without pericardial adhesions.

Valvular cases, where the disease commences primarily in the valves. Such cases may be grouped as follows:

Disease of the valves due to excessive and destructive tension, especially in the aortic valves, so-called atheromatous disease of the valves. This atheromatous disease of the aortic valves is mostly met with in the bodies of men, and after middle age—that is, after immense wear and tear, and therefore presumably due to the repeated and excessive tension; but as corroborative testimony, it is met with in young subjects, in which there has been excessive tension. I call to mind the case of a young man who had been employed carrying bricks up high ladders, and he died of that valvular disease. The post-mortem examination left a clear impression on my mind that such had been the origin. We are, moreover, led to attribute the atheroma to excessive tension, because it usually occurs in other parts of the body where obviously there must be undue tension at times. I

mean, it is seen at the orifices of vessels, in the sinuses of Valsalva, and in those vessels which have to bear the greatest pressure. Again, the only cases in which atheroma occurs in the pulmonary artery is where there has been extreme tension of the pulmonary artery, consequent on fibroid or other contraction of the lung.

Atheromatous disease of the aortic valves generally begins about the sinuses of Valsalva, and extends into the substance of the valves themselves, and there is fibroid thickening of the valves; and owing to the contraction of this fibroid material, the valves are drawn upwards and outwards and may be everted, and so the valves are rendered incompetent to close the aortic orifice. Such valves are commonly calcareous, and the loudest and harshest bruits met with are heard in cases with this calcareous change.

Disease of the aortic valves may come on from a blow on the chest, or from sudden severe strain in lifting a very heavy weight, etc. Further, morbid changes of the aortic valves may be consequent on the disease of the mitral, and they are very commonly the remains of rheumatic fever. That brings me to this question: Rheumatic change in the mitral valves being extremely common, what form does it take? The mitral valve is thickened by tough fibroid material, the remains of endocarditis; the chordæ tendineæ are thickened and adherent, the wall of the mitral orifice valve is commonly thickened and much contracted, and very commonly the thickening extends, in some degree, up along the substance of the mitral to the curtains of the aortic valves.

This fibroid thickening also extends from the substance of the mitral valve along the endocardium of the auricle and ventricle—along the connective tissue of the wall of the heart; and I am led to think (though I have not yet had time to search sufficiently and demonstrate it) that the

reason why some cases of mitral disease continue longer than others is owing to the fibroid thickening not extending, or extending less, into the left ventricle; the nutrition of its muscle is less interfered with, the capillaries of the ventricle being less thickened and contracted; for we know that fibroid thickening in the connective-tissue of the left auricle leads to atrophy of its muscle. Fibroid thickening of the mitral valve may result from scarlet fever, or be connected with chorea (which latter condition may be rheumatic). Moreover, inflammation of the mitral valve comes on when the body is much weakened, and in various diseases. I have met with vegetations indicative of endocarditis after death by pyæmia, Bright's disease, by pneumonia, by typhoid fever, by cholera.

There is a proportion of cases in which we cannot attribute the valvular lesion to rheumatic fever; there is no history of rheumatic fever, and it would seem probable that in some of these cases the endocarditis has been connected with other morbid states of the body.

In all the chronic thickenings of the valves, endocarditis is liable to supervene amongst and swell the thickening material. Such acute inflammation is common where there is chronic damage in a valve; especially it occurs if there be conditions weakening the body. We should not overlook that risk, for if we are not on the look-out for acute endocarditis, it may come on rapidly, and in a few days soften down the substance of the valves and destroy them. Therefore it is very important in all these cases, immediately we have reason to think there be acute endocarditis, to take all unnecessary tension off the valves of the heart as quickly as possible; and we endeavour to do that by guiding such patients to rest in bed, and otherwise securing them rest, as called for.

LECTURE XIII.

HEART DISEASE—*Continued.*

I AM afraid I did not put it clearly to you about dilatation of the left ventricle. What are the conditions which give rise to dilatation of the left ventricle? We will take, first, one of the most common forms—disease of the aortic valve, which may be obstructive; some narrowing of the aortic orifice. This is usually due to atheromatous and calcareous changes in the aortic valves, giving rise to aortic obstruction and regurgitation; in many cases the regurgitation is much marked, and associated with the signs of obstruction. But the calcareous change may make the valves so thick and so viscid that they block the orifice exceedingly; then the signs may be those of obstruction only or mainly; the blood tension in the left ventricle is much increased, and the ventricle becomes dilated and hypertrophied. A large heaving impulse is felt under and to the left of the left nipple, denoting hypertrophy and dilatation, with a loud, harsh, systolic bruit carried along the aorta, denoting obstruction; and the radial pulse is exceedingly small, manifesting that there is a diminished stream of blood in the arteries—which, moreover, reveals that the aortic valvular disease is extremely obstructive. But the aortic obstruction may not be in the aortic valves, but farther along the aorta: for instance—there may be fibroid thickening of the outer coat of the aorta in connection with a firmly adherent pericardium; that product of rheumatic inflammation may have extended

some distance along the aorta, and subsequently contracted and constricted the aorta.

Dilatation and hypertrophy of left ventricle and no valvular incompetency, or merely mitral incompetency consequent on the extreme dilatation of the ventricle, is very often found associated with granular contracted kidney ; but in some cases it is indispensable to perceive that the heart's condition calls for the medical treatment, and not the kidney—that the patient is suffering from heart disease, and dies of heart disease, and any part the kidney takes results mostly from the failure of the heart. That is proved by the condition of the lungs, and the 'nutmeg liver,' and the firm, dark spleen. All these changes testify that death was the result of the heart disease—organic conditions such as are always found, more or less, after death from heart disease.

Dilatation and hypertrophy of the left ventricle is also found associated with degenerative changes in the arterio-capillary system. I have seen gross fibroid thickening along the aorta and larger arteries, associated with dilatation, and there is often much atheroma of larger arteries ; but the degeneration which is recognised as the main condition leading to the dilatation and hypertrophy, is in the arterioles and capillaries. There may be many degrees of contraction in these kidneys. In some of these cases the kidneys are extremely granular and contracted ; in others, the contraction is only appreciable by microscope ; so we were brought at last to recognise that the dilatation of the left ventricle is due more to the disease in the vessels than to the contraction of the kidney.

In the course of many years of post-mortem examinations, we increasingly noticed that there might be great dilatation and hypertrophy of the left ventricle, and much contraction in the kidney ; or the kidney contraction so little that it could only be appreciated by aid of the microscope : yet in

both kinds of cases there was much fibroid and other degenerative change in the vessels; hence we were brought to say that the dilatation of the left ventricle is determined by the disease in the vessels more than by the disease in the kidneys. The old teaching was that it was entirely dependent upon the disease of the kidney, but during the last ten years we have taught otherwise.

Further, we have noticed that there may be much dilatation and hypertrophy of the left ventricle, little or no kidney disease, and, as far as we could appreciate by microscope, comparatively little fibroid degenerative change in the vessels.

These are, however, rare and exceptional cases. But what is the cause of such dilatation of the left ventricle? We have found in the wall of the left ventricle itself much degenerative change. In some of these cases it was a gross fibroid change, fibroid masses which cut like gristle, and formed one or more lumps amongst the muscle. In other cases, when we cut into the muscular wall, it was not such a mass of fibroid tissue, but a fine, thready, fibroid substance extending amongst the muscle. These changes may be traceably due to syphilis, or to abuse of alcohol.

By this experience we were led to conclude that the connective substance of the wall of the left ventricle underwent a similar process of degeneration, to that seen in the contracted kidney itself, as well as in the vessels themselves. This fibroid change is like all fibroid change; it is a stiffening and hindering process, a stenosis around the vessels. If you are asked what changes have been found in the wall of the left ventricle, where the ventricle is much dilated, and associated with granular contracted kidney, answer: 'The connective-tissue of the wall of the left ventricle is thickened and stiffened, and markedly that around its arterioles and capillaries.' The longitudinal striæ in the

muscle-bundles are similarly stiffened, so that the muscle looks more like bristly substance than muscle band, and the transverse striæ of the muscle are much diminished.

Besides these changes, there is atrophy of the muscular fibres, owing to the contraction of the fibroid material and to the thickening of the capillaries; and by the side of these atrophied fibres others occur which are hypertrophied.

It is here, as it is everywhere the rule in the body, atrophy and hypertrophy side by side. As one part of the tissue fails, the other part has to take on increased function to compensate.

It should always be borne in mind that, with failing function in one part, there is a necessary effort in another part to supplement the weakened action—that in nature there is thus a balance. That is particularly noticed of these hearts. Even if weakened in one part, they become stronger in another. That supplemental proceeding is the spirit of therapeutics.

When dilated left ventricle is the result of adherent pericardium there also, there is a fibroid substance, remaining from the inflammation, extending around the vessels, thickening them, and contracting the muscular fibres in parts. Dilated left ventricle occurs also, especially in children, as a result of rheumatic fever without adherent pericardium. In these cases it is, I am led to think, the result of myocarditis, an inflammation of the connective-tissue of the left ventricle; but I have not verified that inference by microscopic observation.

We now come to consider the signs which manifest that the heart's function has more or less failed; in short, the signs of weakened heart—the heart disease. These signs are, in some degree, met with in all forms of heart disease. One of the earliest signs is irritable action in the heart's rhythm, felt by the patient as restlessness, very commonly

accompanied by sleeplessness. The nights are much disturbed by waking many times in the night, or by lying awake for hours together. This sleeplessness is a great trouble. Heart's failure is also often manifested by excessive irritability in feeling. The nervous system becomes unhealthily sensitive, and the patients, therefore, are beset with worries and troubles. As the beautiful, harmonious rhythm in the heart's working is lost, the world becomes exceedingly worrying, because (that is to be remembered) the rhythm of heart and brain work together, and are disordered together, and impressions from the outer world received accordingly. The next noticeable symptom is muscular and nervous weakness; the patient is soon tired, and prone to be apprehensive. On listening to the heart, we feel that the easy, rhythmical process is lost; the action is more tight and constrained. Such patients complain of palpitation. By that they mean the irritable beat of the heart, maybe against the wall of the chest, but felt by themselves only; or that irritable, constrained rhythm may be felt by our hand placed over the pericardial region. Whenever the patient is alone it is most distressing, therefore they complain so much of its occurrence at night.

Now here let me mention to you what I have gathered about rhythm. What does rhythm mean? I soon came to recognise that rhythm and easy working always go together; that which works easily is rhythmical. Regular repetition, and absolutely reliable repetition; therefore it is in order. In nature it is traceable that all motion is rhythmical. This is ascertained of heat, light, electricity; and seen in the wavy movements in tides. I turn and see it in the working of fire, and energy passing into water—boiling; in the working of wind with water, with trees; in the breathing of animals and human beings. To go

further, rhythm and easy definite working in all nature go together.

Paralysis is absence of rhythm. All work, as work, means rhythm; therefore a healthy heart and power of work go together; and as the heart loses its rhythm, the patient loses his power of working.

As I proceeded inquiring for rhythm, whilst endeavouring to feel my way into the rhythm of the world, I one day stood near a running brook, and waited until my senses were governed by its rhythm; then I found that I was inwardly, and in a little while outwardly, moving to it. The brook got me into tune, and away I could go. As I got into tune and time and rhythm with the brook, my heart's and other muscular movements were toned, agreed accordingly. My senses were governed by the mighty, undeviating rhythm, and my heart and limbs moved marvellously 'easy.' The government of the great being the easiest government.

Turn to the other, the government of the sentimental mawkishly weak; then we see what has been long recognised of the 'danger in works sentimental.' 'They attack the heart more successfully because more cautiously.' (Dr. Knox.) Disease in such is rampant. The most terrible tightness and uneasiness in heart's rhythm that I have ever listened to was in the heart of a person whose mind had been wrapped in spiritualism. She murmured to me, 'I cannot bear it long.' Sound and rhythm concur; so heart's easy, healthy rhythm concurs with the sound in health and varies in disease. Disordered rhythms concur with distinctive sounds of disease—bruits so termed. To understand the meaning of these bruits, we have to consider that the first sound of the heart is connected with energy flowing from the muscle in systole into the on-travelling blood. It is not a definite sound until the end

of systole, when the apex-beat impinges on the chest, and mitral valves close. It is a low-pitched, deep sound. At the end of systole the energy passes into the closing valves, when the sound is definite, sharp, clicking ; it is finite.

It is a remarkable feature in valvular destructive disease that the definite feature of the sound is lost : it is more an infinite sound. There is a blowing from the first or second sound, the end of which fades away imperceptibly ; so that this imparted infinite or indefinite character is consequent on too definite fixed states that have encumbered the heart's structure and working, consequent on the rigid thickening of the valves, or the hindering dilatation of ventricles or aorta : an abuse of the definite, which has marred the normal rhythmical time-keeping action, until time cannot be kept nor required position retained. The abuse of the definite deprives the tissues and the sufferer of energy. Energy cannot accumulate where energy is needed for the discharge of day-by-day work.

In health 'all things in imperfection hold but for a little moment ;' in disease, in the too definite, it is the conceit of this inconstant stay that is the trouble of the heart. Whilst the elements in the blood and in its own tissues must obey the all-providing power, the sensibility, its nervous working, are hindered by the 'conceit of the inconstant stay.'

We want to recognise the disordered rhythms and sounds which precede these bruits, which might warn, so as to prevent the heart getting into a fatally injured condition.

You are familiar with my paradoxical speaking, therefore will not be so much surprised to hear that it is a great aid in listening to sound to be deaf. Being somewhat 'deaf,' I have had to listen, and not hear until the sound came and taught me ; I did not paralyze myself by striving to hear. In listening to a heart, let your ear guide you, and keep out preconceived ideas. What we notice in diseased

cases, on listening like this, is that the sounds of the heart are abnormally prolonged, abnormally pitched, abnormally intensified.

We are required to searchingly consider the disorder in cardiac rhythm. There may, in some cases of mitral regurgitation of rheumatic origin, be no bruit, but an exceedingly irregular rhythm. The disorderly disturbance in the rhythm in such cases enables us to appreciate more the value of the orderly rhythmical action.

The hearts I have just spoken of have long been recognised. Often in them no mitral bruit is heard on listening to the heart; but more careful listening may reveal that there is a bruit, but the heart's action is so rapid that we cannot recognise the bruit. Or we may give digitalis to slow the heart's action, and then the bruit is distinctly heard; and not only that, but the breathing is much relieved, showing beyond all question that regularity of rhythm, ease of breathing, and increase of strength are all related closely.

While I am on the subject of disturbance of rhythm, I have to refer to cases of dilated left ventricle in which there are various disturbances in rhythm—so often heard that they are known to be distinctive of the dilatation of the left ventricle that is so common about the middle or later period of life, and usually connected with diseased vessels and granular kidneys. One of the earliest signs of disorder in the rhythm of such hearts is a heavy, laborious pendulum-like swinging action; in the rhythm it sounds as if it were, as it really is connected with, a stiffening process in the heart. Such hearts cannot dance sweetly on as the healthy heart does.

After listening to such hearts, we can understand a patient sadly saying, 'I cannot do as I used to do;' he is constrained to say, 'What is the use of living?' In other of

these cases of dilated left ventricle, there is with this labouring condition noticed a 'hurrying,' somewhat irregular 'cantering' rhythm; probably hurrying has had a lot to do with it. Then there is another group of cases where the first sound is very weak, and the second sound prolonged, familiarly spoken of as 'tic-tac'-sounding heart.

Valvular bruits are heard at a little later period, when the ventricle becomes more extremely dilated. Moreover, there is a very common form of irregularity of rhythm in such cases—one regular beat may be heard, now and then followed by many more rapid, hurrying, irregular beats. These disturbances in rhythm are so commonly met with, that medical men are accustomed to say immediately they discover them, that they look for further signs of dilatation of the left ventricle, although there is no bruit.

In some of these cases with extreme irregularity, if digitalis be given, and the rhythm becomes less irregular, a bruit may be heard.

To go on further with the increasing disturbance of rhythm, there is another sign, and that must be noticed, for it is evidence of increasing tension in the pulmonary artery, and of impeded circulation through the lungs. The second sound, due to closing of the pulmonary valves, heard over the second left costal cartilage, is exceedingly prolonged, and of higher pitch.

With the increasing difficulty of breathing, we notice that the tubular sounds of the lung are much more marked than normal. Evidently there is obstruction in vesicular breathing; there is exceedingly harsh tubular breathing, and the harshness manifests that there is increased friction as the air travels down the lung. We next notice in the lung, moist crepitations; that is evidence of exudation into the air-passages, and this exudation is evidence of increased tension. With that increased friction and tension, uneasi-

ness, tenderness, and pressure in the epigastric and hypochondriac regions are complained of, also flatulent and other disturbance in stomach and bowels. And there may either be diarrhœa, or constipation; there may be from time to time windy colic.

As the uneasiness increases in the stomach, the patient complains more and more of symptoms of indigestion—food is slow in digesting, occasionally vomiting occurs. Vomiting when the heart is rapidly failing may be the most prominent symptom — uncontrollable vomiting of muco-serous fluid. Hence, in any case, if there be tenderness in the epigastrium and vomiting, we should not fail to examine the heart, for rest in bed may be the best of all remedies.

To go on studying the signs of failing heart, there is also tenderness over the liver, and the sufferers complain of aching and tenderness in the right side. Liver is usually felt below ribs, manifestly enlarged—swelled by accumulating venous blood—and there may be more or less signs of jaundice; the gastric mucous membrane, owing to venous congestion, is swelled, the mucous membrane of intestines and kidney also swelled. The urinary function is much disordered. The urine may be at the outset excessively abundant—there is diuresis; but after a while it gets more scanty, high coloured, and charged with lithates. In some cases, whilst the kidneys are much congested, certainly after death, they are seen to be extremely venously congested; yet there was no albumen in the urine, whereas in other cases there was a little albumen, or the test-tube on examination may seem to be half full of albumen. Spleen also becomes swelled, hence the tenderness in the left side. Legs swell, their veins are excessively charged with blood, and the serum cannot flow onwards—it accumulates enormously in subcutaneous cellular tissue, back and abdomen, and maybe in the arms. In some cases œdema

of the legs becomes much marked before there is much sign of disturbance in stomach or lungs. In others there is very little swelling of the legs, whilst there is evidently much congestion of the lungs and stomach.

These effects are probably connected with localized weakness in coats of the vessels themselves. We must remember that there is a rhythmical action in every vessel as well as in the heart, and it is presumable that it may fail more in some vessels than in others.

We next notice that harsh breathing sounds are mixed with bronchial râles. As the heart fails seriously, crepitation becomes more and more abundant, and there is increasing dyspnœa.

Briefly here, let us ask, What is the most significant indication of failing heart? The answer is, 'Difficulty of breathing.' The patient becomes unable to lie down as usual in bed, on account of the difficulty in breathing; he must have his shoulders raised to aid the auxiliary muscles of respiration, which are increasingly called into operation. That the breathing is rendered thus difficult by the failure of heart's contractile power and consequent congestion of lungs, there can be no doubt. I used to think that the difficulty of breathing was simply due to the failing heart; but I am increasingly brought to think that there is antecedent failure in respiration, and that is the immediate cause of the heart's failure of power. Owing to some great disturbance in the rhythm of respiration, the heart becomes unable to obtain its required energy from the blood, energy evolved by the blood being sufficiently oxidized.

Even in early periods of cardiac weakness, the disorder of respiratory rhythm must to some extent be attributable to the disease in the heart; but it is also attributable to other conditions—the body has not been kept sufficiently in

association with rhythms that are continuously maintaining respiration, circulation and life.

It follows, therefore, that patients suffering from heart's failure should be allowed to rest in a place well ventilated and well lighted, where the air is sufficiently moving, dry and warm, and the skin should not be covered with more than is necessary for warmth—loosely covered—to allow air to move over it and stimulate respiration; and any excessive tension in abdomen or elsewhere, which depresses feeling and respiration, should be relieved.

Nature gives relief to the difficult breathing by sleep, and it is wonderful how quickly the œdema of the lower extremities may diminish from refreshing sleep. Unconsciousness may be induced by morphia or chloroform, or such-like agents, and afford much relief—better breathing; but I have found that whilst I thus soothed the feeling and the respiratory movements became less struggling, yet strength, on the whole, diminished. I have known a medical man, with valvular heart disease, continue the morphia during several months, and it afforded him such relief that he was enabled to attend daily to his practice, yet his circulation became weaker and weaker until he died.

A hot bath commonly assists persons to go to sleep; it evidently does so by rhythmically freeing sentient actions of skin, so lulling consciousness into rest. Sponging the face with hot water has a similar effect; and these are more natural ways for sleep—they lead more to the 'rest in action, and action in rest,' which is the working of rhythm.

Shakespeare says, 'Sleep . . . the death of each day's life.' So it is; the death of this day's externals, allowing its definite forms to pass behind. The circulating, rising again, is travelling onwards from the dead yesterdays, as Macbeth said when the apothecary announced Lady Macbeth's death, 'She should have died hereafter, there would have been a

time for such a word "To-morrow, and to-morrow."' She should have realized the present—the ever present.

I make these remarks here to impress upon you that for relief to breathing, the feeling must be relieved, so that the mind go freer. In such cases, if we listen and will be taught, we may learn that old impressions come to the surface-consciousness and perplex poor self distractedly. Such dreams beyond the wit of man; delirium, too, may prove useful by freeing from past, dead impressions, and breathing may so be much relieved. Respiration is always freeing mind, and freeing mind is always relieving breathing.

As the failing heart comes nearer to its end, we observe, on auscultating the chest, that crepitant râles may have much disappeared; but the breath-sounds are more extremely tubular, and the percussion note is dull; it is difficult to determine to what extent the lung is condensed and consolidated. Usually there is also a thick fibrinous substance expectorated, mixed more or less with red-blood corpuscles, which denote that there is 'pulmonary apoplexy,' and vessels of the lung are charged with fibrinous, dying albuminous material.

These sufferers long to be out of doors, in association with what is going on in Nature, and to be pulled into order and strength again; and ought we not, as medical men, to promote that more than we do? We fear Nature too much, to say the least.

The next question we have to put before us is, If death results, what condition do we find in the heart? The wall of the heart, especially the right ventricle, appears 'leathery,' and the right auricle is also toughened, and the coronary veins of the heart are enormously distended with blood. When we examine by the microscope we see the muscular and connective tissue charged with granular

matter, and the wall of the heart is also more or less œdematous; in other words, the heart has been overloaded by the accumulation of venous blood in its structures, by serum, owing to enormous venous congestion and by the glutinous granular material of the albuminous constituents of the serum. By such accumulations the heart becomes stiffened, until at last it stiffens into death! On examining the lung we find its structure thus œdematous and choked, the air-cells charged with granular albuminous matter, leucocytes, and red-blood corpuscles. This is the so-called fleshy splenized heart-lung. We find the liver-structures similarly overladen, the intertubular capillaries enormously distended with blood, and the liver-cells compressed by the over-distended capillaries and charged with granular matter. This is the so-called 'nutmeg liver.'

LECTURE XIV.

SECONDARY CHANGES IN HEART DISEASE.

BEFORE we leave the subject of heart disease, gentlemen, there are one or two other features we have to notice. You will remember that in my last lecture I spoke about great venous congestion, proceeding into œdema, albuminoid infiltration, hæmorrhagic exudation, and consolidation. That is illustrated in the lungs in a striking degree—venous congestion resulting in serum exuding from the capillaries, swelling the tissues by œdema; the water of the œdema by degrees being pushed away by the augmenting albuminoid matter accumulating in the air-cells and lung-tissues, until after death the lung-substance is found comparatively dry and toughened. The water is replaced by a granular albuminoid substance, which sticks the parts abnormally together, making them 'leathery,' fleshy and tough, that again being further (as the tension increases) mixed with extravasated red corpuscles, appearing as hæmorrhage. Similar alteration to this occurs in lungs, and also in heart's substance, in liver, kidneys, in spleen, and in stomach.

Whilst that is going on, any of these organs may take on an acute inflammation; therefore pneumonia, nephritis, catarrhal inflammation of the stomach, commonly supervenes, and, exceedingly commonly, inflammation of the skin of the œdematous legs takes place.

Hepatitis (inflammation of the liver) is more difficult to

speak about, except in a histological sense ; and in a clinical point of view we must be clear how we use that term. If you ask me, Do we find by naked eye indication of inflammation, due simply to heart disease ? I reply, No !

As the heart-failure becomes extreme, there is increasing anæmia of brain, and emptying of the arteries—its venous system choked with blood.

There are two kinds of anæmia usually met with in these cases : one, in which the red corpuscles—the breathing organs of the blood—are much diminished ; and there is another form of anæmia, where the blood stream is much diminished.

As this anæmia increases, pain in head, dreams, delirium, maybe convulsions, may occur, and may pass into coma. When we examine the brain, we find venous congestion, and signs of anæmia, and evidence of serous and corpuscular exudations. In the processes of evolution blood is formed, and circulates before the heart is completely organized ; in the processes of involution the heart's organization may be much deteriorated, and yet it may continue to act. And it is a question if the heart can become diseased and fail altogether so long as the blood is rhythmically healthy.

It is not simply the heart's contractility which circulates the blood—that is a borrowed quality ; it is equally the energy in the circulating blood which supplies energy to the heart, enabling its muscles to contract ; both heart and blood are mutually dependent. Moreover, the blood circulation *per se* must depend much on the revolving orderly actions of the red corpuscles—rhythmical no doubt, because orderly—governed by the oxidizing power of the air, and by the colour power of the light. That the blood is rapidly altered by exposure to air and light I often show you in the post-mortem room.

Further, food is an immense means to promote the

function and movements of red corpuscles. In food, fresh from the earth, are exquisite influences of heaven and earth, for the making of human nature—to encourage human feeling, and feed the blood and heart.

Again, it is traceable that the colour of the blood and restfulness are related: that comes home to our convictions as we study anæmia and mental diseases. Rest is the rhythmical government in the body—certainty, in the feeling, it is easy, comforting, and refreshing, because certain, natural, orderly.

When I knew less, in fact nothing, about it, I thought of rest as doing nothing; whereas, it is the not hindering anything—it is the perfect rhythmical progress.

The so-termed physical conditions of the body are so true—true as steel—that they rest, if 'the mind' will let them. Often I have made that assertion to patients, to ascertain if I were speaking correctly, and the response I received from them gave increasing strength to my conclusions. And the whole art of a medical man consists in leading persons to rest.

This Buckle, in his 'History of Civilization,' expresses excellently, when he lays it down, that the pathologist must teach how suffering comes about; but the medical man must have the tact himself and the touch of the patient to lead to health: then his own restfulness guides the patient to rest.

Liver Disease.

We turn to liver disease. One of the commonest morbid conditions of liver we have to consider is venous congestion; and it is very instructive to watch symptoms of such congestion, because it reveals how essential it is for the

healthy action of the liver that the blood should flow freely through it.

With regard to causes of venous congestion of the liver, the most common of all is heart disease; but it may be secondary to vesicular emphysema, or some chronic condition of lung. To some extent also it occurs in failing brain, but that is comparatively little marked; and in some degree also it is present whenever breathing fails much, as in fevers.

What are the symptoms of venous congestion of the liver? The first noticeable condition is evidence of increased tension—a sense of swelling about the liver—that swelling and tension culminating in more or less pain and tenderness.

As this takes place, indigestion is a most marked symptom, and jaundice frequently supervenes, and the skin becomes more or less yellow, and the urine contains bile, and often lithates.

What are the changes in the liver as venous congestion becomes more and more extreme? The capillaries of the liver between the liver-cells become extremely distended with blood, and become enormously dilated; the liver-cells become infiltrated with granular albuminoid material. That granular change is a very common condition in death by fever, by burns, by pneumonia, and other acute disease. Moreover, where there is extreme venous congestion, hæmorrhage takes place around the capillaries amongst the liver-cells, still more breaking up the liver-cells—producing the purple hæmorrhagic appearance so commonly seen in nutmeg livers; then the liver-cells become extremely compressed by the dilated capillaries, until it is difficult to find them, and they become charged with bile pigment. You will see all these changes in the nutmeg liver.

If you are asked, What is the cause of jaundice in nut-

meg liver? your answer should be, 'Compression.' The liver-ducts are compressed, and the bile cannot pass. The mucous membrane of the common duct is also swollen, and its orifice into the duodenum is compressed by similar swelling—that prevents the passage of bile from the liver-cells into the duodenum—the bile cannot escape.

What must be the result if the bile cannot escape? The body must become charged with a poison, and that will be an increasing source of weakness. It has been noticed that as the liver swells the weakness increases.

Cirrhosis.

It has for many years been recognised that if venous congestion continues long, the connective-tissue of the liver swells, and undergoes a process of stiffening and thickening; therefore the authorities have taught that heart disease causes cirrhotic disease of the liver. It does, beyond question, cause a granular contraction of the liver.

If asked, 'Does heart disease cause an early degree of cirrhosis?' you should say, 'Yes.' 'Does it cause extreme hobnailed condition?' 'No.' At least, I have never known it, except where there has been abuse of alcohol also.

May not heart disease lead to extreme contraction of the liver, and to dropsy—such dropsy as we usually meet with in these hobnailed livers? Yes, by the capsule of the liver becoming thickened, by inflammatory changes, peri-hepatitis. The thickened material contracts and squeezes the liver, and obstructs the portal circulation. Therefore, in any case of heart disease, should you find the dropsy of the belly is out of all proportion to the dropsy of the legs, you should always suspect a contracted liver. In some, the dropsy of the belly begins before the swelling of the legs; that further points to a contracted liver. Contraction of

the liver, with its consequent symptoms, may result from several different conditions.

I have just mentioned contraction due to thickened capsule; and there is contraction due to simple chronic atrophy of liver, where the liver-substance wastes away; contraction due to extreme fibroid change in the capsule and substance of the liver without much unevenness of the surface—a uniform fibroid change.

I will now say a few words about contraction due to fibroid formations—a first and much more irregular contraction—the so-called 'hobnailed' liver. That form is most commonly met with in persons who have been great spirit-drinkers.

There are two kinds of hobnailed liver—the large and the small. In the small, the liver is extremely contracted, weighs much less than normal, with its connective substance much affected—especially in the track of Glisson's capsule. In the large form of cirrhosed liver, the liver weighs heavier than normal; and the only difference I have seen between it and the contracted was an enormous growth of spindle-cells in the connective-tissue of the liver. It was evidently a more rapid and malignant form of cirrhosis. Further, fibroid contraction may have been produced by a long-impacted gall-stone, leading to inflammation and thickening of the connective-tissue of liver. Then there is a class of cases in which there has been tubercular change in the peritoneum, evidently extending over many months, and which may be attended by tubercular formation in liver, and leading to great fibroid thickening of the connective-tissue of liver and contraction, like cirrhosis of liver. Further, tertiary syphilitic changes may produce fibroid contraction.

Let us think, now, of the actual suffering. The cases of contracted liver are always obscure for awhile. What patients complain of, usually, are symptoms of dyspepsia,

failing digestion, fulness and discomfort after food, flatulence, and occasionally vomiting; then, also, wasting. These symptoms impress us that the liver is an immense organ of nutrition; that its function is to convert food into blood, so that failing digestion and failure of absorption of food, with wasting of body, come on. The body does not get its required nutritive material. With the wasting of muscle there is also cachexia, and the colour of skin loses its healthy red appearance—becomes more of a pale yellow. With that, increasing weakness is observed, the brain and nerve-tissue lose their healthy blood, and there is an increasing feeling of weakness and mental depression. The urine becomes charged with lithates—with the brick dusty red lithates—and it becomes necessarily high-coloured; such urine as has been recognised as liver urine. So it is clear that the liver has a great excretory function, as well as a great blood-forming function. We usually observe these symptoms persist month after month, and that leads to the experience that there is some great degeneration of liver-substance. Sometimes we have to ask, 'Is it cancer of the liver?' Time answers that question. The morbid conditions progress slowly, unlike cancerous conditions.

Another fact impresses us. The stomach and intestine are getting more filled and over-distended with gas. There is evidently some obstruction. Soon after that the gaseous distension is followed by serous distension of the abdomen; serous fluid accumulates in the peritoneal cavity. Then we have no doubt. Another condition comes on, the blood tends to perish more rapidly, and hæmorrhage occurs in the skin, or from mucous membrane; hæmorrhage may be also into the peritoneal cavity. The next thing we may notice is that the muscular system has lost its energy to such an extent that it is becoming paralyzed; these patients generally die

of failing heart, or pneumonia; and nephritis or peritonitis very commonly supervenes.

Thinking of all this, we get a clearer view as to the treatment of cirrhosis. Whilst regarding the degeneration of liver (contraction of liver) as the product of chronic inflammation, the doctors endeavoured to get the morbid material absorbed. That was the prevailing treatment.

In course of time it was seen that mercurial treatment led to little or no success, and subsequently tapping the belly was much relied on. But here I may say that in one of the most extreme cases of contraction and cirrhosis of liver I have ever met with, there was no dropsy, and the man was at work when he met with an accident that killed him. I have been led to think that extreme contraction of the liver does not necessarily give rise to dropsy, so long as the general circulation is maintained by the healthy operation of the other organs.

When the liver is contracted, get the other organs to supplement the functions of liver—the lungs and the kidneys especially; as pulmonary function increases, it will tend to promote more absorptive power of stomach, and the general circulation will be strengthened by rest and food in that way. We have been brought to see that persons with cirrhosis of the liver may much improve in health, and live for years—dropsy entirely disappearing. But always bear in mind the great risk is the blood decaying; therefore these patients require much rest, fresh air, and food.

While these cirrhotic conditions are going on, hæmorrhage from stomach may supervene. It is a curious fact that a person may be walking about, day after day, with a cirrhosed liver, and hæmorrhage may suddenly come on and kill him in a few hours.

What brings that about? I suspect that there are deteriorating changes in the blood which led to the failure

of circulation; or patient may pass a large quantity of blood by the bowel. A patient with cirrhosis may, however, vomit blood again and again, and subsequently progress favourably.

Next let us notice acute atrophy of the liver. Now, here again we have a remarkable demonstration of the function of the liver, showing the mysterious interaction of the liver with the nervous system. It has been long recognised that fright may cause jaundice, that mental shock or worry may lead to great disturbance of liver; people who are getting mentally depressed, go to medical men and inquire about their livers. In acute atrophy of the liver, the liver rapidly shrinks. Instead of weighing two and a half to three pounds, it may shrink to about ten to fifteen ounces, and it becomes much thinner. The common way I demonstrate that, is by taking up the liver, showing how it bends and folds over the hand. When its substance is cut into, the most striking feature is the loss of lobular appearance. It has become homogeneous-looking. In colour it reminds us of a piece of Turkey rhubarb—deep red and pale yellow blending; on examination by microscope it is a very impressive sight—I may say bewildering sight. The liver-cells have disappeared, and are replaced by a homogeneous and finely granular material, and that alteration is wide-spread, in fact, throughout the liver. We see the capillaries distinctly, and the liver-tubes, but the cells have disappeared; it has been spoken of as a 'solution of the liver,' as if the liver-cells had dissolved down into a granular homogeneous substance.

The cases occur in two groups: (1) acute atrophy secondary to chronic change of the liver after cirrhosis of the liver, or long impacted gall-stones; (2) acute atrophy as a primary affection. For instance, a young woman was affected with simple jaundice, but she had had repeated vomiting.

In a few days after the onset of vomiting, symptoms of acute atrophy came on, and she rapidly died.

In the beginning the symptoms are very insidious, but commonly there is vomiting, and delirium follows it, and may be one of the earliest symptoms. A young girl was found by her mother standing in a corner of the room naked. She had become delirious in the night, and the jaundice was very slightly marked, yet she soon died of this acute atrophy.

These patients rapidly become extremely asthenic pass into a typhoid condition, with muttering delirium, and die usually in the course of a week or two. Acute atrophy of liver is more commonly met with in women who have been recently confined, further denoting that it results from some great strain upon the nervous system.

LECTURE XV.

CANCER OF THE LIVER.

CANCER of the liver is very rarely a primary affection. To speak from my own experience, it results from antecedent cancer growth in other organs, and it may occur consequent to cancer in any part of the body; that is to say, to cancer of the uterus, testicle, bowel, and very commonly secondary to cancer of stomach or head of pancreas. When cancer supervenes in liver as referred to, usually the first condition that is noticed is enlargement of the liver. The liver is found to be enlarged, with a smooth surface; there may be nodules near the surface, but at the outset it may be smooth, and that is a perplexing feature in some cases. The liver is enlarged, its surface smooth, and the question is, 'What is the cause of the enlargement?' It is a very serious thing to say it is cancer of the liver until we are certain. We notice that there is evidence of cancer in other parts of the body, and in the course of time we observe that the enlargement of the liver is increasing, and the failure of strength is more marked; also there is generally pain or uneasiness about the region of the liver which persists, and there is commonly no jaundice with this. After a while, we notice that the surface of the liver is becoming uneven; it is no longer smooth, but nodular, and the liver is felt to be firmer and becomes harder. Then we have no doubt that we have to do with cancer. We see enormous enlarge-

ment of liver due to that condition. Some of the largest livers we see are studded with masses of medullary cancer, circumscribed grey masses, very vascular. To this vascularity we may attribute the rapid and enormous growth. This condition of cancer usually ends in a few months. When I say a few months, I mean within a year usually. It may go on to two years, but generally it terminates within a year.

There is another form of cancer which invades the liver, and without jaundice, that is, medullary cancer growing from the lesser curvature of the stomach, the bile-duct escaping; or scirrhus cancer, which begins usually in the wall of the gall-bladder, and extends up into liver-substance.

In that condition also the common gall-duct may escape, and then there may be no jaundice. A tumour is sooner or later felt, and the liver becomes larger and harder. There is another common morbid condition, which is spoken of as 'cancer of the liver'—that is, cancer of the head of the pancreas—associated with jaundice.

At the outset, such cases are always obscure. The patient feels increasing weakness, and it is noticed that there is increasing loss of flesh; usually little, but some pain; increasing uneasiness about the right hypochondrium; and we hear the friends make a familiar remark, 'Don't you think he is breaking up?' That means that his constitutional power is failing, and he is going to die. Weakness, with sleeplessness, are more complained of. The disturbance at night, often due to pain, increases, and jaundice comes on. In such cases we often have to reason, and say there is no evidence of gall-stone, and the symptoms are too persistent for simple catarrhal jaundice, which usually disappears in a week or two, but this jaundice persists week after week, and there is increasing evidence of constitutional failure.

Then we further notice the urine becoming more excessively charged with bile, and the colour of the jaundice getting deeper and with more tint of dark green, and the fæces have persistently lost appearance of bile.

All this time, no mass may be felt in abdomen to indicate a morbid growth; it is deep down in the vicinity of the liver, and involving common bile-duct. A morbid mass may of may not be felt, but we say beyond all question that the common duct is completely blocked—there is permanent stoppage in the common duct; and it is evidently something malignant, because it is destroying the patient's health more and more, and cannot be arrested.

There is, however, another circumstance in estimating this condition. The growth presumably (and we can have little doubt) presses upon the duct before it completely blocks it; it gives rise to some distension of the gall-ducts before it completely blocks the common duct; then, owing to the distension by the accumulated bile, spasm from time to time comes on, and a question arises, Is it a gall-stone passing? These spasms may recur, and the jaundice in some degree varies; then again asks the medical mind, Is it a gall-stone passing? If we say it is cancer, all hope will be shut out of the patient's mind. There is an easy way of getting out of this difficulty. 'Don't be too ready to commit yourself to a final opinion.' It is quite enough to say that the jaundice is due to pressure on the duct; but the precise cause is not yet evident. Nature's ways are the best, and so wait until she reveals the certainty. As the obstruction becomes greater, the liver enlarges and enlarges, but the surface may be smooth and remain so; and the liver may not be exceedingly hard. All this while the jaundice is getting deeper in colour, and the motions paler. The bile is accumulating behind the cancerous growth that is blocking the duct. The bile is accumulating in the ducts,

and, as it accumulates, it dilates the duct—dilates first the larger ducts, then the smaller bile-ducts, until the liver becomes like a piece of honeycomb riddled with dilated ducts which are filled with condensed yellow bile. As that occurs, the liver swells and swells, but, as said, it may be, and commonly is, smooth on the surface; and as that dilatation takes place, the liver-cells are pressed upon and destroyed: therefore, during this process, symptoms like acute atrophy may come on towards the end—that is to say, an exceeding asthenia with delirium and death.

In these cases, gentlemen, we find, on post-mortem examination, the structures and fluids of the body stained more or less with bile, and commonly evidence of recent acute inflammation in various parts of the body; for accumulated bile in the tissues becomes an irritant. It acts as a poison, and may excite bronchitis, pneumonia, nephritis, pericarditis, peritonitis—in a word, inflammation in any part of the body. You see that strikingly marked in the skin first itching, and then eczematous eruptions appearing, until the skin becomes sore by scratching and, a tortured, inflamed surface results.

It will be convenient here to notice that a long-impacted gall-stone produces similar accumulation of bile, dilatation of ducts, and enlargement of the liver; and, if the common duct be completely and long obstructed, there may be danger of the liver-cells being destroyed. Usually, however, that only occurs after there has been, in the course of years, repeated obstruction by gall-stones in the common duct. I have not known it to occur in a young person; but in elderly persons, where there was a history of a repeated jaundice due to obstruction by gall-stones in the duct, and at last the jaundice had become persistent, extending over months, and the liver had become enlarged, the patient complained of increasing—and somewhat rapidly

increasing—weakness, followed by delirium and typhoid symptoms, ending in death. I need not detain you with particulars of gall-stone, but must warn you not to overlook that the gall-stone trouble usually takes one of two forms: gall-stones collected in the gall-bladder, which may excite irritation and inflammation in the gall-bladder; suppuration may follow in gall-bladder, which may set up adhesive inflammation, and so the pus may make its way on to the surface of the skin, or into the stomach, intestine, or, maybe, into the peritoneal cavity. The symptoms in these cases are generally pain and tenderness, more or less persistent, in the region of the gall-bladder; and after a while we feel a marked swelling, a tumour.

The other form is the more common, where a gall-stone passes down the cystic duct into the common duct. It may pass into the duodenum, we are led by the symptoms to think, in a few hours, but it may take days, or months.

I had a man under my care in the hospital who had had jaundice four years. I was doubtful about his assertion, but his family medical attendant confirmed his statement. This man had a stone impacted across the common duct, and extending into gall-bladder; and repeated shivering came on, most violent rigors, with profuse sweating and high temperature; and they recurred until death. I found a gall-stone, which had formed in the gall-bladder, and had set up ulcerative inflammation in the wall of bladder, and so made its way through its coats into the common duct. There was a large gall-stone lying about half in the gall-bladder and transversely across the common duct, and the protracted irritation had set up suppurative inflammation of the common duct, which had travelled along the hepatic duct into the liver-substance, and riddled it with abscesses. The recurring suppuration was the cause of the shivering. But, in cases of impacted gall-stone, do not give a very dis-

couraging opinion until the facts are such that there can be no doubt. I will tell you why. It is astonishing how many months the jaundice may persist, and yet the patient get well.

There is another striking feature in cases of impacted gall-stone : the calculus may remain impacted, and yet the symptoms may rapidly disappear. I have known jaundice to disappear, and the pain to be absent for weeks, though it subsequently recurred when the patient had another severe attack of hepatic colic. These attacks kept recurring for years. One case I saw, the patient had an attack once every week, although the jaundice had disappeared. The general history of the case, course of the symptoms, and subsequent recovery, indicated that the stone was still in the duct, but the bile could get past it ; hence the jaundice had disappeared, but the fact of the recurrence of the severe paroxysms of pain manifested that the stone was still lodged. Bear in mind that the jaundice may disappear, and yet the stone have not got completely out of the duct. It is important to recognise this ; for suppose a stone has been ulcerating its way through the duct, peritonitis may result from bile escaping into the peritoneal cavity ; and bile may excite a very virulent form of peritonitis. If the patient be kept at rest, the stone generally passes safely; hence the importance of not allowing the patient to move, lest the adhesions be torn away. Gall-stones are mostly met with in women at or after the middle period of life, who have stayed indoors too much, and thus enfeebled their excretory powers. I have known gall-stone colic to occur in a young man, but this is exceedingly rare.

I will just add, Be slow to discourage! Even when patients have had attacks year after year, it is astonishing how they get rid of them. Promote more excretory action and rest, for the stones in gall-bladder to get set, impacted

in the gall-bladder, so that they cannot be shaken and dislodged into the common duct. I have, by post-mortem examinations, been led to think that such is the way in which patients become freed from the repeated seizures. We have to remember that we commonly find many gall-stones in the gall-bladder, and yet no history to indicate that they have caused much trouble; therefore post-mortem examinations have taught me that rest should be the aim in treatment.

Stomach Disease.

We may now proceed to speak of stomach disease. You may be asked, What do you mean by indigestion?—by dyspepsia? Are there several varieties of indigestion? Some observers have made several according to particular symptoms, and we may make any number. If we wish to make a *specialité* of stomach, we would speciously make a number of varieties according to special features. Dyspepsia itself is only a symptom, manifesting that digestion is interfered with, and rendered disturbing to the mind.

All strong processes go easily, comfortably, and unconsciously. A healthy man does not feel that he has a stomach; and when he feels that, it depresses him: so that with indigestion there is usually mental depression and a sense of weariness, or of fulness; pain or other distress in the region of the stomach; vomiting; and often palpitation of heart, or aching about præcordium. These symptoms may continue some hours, giving evidence of slowness of digestion. When the digestion is weak there is excessive accumulation of gas in the stomach; and as that gas is eructated it brings up with it some of the acid constituents of the digestive process; and acidity may be the trouble complained of. Patients attribute their suffering to the acidity. In the healthy processes of digestion, stomach moves the food to and fro. There is a kind of churning process to

mix its contents, and promote the onward flow and absorption of the pabulum. It is, no doubt, a rhythmical action. When stomach is much dilated, some of the wave may sometimes be seen transmitted externally. When that healthy movement is interfered with from over-distension, by gas or by food staying in stomach too long, then vomiting commonly comes on ; undigested food is vomited. If there be much persistent irritation of stomach, catarrh may supervene, and then undigested food and acidulated mucus be vomited. If the indigestion be very protracted, the food may decompose, with various forms of fermentation, acute and other. The matter vomited is fermenting decomposing substance, and it looks frothy, yeasty ; it may decompose, until it yields sulphurcttted hydrogen ; and smells like rotten eggs.

We will now take a more physiological view of indigestion. For healthy working of stomach, there must be healthy structures of the stomach, with a sufficient supply of circulating blood, also sufficient nervous energy—because nervous energy, as disease in nerves reveals, is a great co-ordinator, keeping the organs of the body working harmoniously. That is, one great function of 'vis nervosa' is to keep the organs and tissues of the body harmoniously working with the travelling fluids—digesting; so enable stomach to be the servant of all the organs and tissues of the body, and serve the purposes of mind. It is obvious that we live 'in our bodies' to know the world, to digest it. To enable the mind to be a power, supposedly the greatest power. The stomach supplies our nature with the products of the world; so that it is more than a figure of speech to say that the living human stomach means stomaching the world. Therefore, men who have very active minds, commonly do and should eat well, and may be large eaters. When there is excessive thinking and great wakefulness, the stomach craves for food—there is much sinking sensation in epigastrium,

and patients have often said to me, 'Oh! doctor, I must take a biscuit up to bed with me.' Further, when there is excessive action of mind, wakefulness, and delirium, experience has taught that much food is indispensable.

I used to be in the habit of saying people ought to 'eat properly,' that they should only eat every three or four hours, they should not eat between meals, they should eat and live by rule; but year by year many poor creatures complained dreadfully of their stomachs, of its sinking, and they became so miserable their days were almost unbearable. The big bell of Westminster tolled hourly on, that is properly, and their times for eating were regulated accordingly. But as I grew older, I looked at the animals, and they were eating and eating, and evidently whenever they could. I learnt at last to thank heaven that I, and others, had been made as animals, and with use of reason.

Let people eat when it is necessary, let them take food when they want it. The stomach, proceeding with healthy digestion, is an immense encouragement to the human mind.

Medical practitioners often hear patients complain that they cannot take this or that article of food, it distresses them so—it may be salmon, shell-fish, or even mutton or fowl. In these patients it is evident that there is some condition of sensibility which, when brought in connection with processes of digestion and influences of the food, discourages and distresses much. It is usual, therefore, for the practitioner to say, Avoid eating such food, and only take so and so. In doing that, he hopes to encourage and endeavour to satisfy—his plausible manners no doubt aiding and conducing to his success; but it must be admitted that such a proceeding requires great judgment. For the patient credits the practitioner with doing that which is most conducive to his, the patient's, welfare, strength, and progress. It must reasonably be recognised that digestion means going for

'newness;' taking food is a new state of things, for 'refreshment;' and all change in the body must be attended by some alteration in sensibility. The brain, the heart, the lungs, the bowels, and others respond to the actions of the stomach.

That is evident from the sufferings of the patients. In health, there is such a unity and evenness in the correspondence and interchangeability, consequently there is not distress but comfort; not intimidation but trustfulness. We must further consider, in reference to dietary, how are the wants of the fluids, tissues, and organs for strength to be gained, if the practitioner's thought is narrowed to hard-and-fast decisions, and if he thinks he knows and does not inquire what the individual's needs are, if he does not feel his way into unknown regions, and let nature guide him?

It is very instructive to notice that children and old persons suffer little or not at all from indigestion, and incline to eat anything that is nice; the child takes the world on trust, and the aged mind has had enough of dicta. There is much truth in the old saying, that a man is a fool or a physician at forty.

I have witnessed enough, as regards indigestion, to convince me that it is better some distress should be suffered, in giving the means, to enable the stomach and other organs to benefit by change of diet; rather than keep the individual from various foods, which are vehicles carrying the influences from sea, earth, and heaven, to enable us to learn what is man's relation on this earth.

For healthy digestion there must be healthy *rhythmical* action of the stomach, and for that proceeding it must not get over-distended. Then there must also be healthy tissue in the wall of the stomach, muscle that can contract rhythmically, capillaries that can let out flowing serum, for healthy digestion and secretion. There must also be healthy

epithelium for absorption, healthy lymphatics for transmission; there must be a free passage onwards to the other organs; healthy action of lungs to carry on venous circulation, because the lymphatics empty themselves in the venous circulation; healthy action in the liver to work up the food; healthy action in bowels and other excretory organs to maintain freshness in blood and structures. There must be healthy expenditure of energy; for living beings take in health in proportion as they give out. A person who stays indoors too much, and leads a miserable life, loses appetite. For healthy digestion there must also be healthy desire, and for that purpose there must be sufficient change in food and in associations in general. 'Change is in all things sweet,' and the physiologist has come to the conclusion that change of food much assists digestion. These remarks are testified to in a remarkable manner in the sufferings of melancholics. They wish to sit still without speaking, to be reduced to one or two articles of food; they suffer dreadfully in their stomachs, their ideas are so set. The world is going beautifully on, and all things are progressing, but not to them. Their loneliness would lead them to keep still and starve to death; they are weary of the hard and narrow decisions that have reduced poor self to desolation, and shut out a lovely world.

LECTURE XVI.

CATARRH OF STOMACH.

ONE of the most common diseases of the stomach is catarrh and catarrhal inflammation. Various morbid conditions give rise to it: anæmia and cachexia of various kinds—especially the cachexia of Bright's disease; venous congestion from heart, lung, liver, brain, or other organic failure; exposure to cold; morbid growths in or about the stomach—notably cancer, and various blood poisons; and very commonly it results from abuse of alcohol. Catarrh of the stomach is evidenced by hyperæsthesia of stomach—some uncomfortable weariness, aching, or other distressing feeling in epigastric region, more or less constant, but increased by taking food; and pain comes on immediately after taking food. You will easily remember that, if you bear this fact in mind, that catarrh of the stomach is always most marked along the most dependent region of the stomach—the greater curvature; and food, immediately it enters the stomach (it is obvious), must come in contact with that part of the stomach. Therefore the pain comes on immediately after food. The catarrh is most prevalent where the venous circulation is weaker. The pain is relieved by vomiting. Immediately the contact is relieved between the food and the stomach, the pain is lessened, but it is not usually entirely removed. The swelling of the membrane of the stomach persists, therefore the pain is not entirely abated. Vomiting occurs from time to

time; it may be only a mucoid substance that is ejected, or food mixed with mucus; it is the vomited mucoid exudation which reveals that it is catarrh. Commonly, food is mixed with an albuminoid exudation, a 'sticky mucus.' There is no feverish condition; there may be streaks of blood in the vomited matter; and in its most extreme form, when patients are dying with it, they vomit mucus mixed with blood, looking like 'beef-tea' or coffee-grounds. It is the black vomit of the dying.

There is a morbid condition of the stomach which requires further investigation, and that is the great disturbance of stomach with more or less catarrh, due to what people speak of as 'worries'—extreme mental anxiety, attended by symptoms as above described, but maybe with more pain, more severe vomiting; and I have known in such cases vomiting of blood, and I could not, from antecedent and subsequent course, attribute it to ulcer. So that I would have you consider that, under extreme mental depression and harass, the stomach, like the face and other surfaces, may become much congested and undergo catarrhal inflammation, and the vessels become so full that hæmorrhage may result.

Bearing on that statement, experience has shown that there may be vomiting of blood or recurring vomiting blood similar to that of ulcer of stomach, and the hæmorrhage has been in such cases attributed to ulcer of the stomach, until the post-mortem examination revealed that there was no ulcer of the stomach, but morbid change in brain—a tumour. It may also occur in connection with some epileptic or insane condition.

Generally, catarrh of the stomach offers some difficulties in distinguishing it from simple ulcer of the stomach, particularly when there is anæmia. That leads me to speak of superficial ulceration of stomach in connection with

catarrh of the stomach. Superficial ulceration commonly occurs in connection with extreme forms of catarrhal inflammation. Numerous superficial ulcers occur in the swelled mucous membrane; and the ulcers are traceable as caused by catarrhal inflammation or small exudations of blood stripping off the epithelium: these are called 'punctate ulcers of the stomach.' Extreme venous congestion often leads to punctate ulceration and more or less hæmorrhage into the stomach. Therefore, that is commonly seen after death from heart disease. It is owing to this venous congestion, and the further changes in mucous membrane, that persons with heart disease suffer so much in their stomachs. Don't overlook that fact; for patients who have heart disease go to the doctor for relief to the stomach distress, while others go complaining of heart when it is stomach disease. In the latter cases, as the stomach becomes excessively charged with gas, and digestion is difficult, the diaphragm doubtless is more or less interfered with, and the heart's rhythm is interfered with. The difficulty of distinguishing catarrh of the stomach from ulcer arises mostly in anæmic young persons; for they are liable to both catarrh of the stomach and simple ulcer; but what makes the diagnosis occasionally more difficult, the question may arise, 'Has the morbid condition passed beyond catarrhal inflammation into simple ulcer of the stomach?' As said, with both morbid conditions there is anæmia and there is pain after food; besides that, there is vomiting, and the pain is relieved by vomiting. Such symptoms are common to both catarrh of the stomach and simple ulcer, and how are we to tell one from the other? Simple ulcer of the stomach, in by far the majority of cases, occurs along the lesser curvature. It is very rarely seen along the greater curvature, therefore the pain does not come on immediately after food; it may, a quarter

of an hour or two hours after food, but not immediately afterwards.

In cases of simple ulcer of the stomach, there is usually not much swelling of the mucous membrane, therefore the uneasiness is not persistent as with catarrh of the stomach. When they have vomited, the patients are free from pain; when they lie down in bed, they are free from pain, whereas with catarrh the membrane is more or less swelled, and there is continual uneasiness. With simple ulcer, the difficulty being in the lesser curvature, and this injury being close to the spine, there is pain in the back. Further, with simple ulcer there is hæmatemesis, whereas with catarrh it is rarely met with; and lastly, another important sign is that, with simple ulcer, if the patients be kept in bed with liquid food, they speedily get relief to their symptoms,—more quickly than they do with catarrh. I have seen a large simple acute ulcer, like a 'rodent ulcer' in the stomach. The patient was a young woman, who suffered dreadfully night and day with pain until she died; but that is rare.

Simple ulceration of the stomach is best grouped as it is naturally—into acute and chronic. By chronic cases, we mean simple ulcer of the stomach recurring and recurring over years—that is the usual chronic ulcer of the stomach. The simple ulcers in their acute form are usually small, about the size of a threepenny-piece or sixpence, may be larger, and they look as if a piece of mucous membrane had been clean cut,—chiselled out without marked thickening material along the edge of the ulcer. They are usually funnel-shaped, tapering down to the peritoneum. Being small, they are sometimes very difficult to diagnose. Tapering down to the peritoneum, they are liable to cause perforation, and rapid collapse. If, therefore, the symptoms are similar to what I have described, we should always ac

upon the safe side, and keep the patient lying down; so that if the ulcer be near the peritoneum, it will cause peritonitis over the floor of the ulcer, and the stomach wall become adherent to some adjoining organ—most commonly to the liver, and perforation be prevented. It is notorious that the symptoms, in cases of this kind, may readily be overlooked. Hence, if we have reason to suspect ulcer of the stomach, we should always act on the safe side. The experience of different hospitals would supply sad evidence of that failure in diagnosis. I remember the case of a young man who was attacked with collapse from perforation, as he was leaving this hospital, and I found that simple ulcer of the stomach had caused his death.

To repeat, simple ulcer may be symptomatically obscure, because it is small, and from its situation; but if we have reason to think it be present, we should act accordingly.

When perforation takes place, patients are suddenly seized with severe pain, extreme restlessness, laboured breathing, cold sweats, and pulse becomes exceedingly small. A case of that kind reminded me very much of the collapse of cholera, and I could not make any distinction except in the origin. The symptoms of perforation, if not so severe, may be followed by peritonitis; food escaping into the peritoneal cavity, exciting peritonitis. And we must not forget that the peritonitis results in much lymph being effused, which may cover over the escaped food, localizing it, and the patient ultimately recover. I remember making a post-mortem examination where a simple ulcer had perforated, and there was an old, buried-up abscess containing concrete pus over the scar of the ulcer.

Simple ulcer of the stomach may cause a considerable amount of thickening about the stomach wall, which I have known mistaken for cancer. The history of the case was

not sufficiently recognised; the stomach irritation had lasted for years. In chronic ulcer of the stomach, the area of destruction is, on the mucous membrane, usually much larger. It is a kind of recurring simple ulceration of the stomach; but, as said, the ulcer is much larger, and there is much old scar-like fibroid thickening about the ulcer; whereas that is not the case around simple acute ulcer, only around simple chronic ulcer. The stomach, with that chronic disease, may be much destroyed by the fibroid thickening and recurring ulceration. In these chronic cases, the ulceration more commonly opens into a vessel, and therefore recurring hæmatemesis is common: that and the other symptoms may be repeated over many years.

We are led to infer that in the fibroid tissue which forms around these chronic ulcers, these vessels are very weak, for they are buried up in tough, hindering material, like that in any ordinary scar: the fibroid substance is liable to be swelled by serous exudation from the weak vessels, and take on acute inflammation, when the general circulation has weakened.

When asked, 'What is the cause of simple ulcer of the stomach?' say, 'I don't know.' It occurs with anæmic conditions, therefore it is most common with young women who are much indoors; but it occurs also in males, and in connection with several cachectic conditions, such as Bright's disease and others. It has been suggested that it is due to thrombosis in the stomach. I can only tell you that I have often taken up a stomach and seen the veins more or less plugged, without a trace of simple ulcer; but it might be replied that there is no similarity in such conditions, that with simple ulcer there is a localized death in blood, and, owing to the anæmia, also much failure of nervous energy, tending to death in tissues. There is much to be considered about the solar plexuses, cœliac

axis, etc., and simple ulcer of the stomach, and their relation to nervous distress in stomach region.

We now pass to malignant disease of the stomach. Cancer may attack any area of the stomach; but it is very commonly met with along the lesser curvature—lying between the lesser curvature and the liver. The cancerous growth lies under the sternum, and it therefore cannot be felt for awhile; therefore diagnosis is always obscure in the beginning. The patient's suffering, increasing failure of strength, persistent day and night distress, evidently denoting severe disease. The weary uneasiness in the epigastric region makes it increasingly difficult to get sleep. Muscle continues to waste, and healthy inclinations and feelings are replaced by utmost gloom. Food is often vomited, and becomes more mixed with quantities of mucus. We are able then to say that there is some persistent irritation of the stomach, keeping up a catarrh of the stomach; and it reveals that there is some augmenting irritant in the mucous membrane, associated with failure of constitutional power and nutrition. It resists all treatment: evidently malignant.

If we keep our minds on realities, we can keep clearness of mind. I say that here, for a searching question comes up, in these cases, and about this stage of the proceedings. Are the symptoms indicative of cancerous, or more simple ulcer of stomach—which further means, can we go on hoping for recovery? In simple ulcer, if patients rest in bed, they usually lose their pain; therefore they are not much disturbed at night, and they do not lose flesh to the same extent. 'Time,' said the old English Judge Hale, 'is the wisest thing under heaven'; therefore go on hoping, until the symptoms are beyond question.

After a while we find increasing resistance in the epigastric region, a sense of abnormal solidity, and at last an irregular,

nodular, deeper growth is felt; then we know that it is a cancerous growth extending through the wall of the stomach. As it becomes more nodular, we have no doubt; and the general symptoms make it more decided by their increasing severity.

Cancer may attack the greater curvature of the stomach; then it is commonly blended with intestinal symptoms, such as flatulence and diarrhœa, recurring colicky pains, or it extends and involves the common duct, and then there is commonly persistent jaundice or ascites—maybe both. Cancer also attacks the smaller end of the stomach, and gives rise to stricture of the pylorus. *Stricture of the pylorus* occurs usually in two forms. Stricture due to carcinoma of the stomach, a cancer that has grown into the pyloric end of the stomach; and in such cases there is commonly a mass which can be, sooner or later, felt through the abdominal wall. The second form—there is no nodular mass, but the middle muscular coat of the pylorus is enormously increased, so termed 'hypertrophied,' and that thickening narrows and paralyzes the pyloric end of the stomach. As the pyloric end is thus encroached upon and weakened, made more passive, the food has greater difficulty in passing, and it accumulates in the stomach. The other portion of the stomach evidently makes great attempts to compensate for this failure, its muscular coat becomes increased; but nevertheless it becomes dilated, so that there is dilatation and hypertrophy of the wall of the stomach; then, as the orifice becomes more and more ·'ɔsed and useless, the dilatation much increases, and the food accumulates and decomposes. As it decomposes, a quantity of offensive gas is formed, which still more excessively stretches the stomach, and increasingly tends to paralyze it. It is important to recognise that; because if we can get rid of these gases and the decomposing food, it is astonishing to see how

much the patient improves. So, formerly, disinfectants were resorted to—hyposulphites, creosote, charcoal, and others; but more recently, the stomach has been washed out, to get rid of the decomposing food and gases. By so removing the over-distension, the blood is enabled to pass through the vessels more freely, and store the muscular tissue with energy for contractions, so the stomach be enabled to get the food through the narrowed pyloric end. If it fails to do that, then symptoms of starvation become more and more marked; but under favourable treatment, some of these cases may extend over years.

LECTURE XVII.

CANCEROUS STRICTURE OF PYLORUS.

WHAT is the kind of suffering when stricture of the pylorus is coming on? An obscure indigestion is usually the first—fulness and discomfort after food—which resists treatment, and there is not any very definite condition to account for it; no heart disease, renal disease nor phthisis, nor other organic failure. After awhile, vomiting supervenes; but what rivets the attention more is the increasing sense of fulness and the increasing accumulation of gas in the stomach; and the patient vomits more frequently undigested food. We have then to ask, how is it that the food does not digest and pass onwards? The hindrance is not any accidental condition, because the difficulty continues week after week; there is something manifestly hindering the passage of the food into the general nutrition, the loss of flesh reveals that. We next notice that the vomited matter is charged with much mucus, and we are led to say that there is some persistent irritation of the mucous membrane, which leads us to think there may be a morbid growth.

We further notice that the vomited matter smells like vinegar and the vomited food looks yeasty, indicative of acetous fermentation in the stomach, and there is fungus growth in it in the form of 'sarcinæ.' After awhile the retained food commonly decomposes more, and the vomit evidently gives off sulphuretted hydrogen. While this is

going on, the belly gets more and more sunken, the eyes sunken, the flesh and fat of the body diminishes. The fæces are harder and harder and more scanty. Food is not able to pass into the intestine. Urine becomes scanty and loaded with lithates. Water in sufficient quantities cannot be got out beyond the stomach. Skin dry. The body is being dried up. In this manner the patient is weaker and weaker, and dies from starvation.

A patient with extreme stricture of pylorus may go on for weeks without vomiting, and all the while the food is being impacted in the stomach layer upon layer, until the stomach is almost filled—excepting a small passage in the middle of the impacted mass through which liquids might pass on into the duodenum—so that the stomach becomes unable, from excessive distention, to contract, even for weeks, whilst impaction is going on. Such cases I have seen.

Hence, as the dilatation becomes greater, we notice that the patient does not vomit so often, but when he does vomit, he ejects much larger quantities. The vomiting is, in some cases, most distressing in the early stages. In cases of stricture of pylorus in which we find great 'hypertrophy' of the muscular or middle coat, there may be evidence indicating that it has resulted from much abuse of alcohol.

There are cases of strictured pyloric end of stomach which extend over many years—cases in which there is old thickening and adhesions about the pyloric end of the stomach that have twisted it into an abnormal form, until the stomach could not empty itself.

There also is another form—passive obstruction, in which we may come across symptoms like those of stricture of the pylorus, but due to simple dilatation of the stomach. The stomach, or intestines may undergo extreme dilatation

from simple atrophy of the muscular part of their walls, and produce symptoms like obstruction.

Just a caution about the stomach before I leave it. You must not overlook that it is usual after death from various diseases to find the stomach much congested, and that that congestion is in proportion to the amount of blood in the body; therefore, if when one has a great deal of blood in the body, and there has been very rapid death, we generally find extreme congestion of the stomach, and we must not jump to the conclusion that it is due to poisons. Yet, if we find no evidence of organic decay, we have then to consider the question of poisoning, or strangulation, or other violence. You will easily get your guide from the appearance of the stomach, as well as from the history. The venous congestion due to 'dying' is always most marked along the greater curvature, and the veins can be seen filled with blood on holding the stomach up to the light, whereas the congestion of poisoning is widely spread over the whole surface of the stomach, and it is arterio-capillary congestion. This question comes up as follows: A patient is suddenly taken ill, vomits and dies, and the post-mortem examination may reveal no organic decay, and death may be due to epilepsy; but suspicion may be raised, Is it due to poison?

LECTURE XVIII.

STRICTURE OF ŒSOPHAGUS—BOWEL OBSTRUCTION.

I MAY just mention to you, gentlemen, what I purpose to do in the remaining lectures. This morning I am going to speak of stricture of the œsophagus and obstruction of the bowels, and devote the next lecture to kidney disease, and one lecture to brain disease—two, if time allows.

Stricture of the œsophagus, in the form of a narrowing of the œsophagus until it is almost closed, is a rare condition. When we do meet with it, it is usually the result of some irritant poison having been swallowed, such as strong acid or alkali, and that has excited a sub-acute inflammation which has gone on thickening and contracting the œsophagus in the course of many months. I have never come across stricture of the œsophagus as the result of syphilis. I have seen it in the trachea, but not in the œsophagus.

It is a curious fact that 'syphilis' more commonly contracts the air-passages than the food passages. What is usually understood by stricture of the œsophagus is a life obstruction and a clinical experience. That is, the patient is unable to get the food down into the stomach, and the medical man may have much difficulty in passing a bougie down into the stomach; he feels an obstruction in the œsophagus, that the œsophagus is narrowed and obstructed. But when we make the post-mortem we find that the œsophagus over a large area is much destroyed; it is not

narrowed, and owing to its being destroyed it has been paralysed, so that the obstruction is a passive one, not an active one.

Here, however, I must remark spasm and paralysis are akin, and I have been accustomed to speak of an irritable spasmodic contraction immediately above the ulcerated part excited by contact of food or bougie, so that it would be more warrantable to speak of the obstruction as the result of irritable weakness and paralysis. And let me add that the greatest obstruction we meet with is passive obstruction—it is impracticable. If a thing offers no resistance, we are done. This disease is a most remarkable illustration.

Then, what is commonly known as stricture of the œsophagus is malignant ulceration of a portion of the œsophageal tube. It may occur in any part of it, but more commonly in the middle or lower part. The malignant growth is usually in the form of epithelioma or medullary cancer. Scirrhus is more rare. I prefer to keep, at present, to the old terms by way of speaking of morbid growths. Such growth begins in the wall of the œsophagus, usually in a 'tubercular form,' small tubercles or nodules of malignant growth which extend and become confluent, and thicken the wall of the œsophagus. Subsequently ulceration destroys much of it. As it does that it invades adjoining structures—most commonly it extends into the trachea, or into a bronchus, or into the apex of one lung, or into the pleura.

Now let us look at it from its clinical point of view—the actual suffering—the pathology. How the early suffering begins I cannot tell. Usually, when it comes under a medical man's notice it is extensive, so that a patient comes complaining that he is unable to get food down, that it comes up immediately; that he is getting very weak and wasting much. He does not say he vomits. If we

listen attentively to him he doesn't say he vomits, but that the food comes up; and we know from his manner of stating his symptoms, that it is not stomach disease. There is no conscious effort in bringing up the food, and in that respect it differs from vomiting; and there is little or no pain. The food goes down to a certain part, and it either comes up immediately or stays awhile—one or two minutes, maybe—and then returns into the mouth, and we infer from that, it is œsophageal obstruction.

The patient goes on to say, 'I used to be able to get a little solid food down, but now only liquid. That indicates increasing obstruction. There is more and more wasting of muscle, and the symptoms of starvation in addition supervene. There comes a time when there is extreme difficulty in getting liquids down. But even then there is a curious fact: some days the patient may get solid food down into the stomach, and some days a bougie can be passed, and other days it cannot. I have told you it is not a mechanical narrowing, and we are led to infer that some days there is less passiveness, so to speak.

As starvation comes on, we have similar symptoms of wasting and dryness to those of stricture of the pylorus, *i.e.*, wasting of muscle, increasing asthenia, sunken belly, thirst, scanty urine, dryness of skin, scanty fæces. The parts of the body that get their roundness from a certain amount of fat amongst the cellular tissue, such as eye-balls, temples, and cheeks, become sunken, for the fat is mostly consumed. But life may be much extended if the body can get water. That has been proved often. It will live for weeks, taking little or no food but water; yet the utmost failure comes when the patient cannot get liquids down.

It has been thought advisable in these cases, when extremely ill, to pass a bougie down the œsophagus to endeavour to overcome the obstruction.

Well, even a passive thing will give a little if we drive it hard enough, but the question comes, which way is it going?

When that has been done, and the œsophagus so treated, the result has been the disease has extended rapidly into the adjoining parts.

The operation, I was assured, was a success, but the patient died! I have not gathered much encouragement from that line of treatment. What usually comes on after awhile are symptoms either of pleurisy, or of pleuro-pneumonia, or of windpipe or bronchial irritation and inflammation. The patient becomes subject to a troublesome cough; the cough comes on severely and spasmodically, so suddenly and so severely that it seems as if it would choke the patient; and we know by that, that food is passing into the air-passages, and as it does so, it produces violent spasmodic efforts to expectorate it. Owing to that risk, passing a bougie often may be mischievous. What is wanted is more blood through the passive parts—energy comes from blood.

Sometimes I have given the sufferers a little opium to ease them through their misery, and they have swallowed better for a few weeks afterwards. At other times a little spirit or wine eased the circulation, and patients were able to swallow better for a little time.

Obstruction of the Bowels.

Let us define what we mean by obstruction of the bowel, that is, the patient cannot pass the fæces into and out of the rectum. All obstruction is due to the fact that the intestine has lost the power of forcing the fæces out of the rectum. To merely think of it as obstruction is useless in practice; what is wanted is to gain more peristaltic energy

along the intestine, and to find when and how that is expended unavailably.

What are the conditions that take away that power? One is failure of circulation. It may be, as said, the result of starvation; therefore in various starving, morbid conditions there is constipation, and, maybe, constipation to such a degree that we cannot get the fæces out. There is not blood, not energy enough going through the intestine. It may be failure of another circulation, of its vis-nervosa —its nervous energy is exceedingly exhausted, and there is consequently obstruction. I remember one case of a young woman who had been lying for months with some spinal disease; the medical attendant had to take a spoon and scoop the fæces, piece by piece, out of the rectum; it got so packed and so hard, and she was unable of nature to get relief.

Therefore, whenever nervous energy has been much exhausted, notably, with hysteria or various nervous conditions connected with insanity, we are never surprised if there be great difficulty in passing the fæces, and we may have to remove them, as mentioned, by mechanical means.

Again, thus where there has been a great discharge of nervous energy, *e.g.*, after child delivery, for instance; in some of these cases the bowel gets greatly distended and tympanitic, and the patient is unable to pass fæces: a few nights' sleep and a little mechanical aid remove it.

Moreover, the expelling power fails where the muscular coat of the intestine wastes, becomes fibroidly thickened, and the bowel consequently dilates and constipation increases until the patient is not able to get rid of the fæces. Masses of fæces may be felt in the intestine during life. Yet on opening the bowel from one end to the other there is not a *small* passage—no contraction, there is an excessively *large* bowel—the bowel is, by paralysis, loaded

with fæces and dilated. That may be the result of strumous tubercular change in the bowel.

Further, I remember a case of obstruction of the bowel due to paralysis of the muscular power—without any 'mechanical obstacle,' resulting from the coats being extremely adherent, adhesions caused and the general circulation having been weakened by ovariotomy. Very soon after the operation, the patient got increasing distension of the belly and other signs of obstruction, and died. The post-mortem inspection showed no sign of mechanical obstruction; evidently the obstruction was the result of paralysis of the bowel. In a less degree, a similar condition due to weakened circulation, is not uncommon in the form of obstinate and difficult constipation, about the middle or latter period of life, in cases with tissue degeneration, such as granular kidney, or emphysema.

Again, obstruction of the bowel may result because the muscular coat of the intestine is softened by the œdema of inflammation. Sometimes the surgeon in such a case is called to open the abdomen, for there is very evidently some irremediable obstruction. Then the question arises, 'Is it certain that there is a mechanical obstruction? Or is the obstruction due to paralysis of the intestine consequent on the muscular coat being softened by peritonitis? To repeat, peritonitis softens (by œdema) the muscular coat of the intestine, and doubtless the nervous structures also, until the bowel is unable to pass the fæces onwards. Such patients may die with the symptoms like those of mechanical obstruction.

Obstruction may be caused by a piece of the small intestine being strangulated in the inguinal or femoral canal—strangulated hernia—or by its getting under some old band, as we term it, which may extend between the mesentery and parietal peritoneum (very commonly between

the mesentery and the abdominal wall), or under a band, situated maybe in some part of the peritoneal cavity. A piece of the small intestine becomes wedged in under the band and evidently gets tightly impacted until there is complete obstruction.

From post-mortem inspections we may readily see, that when a piece of intestine becomes thus strangulated, its venous circulation becomes obstructed, and the impacted portion becomes a deep purple colour and its tissues swelled by œdematous and hæmorrhagic extravasations. The structures then tend to perish by enteritis, peritonitis, softening—and, maybe, to pass into gangrene or ulcerate.

The intestine above the impacted strangulated portion becomes exceedingly distended from accumulation of gases and fæces, and consequently the tension in the abdominal walls is much increased—owing to that, the respiration becomes difficult. As the breathing becomes more difficult, the blood increasingly accumulates in the venous system and diminishes in the arterial system, so the pulse becomes smaller and harder. As the circulation thus fails, it must fail most of all through the strangulated piece of bowel until circulation in it stops. But there is another important consideration: how is it that the piece of bowel became strangulated when and where it did? The bands found are old structures, and had been present for months, at least, before the obstruction. Obviously, the healthy circulating energy in the bowel had been such that it kept its safe position and its rhythmical peristaltic action; but from the fact that it became impacted and strangulated, it might reasonably be inferred that the circulating energy into structures had been failing antecedent to the impaction. And we have often noticed, while examining bodies, that as the circulation had failed, the bowel had become irregu-

larly distended or contracted; irregular contractions had evidently occurred.

What we have to do in all these cases is to consider how healthier rhythmical peristaltic action can be restored. There is thus a rational basis for the opium treatment. After awhile, it is no use to drive hard by aperients, for that simply results in the body being taken to the dead-house. We have to consider how the respiration and heart's action can be aided, to promote a better circulation through the bowel. If aperients have failed, opium is resorted to, to rest the patient.

If pain be relieved, breathing becomes free, venous circulation more promoted, thereby enabling the arterial circulation to supply the muscle with more energy, and the nervous energy correspondingly increases—thus the healthier part of the bowel gets the impacted bowel out of the difficulty. So that the question is, how to get more blood and more energy through the intestine. The great cause of obstruction coming on is failure of circulation, and that especially in the structures previously weakened by old inflammatory or other morbid change. I have found such remains.

The history of some of these patients reveals that they have had minor warning attacks of obstruction before the fatal seizure. So much have I found it so that I endeavour never to under-estimate the bearing of these warning attacks as showing that the antecedent increasing weakness —failure of circulation—is the condition leading to the obstruction. I may mention the case of a schoolmaster, who was in the hospital. He had partial paralysis of hands and feet from spinal cord disease. One day he was seized with severe 'colicky' pains, and died rapidly of obstruction of the bowel. And I found that his intestine had passed under an old band and become strangulated. His

general circulation had been failing months before that termination.

Obstruction of the bowel may be caused by a piece of the small intestine (an upper part) passing into a lower piece—it gets squeezed into the lower, turned outside in; invaginated—so-called intussusception of the bowel. It is always an upper into the lower, so that the peritoneal and other coats are bent on themselves, in that way pressed against each other, the invaginated portion becomes, by impaction, extremely congested, swelled, and tends to slough. Keep that fact in view.

As the piece of bowel gets thus squeezed further and further down, more invaginated—it may be pressed down as far as the rectum, and be felt and seen in the rectum as a dark purple mass. The bowel above becomes increasingly distended, and the tension becomes so great that the respiration may be stopped; so that the effort of the medical man is to lessen the tension until the invaginated part is pulled out of its abnormal position or sloughs off, and so the patient may be cured.

How do we know it sloughs off? Because it is discharged externally, and we see it. The contiguous portions of the peritoneum and other structures of the intestinal wall just above the invaginated piece of bowel become adherent, and as the lymph effused becomes organised, the bowel is healed, united again.

In these cases, also, it is instructive to find that there are warning attacks before the major attack, and I have been led, therefore, to think that weakness was behind that accident also—a slowly creeping on weakness. One of the diagnostic distinguishing features (when the bowel is thus invaginated) is hæmorrhage from the bowel, and in some cases we pass the finger into the bowel and we may feel the invagination.

It is a form of obstruction more common in children; it is rare in adults.

Another fact may guide you to consider failing circulation as the condition which tends to intussusception. For intussusception of the small intestine, and maybe elsewhere in several parts of the bowel, is commonly found after death, and if my memory reflects truly, found more especially in cases of rapid dying, as after fatal burns, for instance; but without any congestion, showing it occurred when the vascular circulation had ceased.

It may be reasonably inferred that when some portions of the intestinal wall have lost their power, a peristaltic wave of energy coming along may not be sufficiently transmitted by the powerless, more dead, portions, and so the wave discharges its energy in its accustomed direction, into the channel of the bowel, and so carries the intestinal wall with it, and invaginates it.

Another very common cause of obstruction is cancer; that may occur in any part of the bowel. Scirrhus is most common in the rectum. Carcinoma may begin about the bladder or uterus, and extend to the rectum. The obstruction may be due to syphilitic and fibroid thickening and contraction; or there may have been some inflammation in the pelvis (*e.g.*, the remains of perimetritis) which has left a lot of fibroid thickening which has contracted and thickened the rectum. As the rectum becomes strictured, the belly becomes increasingly, and at last maybe enormously, distended.

If asked, What are the symptoms of stricture of rectum? begin by saying, If there be no diarrhœa, no fluid discharge of fæces, which is the prevailing symptom in some cases, there is increasing constipation and distention due to accumulated fæces and gases until the bowel becomes enormously dilated. Then, as that distention reaches the

duodenum and stomach, vomiting comes on, but it is a late symptom. If the obstruction be increasing, vomiting, not only of gas and of food, but, at last, vomiting of fæces. Here let me warn you. You must not, because there is vomiting of fæces, think that there is certainly obstruction. Such vomiting simply means regurgitant action of the bowel. I have known this to occur in Bright's disease. If, however, the obstruction be higher up in the small intestine, what symptoms do we find? In the jejunum, for example: increasing difficulty in getting the bowels to act until they cannot be emptied, only slight distention, but early vomiting; whereas, with the rectum, vomiting comes on late; and violent attacks of colic are common to cases of obstruction.

There is another fact to bear in mind: that cancer growth commonly extends like a thick puckered ring around the small intestine, and extends and destroys, by ulceration, the mucous membrane; there is, therefore, an obstruction, but usually (from irritation), congestion of the bowel and enteritis, which leads often to diarrhœa, so that one sign sometimes of obstruction of the bowel is persistent diarrhœa; yet fæces are accumulating, nevertheless, above the source of obstruction.

If a person come complaining of increasing tightness in the belly and of flatulence, and that he cannot get his bowels to act, or, maybe, most harassing diarrhœa, examine the rectum for cancer.

LECTURE XIX.

KIDNEY DISEASE.

I THINK, gentlemen, the best way of studying kidney disease will be to begin by remembering that the great office of the kidney is to regulate—to make work safely—the water tension of the body ; in doing that, it co-operates with the lungs and skin. The bowel is sometimes brought into similar action as an auxiliary agent ; the stomach, too, may also be brought into corresponding action, as an auxiliary : but only under circumstances of more extreme disorder. The water tension of the body, it is obvious, must progress continuously with the rhythmical proceedings in the general circulation—in fact, tension in living things is a rhythmical proceeding, as much as in steam and other elementary combinations.

To maintain an equal tension in the body, the function of the kidney correspondingly acts with the other water excretory organs, lungs and skin ; and the water tension varies with the temperature of the surrounding media—therefore, in hot weather, persons pass little water by kidney, much by skin and lung ; in cold weather, much more water by kidney. When the water function of the skin is exceedingly active, and perspiration is profuse, there is usually much less water passed by the kidney ; also then the water function of the lung is very active, and there is less water passed by the kidney. In health, it is clear that these three organs are correspondingly working, and in

disease they are correspondingly disordered. If there be much watery evacuation by bowel or stomach, the urine may be much diminished. It may become exceedingly scanty and suppressed, because water has been rapidly taken out of the body. That is very impressively witnessed in some cases of strangulated hernia, where there has been vomiting for days; then suppression of urine comes on: the patient may go two or three days and pass no urine; but when the strangulation has been relieved, and the vomiting ceased, and the patient is able to drink water, very soon urine is again passed abundantly.

A somewhat similar illustration occurs in cholera: after the patients have passed a large quantity of water by bowel, suppression of urine commonly comes on; but as they recover from collapse, they again pass urine abundantly.

In collapse from any cause; whether due to shock to nervous function, as in fracture of pelvis, perforation of bowel, etc., the general venous circulation becomes arrested, and the circulation of the kidney and the excretion of urine ceases. The failure of circulation may be primarily on the arterial side, as in heart disease, and then partial suppression of urine may supervene, and it may disappear as the heart's contractility becomes stronger.

The water from the kidney comes from the circulating blood, and the secretive or excretive function (whichever way we like to regard it, for there is both, removing from the blood used-up, effete material, and passing onwards purified blood, a vital proceeding) is dependent on respiration, that enables the blood to circulate through the kidneys, and promotes its functional activity.

So, when persons are confined in a close atmosphere, not enough in the open air, or owing to the condition of lungs, as with vesicular emphysema, the air supply to

blood is diminished, the function of kidney is, as shown by urine, disordered.

One indispensable aid to healthy respiration is the easy working of 'vis nervosa.' Hence, if nervous energy be much disturbed, kidney function is commonly disordered. In some cases there is a diuresis. Or urine is at one time excessive from nervous disturbance, and at another time very scanty. That is illustrated in hysteria, or with insanity. With insane conditions I have known suppression of urine without any signs of nephritis.

It is also found that food, drugs, and notoriously alcoholic compounds, very much affect the kidney function, as well as the amount of water drunk.

It is demonstrated in nature at large that air moving through water immediately lifts it—in other words, the travelling air circulates the water, and the air is itself moved by heat energy: thus it is presumable that diminished air supply, not only by diminished oxidation, but by diminished diffusion, tends to lessen kidney function, weakening the venous circulation; the gases not passing sufficiently freely through the (serum) water of the blood.

Also the degree of activity in muscular system reacts on the kidney function, directly affecting the venous circulation, and indirectly by increasing the excretory products.

So we may discern that disorders in these several conditions tend to make the diseases of the kidney, until there remain the 'organic diseases'—the decayed 'worn outs' of the kidney.

We will now go on to consider suppression of the urine. It comes on usually as a consequence of chronic tissue decay of the kidney, and it commonly results from acute inflammation of the kidney—as in cases of mottled or large white kidney—and very notably in cases of granular contracted kidneys; but it also comes on in some mysterious cases,

where, as I have said, there is great disturbance in the nervous system, and evidence of spinal cord failure; and in such a case, whilst making the post-mortem examination, I have heard the house physician say, 'This patient died from suppresion of urine,' and I have been much surprised to find how little morbid appearance there was in the kidney.

The first thing noticed in the cases of suppression of urine, is that the urine becomes more and more scanty, until only a few ounces (or perhaps none at all) are passed daily. As the water diminishes, the specific gravity of the urine is raised—it is condensed urine, it may be so much so that a catheter has to be passed into the urethra to clear away earthy matter which has collected. It has astonished me in cases of suppression to observe how little the patient seemed distressed; in no pain, talking as usual, not looking extremely ill; and I have experienced difficulty in leading the friends to believe that the patient was in most imminent danger; there was little or no vomiting, very little complaint of shortness of breath; but increasing weakness and failure of the circulation; not loss of consciousness until a few hours or minutes before death, and not delirious until just before death. It is surprising to find the mind so remarkably calm.

Such experience proves that for blood circulation to continue, and for the working of nervous and muscular energy, water (urine), in sufficient quantity, must be passed by the kidneys. Exceedingly instructive, also, is the fact that suppression may supervene on extreme mental excitement, and where the urine had revealed no indications of kidney decay antecedently. I remember a case of this kind: there was extreme mental disorder, and there had been pneumonia and rheumatic gouty changes in joints, but urine was repeatedly examined, and there was no albumen;

it had a normal colour, and specific gravity, and antecedently a normal quantity passed daily. Suppression came on a week or so before death; and I may again say there had been no signs previous of granular or other decay of kidney, and none of nephritis. In that case I was led to connect it with cerebro-spinal failure.

These cases of suppression afford other useful guidance. For many years we have been taught that the coma of so-called uræmia was due to failure of kidney's excretory function. But there is in these cases extreme failure of the kidney without coma. Sir William Gull and I drew attention to that fact at the Medical Congress in London.

In cases of suppression, I have been most impressed with the signs of increasing failure of general circulation, and of failure of muscular and nervous energy; in other words, by the rapid loss of strength.

In some cases, beyond question there had been inflammatory changes in kidney to account for the suppression, and consequent failure of general circulation. But in other cases, in what degree the suppression was due to antecedent failure in the general circulatory energy, or in what degree the failure of circulation was due to the suppression, I could not see my way to answer.

Now let us pass on to consider other conditions of kidney failure. The kidneys, like lungs and other organs, are advantageously studied according to their tissues; studied from their mucous surface communicating direct with the bladder and outer world,—from their immense fibrous surface, which communicates with the connective tissues of the body at large,—from their large sero-vascular surface, which communicates with the great sero-vascular channels and structures of the body. Of the nerve tissues I cannot speak. Moreover, the causal conditions of kidney disease are grouped according to these tissues, and the

symptoms vary accordingly as the disease is situated in one or other surface. The great office of the mucous surface of the kidney is to transmit water, suspending the effete, useless material, and getting it out of the body; and we have clear evidence, when that surface fails in its function, what is the effect on the individual and the bodily actions. We may take first, so termed 'surgical kidney,' suppurative pyelitis and nephritis. It is a very common condition; the suppuration usually begins in the bladder, and extends to ureters and attacks the pelvis of the kidney; it thickens the pelvis by inflammatory exudation, pigments it by extravasated blood, and softens until it disintegrates the tissues. The suppurative inflammation travels along the cones to the cortex of the kidney, and collections of pus are found in the cortex. They may have increased until the kidney substance is nearly completely broken down into abscesses.

It is necessary to bear in mind that these suppurative processes, which usually commence in small areas, are commonly repeated, maybe for months; and that when this suppurative inflammation is going on, there is excessive and rapid tension in the kidneys. We are guided to think it is so, as we peel off the capsule of the kidney, and observe how tightly packed, evidently stretched, the kidney substance is within the capsule; and guided by the fact that the patient has been attacked with rigor, and in some cases with repeated rigors, followed by heat and sweating like in ague, every few days; further guided by the increase and recurrence of the pain in the back at the period of the rigor, and the urine is increasingly charged with pus. Pain in the loins we attribute to the increasing tension of the inflammatory swelling, and increased quantity of pus in the urine denotes increase of inflammation. As the signs are repeated, we notice that the patient becomes yellower in

skin, more cachectic-looking, also weaker, but he retains his clearness in consciousness. There is commonly no coma, and there is no delirium as in uræmia. Weakness is the most prominent symptom. There is no dropsy; there is little or no vomiting; shortness of breath is little or not at all complained of. In that respect it is most strikingly different to Bright's disease. The tongue becomes red, owing to catarrhal inflammation, and there may be diarrhœa, the skin becomes drier, the breath smells of urine—ammoniacal. This morbid condition, *in toto*, has been ascribed to and called ammonæmia — blood poisoned by decomposing urine. These patients die of asthenia. Numbers of times I have listened to the house surgeons repeating a similar statement of the symptoms which had occurred in the fatal cases of stricture of urethra and other bladder diseases. Such symptoms are most commonly met with in cases of such stricture, but they occur in cases of spinal-cord disease, where there is paralysis and suppurative inflammation of the bladder, or in cases of carcinoma involving bladder, or where there is fibroid tumour of the uterus, or ovarian or other tumour pressing upon the bladder or ureter.

Suppurative pyelitis may be secondary to stone in the kidney; calculus of the kidney very commonly sets up suppurative nephritis, which may result in a small or large abscess; and after awhile it may open through the loins, or burst into an internal organ; or the suppurative nephritis may be due to strumous changes.

In these cases, the difficulty is to keep the blood from being poisoned. The pus rapidly decomposes and noxiously infects the system. Therefore, do not overlook that such kidneys want much, and that we should supply them with much, water to wash away the pus and decomposing residue, and that the patient requires rest to enable the renal circulation to travel easy enough to pass out sufficient water.

For that end, the kidney needs sufficient blood, with required tension to pass through it.

Before leaving this morbid condition, let me repeat, that unlike 'uræmia' so termed, although the body be thus poisoned, yet the patients are not comatose nor convulsed, and they die from nervous and muscular failure.

Let us pass on next to consider Bright's disease. I think, perhaps, I shall convey the clearest notion of Bright's disease if I recount to you briefly a few historical particulars of albuminuria.

It had long been recognised that patients became swelled by dropsy, and that there was something wrong in connection with the passage of their water: but it is long since it was found that such patients passed in their water something which, when boiled, looked like white of egg, and they called it albumen. And at the time when Dr. Bright was beginning the study of these diseases at Guy's Hospital, clinical investigation had reached so far, it was known that with the dropsy there was some disturbance in the passage of the water, and that the water contained albumen; but Bright showed that there were destructive morbid changes in the kidneys themselves. The result, later on, was that when practitioners found albumen in the urine, they said there was 'kidney disease.' For years, albumen in the urine was considered to be evidence beyond all question of kidney disease; which no doubt was true, using the words in their proper meaning; but it was later found that not in all cases was there renal tissue decay. The albuminuria might only induce disordered function.

It was further observed that in some of the cases there was no dropsy. In a great many other cases there was much dropsy. That led Bright, subsequently other observers, to question and search further. He observed a number of cases in which there was dropsy, and much

albumen in the urine; but another group in which there was albumen in the urine, but at times it was absent, and at other times persistent, and there was no dropsy.

He further noticed that where there was much dropsy and much albumen, there were usually large white kidneys. Where there was no dropsy and a variable amount of albumen, there was usually small, granular, contracted kidneys. He concluded that there were thus two natural divisions, beyond all argument or question. In both, the symptoms might extend over months, or even years. Pathologists agreed to speak of such cases collectively as chronic Bright's disease; because Bright, by his investigation, had first drawn attention to these renal diseases, these associated morbid changes. His observation went further, and demonstrated that in many of those cases which had large white kidneys, there had been blood passed by urine, and that the urine had been scanty, and the illness had come on in some cases with a feverish outburst, and evidently acutely. Then it was agreed to divide the cases into acute and chronic Bright's disease.

Further observation showed that acute nephritis very commonly, and I might say, mostly supervenes on some chronic degeneration of the kidney. By acute Bright's disease we really mean acute nephritis, which may be secondary to chronic disease of the kidney, or be a primary affection, as for instance, from scarlet fever, syphilis, or other acute malady.

Here I ask you to allow me to acknowledge my debt to Dr. Wilks, whose labours in this and in many other subjects have greatly advanced pathological teaching. He taught me pathology: showed me that acute inflammatory changes are generally consequents of chronic disease; it was his mind that showed me how to study morbid changes scientifically.

As post-mortem examinations went on, another effect was noticed. That there are cases in which much albumen is passed and there is very little dropsy, but there is a large liver and a large spleen, and in some of the cases bone disease, or syphilitic remains or phthisis, and they called such kidney alteration, from its appearance, lardaceous disease of the kidney. Some writers group that kidney disease under the term Bright's disease. That is done for convenience.

Here we have to inquire, What are the conditions which produce acute nephritis? What do we mean by acute nephritis? Acute nephritis, as I have already mentioned, mostly results from some antecedent chronic disease, either in the kidney or elsewhere in the body. It arises from protracted venous congestion, therefore it follows from valvular and other heart disease, from emphysema, phthisis: or it comes on in association with blood-poisoning and cachectic conditions, such as scarlet fever, diphtheria, or syphilis, but it may come on in the course of any other contagious fevers: or it is due to mechanical injury, such as a blow on the loins; or to morbid growths in the kidney: strumous, fibroid, adenoid, or syphilitc morbid growths, or embolimapis, may cause acute nephritis. Exposure to wet and cold is commonly said to be the cause, but, as far as I can gather, that is but the immediate determiner, the other marked changes, injuries, or cachectic conditions having preceded the exposure. It is customary to consider abuse of alcohol as one of the most common causes of renal disease.

I cannot definitely tell you anything about acute nephritis coming on from arterial disease, excepting where the arteries are much altered by fibroid changes, in such acute nephritis is very common; but there the kidney tissues have degenerated. Under the head of acute nephritis or acute

Bright's disease, we do not include suppurative nephritis; suppurative nephritis comes on, as said, from other conditions, such as bladder disease.

The kidney is usually in the early stage of acute nephritis found much enlarged and extremely congested. I familiarly speak of it as 'chocolate coloured kidney,' because it has such a deep brown red colour, and it is extremely swelled, with hæmorrhagic extravasations very commonly in its cortex. Such kidneys are studded with ecchymoses. In these cases there was less blood in the urine. It is evident that the vessels had become so extremely filled and stretched, that the blood had much stagnated in the kidney. And the clinical history reveals that the urine had been much diminished or suppressed at this stage. Through these hyperæmic vessels serum evidently oozes, and consequently there is albumen in the urine and hyalin casts, some of which have epithelial cells entangled in them—they are the so-called epithelial casts. You may readily prove that these casts originate in that manner by making microscopic sections and seeing the casts in the tubes.

In the next stage, the redness much diminishes, but it is replaced by a grey material, an albuminoid substance: that grey material and congested vessels together are intimately mixed, forming what is known as a mottled kidney—these kidneys are usually large, and they are called 'large mottled kidneys.' From this we are led to infer that as the disease continues week after week, the congestion diminishes until the kidney's morbid change is characterised, not by congestion but by pallor, bloodlessness, and then it is termed 'large white kidney.'

Again, there is a group of cases—a form—in which the kidney is most extremely pale. I have called it 'the white marbly kidney.' I remember the case of a girl who had been under Dr. Down's care on and off in the hospital for

two years, and I found the kidneys in that condition—looking like white marble in colour.

In the early stage of acute nephritis there may be a feverish outburst, but as clinical experience we seldom meet with that. We think it may have passed off before we see the patient. In very exceptional cases, the acute nephritis comes on like 'a fever,' but these comparatively are rare cases. I will finish what I have to say to-day by adding that pain in the back is usual and characteristic of suppurative inflammation of the kidney, but much pain is seldom characteristic of the nephritis of 'Bright's disease,' though in exceptional cases it is met with. In one case the medical man thought the patient was sickening for small-pox—small-pox being about, and the pain in back and vomiting were so severe: the case turned out to be one of acute nephritis.

LECTURE XX.

KIDNEY DISEASE—*continued.*

It is puzzling to discern how best to speak of and lead our mind to exact and comprehensive views of morbid and other conditions when they are extremely and variously combined; the course to be taken must be the most convenient—the one that seems at the moment the most handy and useful. Therefore, I may digress somewhat and again refer to the anatomical and histological changes in the kidney, although time will compel me to do it briefly.

It is advantageous here to take that course, for it will enable us to consider these changes in the kidney and their relation to more general morbid conditions in the body.

The histological changes resulting from venous congestion of the kidney are the most common to hand—such as result from heart, lung, or other organic failure. These swelled, purple kidneys, with their stellate veins and their surface fine network of veins much distended are frequently before us; and in such kidneys the veinules of the cones are exceedingly noticeable by their over-distension with darkened blood; in some of these organs their cortex is studded with minute blood extravasations, and this ecchymosis may be mixed with purple and with grey material that makes us inquire if, or to what extent, nephritis had occurred shortly before death.

At the bedside, at the post-mortem table, and even by aid of the microscope, it is often difficult to agree, and, in fact, we cannot decide, that nephritis had occurred or not. We have not this difficulty with the more extreme, that is the more pronounced, appearances; when the vessels are filled, but there are no signs of excessive effusion into and swelling of the tissues, we recognise mere congestion; but where there are such effusions in great degree and extent, we acknowledge the changes to be inflammatory; nevertheless, there are intermediate degrees of effusion and swelling —of these it is more or less allowable for arbitrary opinion to say there has or has not been nephritis.

With venous congestion it is very impressive to see the inter-tubular capillaries filled with yellow and scattered colourless corpuscles, embedding the convoluted tubules, whilst their epithelium is more or less clouded by granular exudation; but there are in many other specimens exudations of leucocytes and red corpuscles around the capillaries, and the nuclei of the epithelium are much swelled and clouded; then and there we are obliged to admit that the morbid conditions had, at the time of dying, to say the least, been passing into an inflammatory outburst.

Protracted venous congestion is one of the most, if not the most common causal condition, leading to nephritis; consequently, where there has been much and continuous difficulty of breathing, it is common to find evidence of nephritis; not only with valvular disease of heart, and other cardiac cases, but with phthisis or other lung disease, maybe in connection with fever or diphtheria, or maybe coming on insidiously in the last few weeks of cirrhosis of liver or other disease where breathing has been laboured and difficult.

In the mottled, large white kidneys the tubules present a swelled and clouded appearance—clouded by granular

and so-called fatty matter, and the nuclei of the epithelium are swelled and appear to have divided and multiplied; and the nuclei of the glomeruli seem to have multiplied, and there may be such a quantity of albuminoid hyalin extravasation under the capsule of the glomerulus that it has compressed the capillaries to an extreme degree; and a hyalin, homogeneous material, doubtless albuminoid, is seen lying between the rows of epithelial cells, forming so-called hyalin casts; the epithelium of the tubules may be thus so much compressed that these exudations seem to have much destroyed its cells, and doubtless in other ways the epithelium is destroyed.

You are familiar with the hyalin, epithelial and granular casts, and blood casts, found in the urine in cases of nephritis; it has been customary to consider that these casts came from the convoluted tubules and that their presence in the urine revealed the kind of morbid change going on in the convoluted tubules; but further investigation into the minute anatomy of the kidney has led to doubt being entertained as to what portion of the tubules they come from, and therefore doubt as to their precise significance.

With these alterations within the tubules there are inter-tubular indications of inflammation, swelling of the connective plasma, and exudations of coloured and colourless blood corpuscles around the capillaries and into the tubules. But in some kidneys the inter-tubular exudations and the swelled and other alteration of the capillaries are much less marked; the morbid changes are mostly intra-tubular; we are then led to infer that in such cases the morbid changes have either been much less acute, and doubtless more insidious, or that the acute changes with the exudation have passed away.

Intra-tubular changes are so commonly met with associ-

ated with swelled or other thickening of the capillary wall, that it is more difficult or less arbitrary to divide the cases into intra-tubular and parenchymatous nephritis; and there is a help in so doing, for we endeavour to define where the disease began: either the morbid change was primarily intra-tubular; or it was primarily inter-tubular; so we hope to discern its further relations.

In some kidneys the inter-tubular changes are extremely marked, and denote that disintegrating alterations had been slowly going on; the connective tissues fibroidly thickened, the arterioles and capillary walls thickened, capsule of glomerules also; such thickening may present a felt-like appearance, indicating that it has been of long-standing; or there are a large number of spindle-cells and increased nuclei in the connective tissue area, denoting there has been a more recent and progressive fibro-cellular growth. But in other cases, these inter-tubular changes are met with in less degree. In their extreme form and extension in the cortex we recognise that these fibroid inter-tubular formations are similar to those of granular contracted kidney. Yet we may have to regard them somewhat differently, for their antecedents have been different, and it is almost needless to say that effects may have much similarity of feature, yet be more or less different, because of the differences in their antecedents. Or it is an open question as to how we should regard the fibroid inter-tubular changes; for example, in some cases, the clinical history, extending over years, has led to the diagnosis that the disease in the kidney was due to fibroid granular contraction; but the post-mortem examination showed large white kidneys, whilst the microscope examination revealed fibroid changes similar to those of granular contracted kidney; hence the question—did recurring sub-

acute nephritis lead to the fibroid changes; or did the fibroid begin and the nephritis recur consecutively?

It is recognisable with the kidney, as with the lung and other organs, that the inter-tubular structures may be much thickened by fibroid material, and that inflammation may have recurred in the mucous tissues from time to time, as bronchitis or nephritis; but it is often questionable as to where the inflammation had primarily and mostly prevailed —in the mucous tissues until it extended to the vascular and connective, or the reverse.

Where strumous conditions have been the antecedents, or where granular contracted kidney has occurred, with stricture of the urethra and the pelvis of the kidney become much dilated, and the cones destroyed, I have been led to think that the morbid change had begun in the mucous membrane and extended to the parenchyma. It is, however, obvious that the inter-tubular changes and fibroid contraction may also have been promoted by other conditions, alcoholic or other, that more ordinarily produce granular contraction of the cortex.

I dwell on these particulars for the reason that intra and inter-tubular morbid changes are so frequently associated; consequently we have been led to inquire of their antecedents, and found they differed much. It is agreed that they do result from protracted venous congestion, with or without thrombolic or embolic deposits. The antecedent condition, in other cases, has been syphilitic or scarlatinal nephritis, and it would seem more probable, in cases resulting from protracted venous congestion or syphilis, or scarlatinal nephritis, that the morbid changes would begin in both areas, mucous and inter-tubular, about the same time, and end in granular contracted kidney.

And where the appearances were merely those of large white mottled kidneys, and I have been surprised to find

extreme fibroid inter-tubular changes; the fibroid looked of much older date, and I have by such cases been brought to teach that the kidney may undergo slow fibroid changes in parts, and that whilst in that condition it may contract acute nephritis, and become extremely swelled and altered, until it looks like a large white kidney, and that in such cases the patients die with symptoms usual to large white kidney.

In that respect the experience of the kidney is very similar to that of the lung; pneumonia supervening commonly where the lung is injured by scattered fibroid changes, and the whole is more or less swelled and otherwise altered by the inflammatory exudation.

But there are many other kidneys in which fibroid changes are so extremely and characteristically marked—distinctive of so-termed granular contracted kidney; and the contraction is so extensively spread through the cortex, whilst the epithelium is comparatively little altered, that we cannot but contend that the morbid changes have begun in the inter-tubular area. The fibroid changes are most marked in and around the walls of the arterioles and capillaries, and so Sir William Gull and I were led to regard them as beginning there and spreading from there in patches through the kidney cortex; subsequently the fibroid substance contracts, and, by compression, destroys the tubular structures. The epithelial layer here and there may be entirely destroyed, that is, some of the tubules are bare looking, and they are the so-called cysts.

These various experiences have shown that the organic local morbid change, granular contracted kidney, is the result of various antecedents, and it is obvious that the local disease must be studied accordingly.

From what you have heard you will be prepared to learn that the symptoms of acute nephritis are commonly

preceded and associated with signs of other disease. There are many cases in which the renal symptoms—albuminuria, hæmaturia, giddiness, weakness, and shortness of breath—have come on, but with no appreciable dropsy. Under treatment the symptoms disappear, and the patients entirely recover in a short time. It is usual to consider such nephritis as the result of cold. But in other cases, the hæmaturia and albuminuria are more persistent; there is more difficulty in breathing, and more or less dropsy follows; and only after many weeks do the patients lose most or all of the symptoms.

In such cases it often remains an open question, how far the tissues have degenerated, and it is apprehended that the acute symptoms may recur.

In other cases the symptoms are much longer persistent; they are present in much greater degree and extent, and they have come on more insidiously. In such also there may be indications of antecedent strumous conditions, or of much alcoholic or other abuse, or manifestations that the general circulation and tissue nutrition have been antecedently much weakened.

Further, there are the usual indications of large mottled or large white kidneys: much persistent albumen in urine, much œdema, much anæmia, difficulty of breathing, weakness, vomiting, giddiness, and pains in the head.

But here let me impress upon you that anæmia, additional shortness of breath, and œdema, come on about the same time, and increase together until the sub-cutaneous cellular tissue is charged with watery serous fluid; and similar fluid accumulates in large quantities commonly in the peritoneal cavity, in pleural, maybe in pericardial, until there be threatening death from pressure of the fluid and over-distension of the serous cavities; but most danger arises from œdema of the lungs: pulmonary œdema is

extremely common in cases of large white kidney and in other cases of renal decay. Most cases of kidney disease are terminated by a large quantity of serous fluid gathering in the lung-substance until the bronchial tubes are filled by frothy serous accumulation.

Whilst the renal symptoms continue, the tissues of the serous membranes, pericardium, pleura, or peritoneum, may become much swelled, and suppurative inflammation follow and cause death; or cellulitis of skin may end the case fatally. Or hæmorrhage may follow: maybe from the nose, or gums; or into skin, from bowel, and in urine, and be repeated until the patient dies.

Now here we have to ask, how comes it about that the blood and serous circulation thus fatally fails? That question necessitates us taking a large survey; but to lead up to the answer let us first go on to notice that, owing to the pathological view being confined to the œdema, most earnest efforts have been made to get rid of the dropsy, and so to restore the breathing, circulation, and nutrition to healthy order again. For that end, hot-air baths, purging, and other measures have, for many years, been resorted to. But it has been usual experience that, in extreme cases, these measures commonly failed, or that the hot-air bath much diminished the œdema, and then convulsions supervened and killed the patients, or that the purging failed to remove the œdema, but after a while diarrhœa set in and continued irresistibly; and then the dropsy entirely disappeared, but the patients died of exhaustion. Hence experience has shown that such a limited view, as considering that the dyspnœa and other symptoms, including the inflammatory and uræmic, were due to the œdema, has been proved to be inadequate; right enough as far as it went, but too limited, it had to go further to look for the cause of the œdema. So that, for purposes of medical

treatment, we have here to further inquire, how is it that the circulation thus fails. It is not merely due to the kidney being injured, for kidneys have been extremely decayed for months and years, and there has been little or no dropsy—in one case we witnessed, until one kidney only weighed three-quarters of an ounce, and the other two ounces and a half, and the patient was off and on under observation, with renal symptoms, for ten years, in the London Hospital, several times with symptoms of granular contracted kidney ; yet during the whole of this time there were no signs of dropsy—and that absence is common experience in the granular contracted kidney ; and where dropsy does follow in these extreme forms of kidney decay, it is because acute nephritis, with symptoms more or less common to mottled or large white kidney, has supervened, or cardio-pulmonary disease has supervened, and so the circulation been weakened.

So that we have to look beyond the kidney failure itself, and its attendant œdema, and endeavour to see how it is that this œdema is so prevalent in some cases and not in others. To do that, let us notice a guiding fact, that the dropsy is augmented with the increasing loss of red corpuscles ; and that with the loss of these coloured respiratory organs there is increasing dyspnœa.

We are unable to confine ourselves to the view that this dyspnœa is merely due to the exclusion of air from the lungs consequent on the bronchial tubes becoming filled with fluid, for that is too limited ; for in some of these cases, where there has been the most extreme dyspnœa, and the patient gasping for breath, we have listened to the chest and been astonished by hearing the breath-sounds distinctly : no moist or dry râles, no dulled percussion note—there were only more harsh and louder breath-sounds than normal ; it was evident that the air passed abundantly into

and out of the lungs. Again, in other cases, there was much evidence of œdema of lungs and yet much less dyspnœa.

We have contended that it is the air, moved by heat-energy, that lifts and carries onwards the water of the blood, that is, the serum and its associates; that the rhythmical working of the heat circulates the watery vapour and carries it out of the air-passages in expiration. But whilst there are many general experiences revealing that human and all other animal breathing is dependent on heat-energy, yet we have now to consider that it is further dependent on light's rhythmical proceedings.

We cannot limit the consideration and say it is merely the loss of heat-energy that makes the air and water of the serum incapable of travelling onwards, until the body becomes water-logged; we may repeat that we cannot remain of that opinion, for the œdema and anæmia (loss of colour in blood), are correlated; nor can we be content by saying that the extreme loss of red corpuscles must be attended by loss of oxidation; and consequently the quickening energy be taken from the serous fluid until it stagnates; we cannot overlook that it is so, yet we equally cannot overlook that the colour of the blood is lost.

Again, let us recall that removing the œdema by heat, where œdema was most extreme, has demonstrably, on the whole, been a failure ending in death. So we have been brought to see that colour in the human circulation, as in the vegetable circulation, is significant of power, simply speaking, of immense power; and we have to recall that colour is due to light, and that the blood owes its colour to light; and that the activity of blood, and the greatest activity of respiration, with its influence on serous circulation and general nutrition, prevail and are most manifested when light-energy is most powerful on the earth—in day-

time and in spring. And it is beyond question that in anæmia there is failure of respiration in consequence of the corpuscles of the blood being deprived of colour- (light-) energy.

In plants and animals it is manifested, and it is admitted that life and light work continuously together. I may say that, recognisably in plants, chemical activity and nutrition are dependent on light. And the vegetative functions in animal and human structures, we have been led to consider, are equally dependent on light, which, in human nature, is Heaven's life-giving energy; therefore the serous circulation fails and nutrition of tissues fails, and blood and vessels at last perish when the body is deprived of that heavenly supporter.

The trees and plants spread their leaves to reach the light, the power of Heaven which raises them up; the animals rise with the morning, and feast and fatten in day-light; children extend in health and strength, and are most happy gambolling in the sunshine, and old persons looking for renewed health rise early to enjoy the freshness and purity of the rising sun—in countless ages there has been testimony to the life-giving influence of the light.

Regarding human nature in its most material and substantial manner, what is it but light-energy working in or through the blood, which is made up of the products of the world? Further, if we trace the effects of injuries, severe shocks, such as fractured pelvis, burns, or other great irritations, which fearfully affect feeling (consciousness), until the blood circulation ceases, and observe that although air is heard to be breathed freely in and out of the lungs, yet on examining after death, we have found that the failure of the circulation was due, not to any obstacle in air-passages, nor any lung consolidation collapse, nor congestion, nor œdema, in the lungs; but such lungs

are much drier and darker than normal. Then also we have been brought to believe that this travelling of the gases in and out of the blood is not enough to maintain the blood circulation, especially the venous circulation: we have to recognise that respiration is a fine rhythmical working and light indispensable to the gaseous breathing. By such common experiences we have been led to consider that the blood circulation is dependent on respiration, the working of light energy, and whilst that continues there is life in us: that respiration and mind act in us as one, and that we feel and see by the light that is in us, we know by the light that is in us; and so might we not exclaim, with the old manly voice, who, loving the light and loving life, feeling it to be his Master—to be the energy and the mind that gave him life: 'He set a tabernacle for the Sun, which is as a bridegroom coming out of his chamber, and rejoiceth as a strong man to run a race.'

LECTURE XXI.

KIDNEY DISEASE—*continued.*

GENTLEMEN,—In accordance with your request, I will recapitulate to some extent what I told you in the last chapter. Having described the morbid changes of acute nephritis, and alluded to their antecedents, I went on to say that at the beginning of acute nephritis there is usually no dropsy, unless due to heart or other organic failure, and weeks may pass over without any dropsy appearing; and I stated that increasing shortness of breath, anæmia, and dropsy came on about the same time, we may say together; so that œdema, anæmia, and shortness of breath, and increasing weakness and more or less giddiness, come on much about the same time. I showed that in acute nephritis the great danger is œdema of the lung; that for awhile the lung is able to supplement the action of the kidney (the lung and skin, we ought to say) and prevent the body being choked with water—therefore dyspnœa is a symptom that we must inquire for in Bright's disease; and I may here add, do not be discouraged by the amount of albumen, for many cases passing daily and for weeks a large quantity of albumen commonly do well. Be much more guided by the difficulty of breathing, and, in considering the shortness of breath, do not be guided only by the lung physical signs of œdema; for there may be undoubtedly physical signs of œdema of lung and much œdema of lung, yet there may be adequate respiratory

power in the blood to maintain the general circulation, because there is not extreme anæmia. Never let us overlook that it is not the 'lung' we formally think of—the pulmonary framework—that breathes: the corpse-lung manifests that; it is the blood circulating in the pulmonary plasma that breathes; but I want to tell you that I had been led by experiences of various kinds to believe that it is the continuing respiratory energy becoming breathing energy that carries on inspiratory and expiratory proceedings, and that the bronchial tubes are thus kept from fatal watery accumulations; but as anæmia pales, respiratory energy of light is lessened and lessened in the serous fluids of blood and tissues, until dropsy fatally accumulates. Here let me add, in speaking of this subject to different scientific observers, I have been brought to think that there is a developing conviction that light-energy, passing into various material media, may become converted, and subsequently manifested as electrical, heat, and other energy. Isaac Newton held that light was the source of all motor power, and those that now believe that all energy comes from the sun and other heavenly spheres must find it difficult to contradict that view. As medical men, we must recognise that we cannot confine ourselves to chemical views; for they have to proceed to account for the affinities and recombinations; physical views have to look for the source of energy, or they are too soon used up. Then comes the biologist to inquire, and see how things live, come and go, and enjoy existence. And however far-fetched some person may consider this teaching that I have put before you, and whilst in our practices in its daily travail we may think it won't work; yet we have to take the world as it is; and I may sadly add, after many years of efforts and labour, that I have found the making of homunculus and bottling him

up to be a sorry business, and after all there was the devil to be paid.

It is well that I should speak thus to you, who are about to undertake the responsibilities and cares of medical practice, for I remarked at the outset of these lectures, pathology has to teach the maxims of rational practice, so as to guide us to appreciate the relative workings of the various structures of the body.

We next alluded to the serous tissues taking on suppurative inflammation and disintegrating rapidly, as respiratory life-energy failed; and that in some cases that is manifested by uncontrollable hæmorrhage, the blood and vessels rapidly perishing.

We have now to go on and consider chronic Bright's disease with granular contracted kidney.

But in approaching this subject I would ask you to let me stay awhile, and recall to our minds that our forefathers inculcated that we should always render honour where honour is due; and now I can see that it is in the economy of Nature to do so, for if we do that, we are helped in return and encouraged. Encouragement every person needs to gain success, and only those can guide who have been the road. And I here gladly acknowledge that Sir William Gull was, at Guy's Hospital, my clinical teacher: he first taught me how to examine organ by organ, until I could take a more comprehensive view of the whole; in course of years, our minds working together on the subject of 'arterio-capillary fibrosis' with granular contracted kidney, Sir W. Gull often enabled me to gather much insight from his very great experience and manly thought and feeling.

In our investigations on that subject, Sir William and I were soon brought to recognise that the local condition—granular contracted kidney — must be regarded as an

organic failure resulting from different causal conditions, and that the clinical course—the pathology—was different accordingly ; for instance, in some cases the kidney disease had resulted from an attack of acute nephritis, and it was mostly a local affection—the remainder of the body being comparatively healthy ; and if no further nephritis ensued, such patient continued about for years. Whereas, in other cases, the clinical history was altogether dissimilar; there were symptoms of degenerative changes in the tissues of several other organs. Some of them had evidently come on about the same time as the renal, others preceded or followed, the renal. Moreover, the tissue degenerations in the kidney and in the other organs had so much similarity in common, that we felt that we were warranted in considering them as having a relation to one another. And in all these tissue and organic degenerations, it was manifested by aid of the microscope that the arterio-capillary system had undergone fibroid changes : the adventitia and intima coats had become thickened by fibro-cellular formations, and the middle muscular coat was, in parts, much atrophied, whilst in other parts it seemed much thicker than normal. That thickened appearance Dr. George Johnson had previously discovered and most serviceably called attention to ; he considered it to be due to increased muscular tissue, and that it was indicative of hypertrophy of the muscular coat of the artery—bestowing upon it an additional vigour. We, however, could not take such a determinate position ; we could not decide to what extent the appearance was due to mere contraction of the muscle, to what extent due to growth of muscle, or to some adventitious morbid growth which had taken place amongst the muscle cells, or how much of the appearances were due to swelling by œdema.

We experienced, as regards this muscular coat of the vessels, a similar difficulty as pathologists ordinarily meet

within so-called hypertrophied or thickened hearts. To what extent is that seeming hypertrophy due to new muscle, to means for increase of contractile energy, or to what degree is it morbid growth, or merely the thicker appearance of muscle in contraction ?

The vessels are channels in connective plasma, provided with specialized structures to promote the safe travel of the blood, and to co-ordinate the serous supply according to the wants of plasma and organic functions. And it was manifest to us that as the adventitious coats had become thickened by morbid growth, the connective plasma extending therefrom had been consequently invaded, thickened and converted into a fibroid material, which had subsequently contracted and destroyed the organic forms ; for instance, the convoluted tubules of the kidney, the liver-cells and tubules, the air-cells of the lungs, the medullary sheaths and axis cylinders of the spinal cord, the heart's structures, bladder, uterus, pia mater, skin, and other structures, had undergone a similar morbid change, and some of these organs had suffered in one case, and some in another, and in various degrees the organic changes had occurred. We, therefore, could not but affirm that there was a wide-spread tissue-degeneration in these cases of chronic Bright's disease with granular contracted kidney, having its basis, failure in the arterio-capillary system.

The examinations at the post-mortem table had shown us, in the course of many years, that the brain, lungs, liver, spleen, stomach, uterus, bladder, skin, might be thus, one or many of them, much altered by fibroid thickening, and with them the kidney had undergone much granular contraction, or whilst other organs had undergone the fibroid change the kidney had little fibroid contraction, or seemingly, to naked-eye examination, had undergone none at all.

We therefore stated that this granular contraction of the

kidney, this fibroid renal degeneration, was part of a general fibroid degeneration; that in the cases with these increasing degenerations we recognised clinically a cachexia, and it, with the diseased forms, constituted a morbid state which we termed arterio-capillary fibrosis. That this fibroid thickening in one or more of the organs imparted an augmenting hindrance, a stenosis to the healthy organic and tissue workings, until it obstructed the circulation to such a degree that it brought about a fatal ending. Moreover, that our further clinical observation in such cases had increased our conviction that the kidney affection was not in all cases the primary disease, nor could the other organic failures be mainly attributed to the kidney disease.

In some of the cases the failure had begun notably in brain, and such patients had suffered from increasing blindness, deafness, increasing giddiness, increasing sleeplessness. In others the failure was in spinal cord; and they had cramps, weakness in limbs, irritability of bladder, difficulty in getting fæces away. In others, it had begun more in the lungs, and they had increasing shortness of breath, emphysema, bronchitis, or progressive wasting, taking more and more the form of phthisis. In others, the failure had been connected at the outset more with stomach; there had been early signs of increasing failure of digestion, and wasting of muscle. In others, it seemed to have attacked the blood, causing fatal anæmia. That is one of the forms of fatal anæmia which comes on about fifty years of age, and goes on for about a year or two, and kills in the face of all treatment. We should not overlook that it early attacks the uterus, and puts on fibroid tumour form with its attendant risk of hæmorrhage. It may attack testicle or bladder—the latter is what the surgeon speaks of as atony of bladder. Fibroid changes having taken place in the bladder, with or without much change in the kidney, but with the usual

hypertrophy of the heart, and in such cases there is recurring bleeding from bladder, and cystitis; and the surgeon sounds and finds no stone, stricture, nor tumour to account for the bladder symptom, but there is a heaving impulse of heart, with signs of dilatation of left ventricle of heart; yet no aortic valve incompetency, but the arteries are found to be thickened. Whatever organ this morbid change had occurred in, we found that organ was liable, by its thickening changes, to acute inflammation, which might rapidly disable the patient; and we gathered that our efforts must be directed to keeping off these acute changes, warding off pneumonia, warding off cerebral hæmorrhage from diseased vessels which occurred—commonly from nose epistaxis, not hæmoptysis or hæmatemesis—or warding off acute delirium, acute myelitis, much more commonly nephritis and its fatal tendencies, or warding off gastritis, cystitis, orchitis, and so on.

In leaving this subject here, let me repeat, to make the position clear, that the cases of granular contractions of kidney occur in two forms—one with hypertrophy of heart, diseased vessels and extensive fibroid changes, as I have just mentioned; and, secondly, granular contracted kidney occurs as a local disease without any hypertrophy of heart, and very little, maybe no recognised, signs of degeneration in other organs. The latter kinds of granular kidney would seem to be in many cases the product of acute nephritis, and that acute nephritis may be due to various causes—syphilis included. So that it became clear to us, from clinical, pathological and anatomical experience, that granular contracted kidney must be regarded according to its correlatives; and in medical practice we have to consider the source of failure of health, and regard the case according as one or other organic disease is the main source of failure.

Now I pass on to consider Uræmia. With all forms of kidney disease uræmic symptoms may occur—cerebral symptoms. It has for many years been recognised that the amount of urea passed in such cases may be diminished, and the conclusion arrived at that it must be accumulating in the blood; therefore the symptoms attributed to the blood being poisoned by urea, and named uræmia. Subsequent investigation revealed an excess of urea in the blood, but no cerebral attacks. Then came a difficulty in going on with the old view; doubt increased as to whether the symptoms were really due to accumulated urea, and it was considered it might not be due to urea, but perhaps to other earlier excretory combinations, such as tyrosin, leucin, etc. So far for the chemical view. I am obliged to speak like this, for we have had to practise according to these chemical views, and they have proved to be unserviceable. The physiologist and anatomist, on the other hand, could say, at least, We can show you things revealing that there has been much disturbance of function; and we here ask, What are the disturbances in function? So-termed uræmia? They commonly take a cerebral and cerebro-spinal form. One of the most commonly experienced disturbances is increasing failure in unconscious manifestations, in patients taking less and less notice, becoming more and more drowsy, but not losing altogether consciousness; it has been called 'the quiet stupor of uræmia'; it is so quietly undemonstrative that we must be sure to recognise it, as it commonly passes into fatal coma. There are signs also of oncoming loss of motor-power—a general paralysis—but usually preceded by restlessness, spasms and twitchings. A convulsive seizure with or without loss of consciousness would be the proper thing to call it. The motor failure may be manifested by movements that might be mistaken for chorea. I will tell you of such a case. I was called in consultation to see a

young woman at Ilford; she had been married a few weeks before, and thought to be well. I saw her lying in bed with repeated twisting, jerky movements of the hands and arms, and her eyes were shut. Abruptly she opened them and said, 'Hold your tongue, mother; I will tell the doctor about it.' Next morning she was comatose, and died. It was found to be Bright's disease. I have little doubt it was a case of granular contracted kidney.

The twitchings may be followed by convulsions, and loss of consciousness—that is, epileptiform uræmia; these seizures may be repeated for hours, or recur for days, or at longer intervals. These fits are very similar to those of epilepsy, and may leave hemiplegia for a day or two, similar to what occurs in epilepsy. It is very surprising to learn, of some of these patients, that they had done their work up to the time they had suddenly fallen down in a fit. I was one day called to the Bank of England to see one of the cashiers in a fit; he was lying insensible, and violently convulsed, and I was told that he had been doing his work as usual up to the time of seizure. He had Bright's disease. There may be apoplectiform uræmia, which may suddenly kill the patient, that is, in a few minutes. A woman was in a public-house close by the hospital, and she was in the act of lifting some beer to her mouth, when she suddenly fell down insensible, and died before they could get her to the hospital. She had granular contracted kidney. Uræmia may be attended by much delirium, continuing several days; maybe resembling mania, or maybe of a fussy, restless, more muttering kind. Uræmia may be manifested by symptoms of a typhoid kind —stupor, sordes about lips, and extreme prostration.

Uræmia takes the form, in some cases, of most distressing wakefulness. In other cases it may not take a cerebral form, but some other organ be attacked—intestine for instance,

and manifested by extreme diarrhœa ; or stomach : there is violent vomiting, which may continue until the patient dies. I have known such a case be mistaken for cholera, the collapse was so marked. I need only mention the rapid occurrence of loss of sight in uræmia.

What do we find on post-mortem examination after death from uræmia ? In cases of acute nephritis—that is, where there are mottled or large white kidneys—we usually find extreme anæmia of brain, and, maybe, some sign of œdema of brain ; and the microscope shows minute collections of colloid albuminoid matter, and leucocytes scattered in the convolutions—these are probably the remains of œdema of brain ; and it is very common to find small exudations of red corpuscles also. If we take cases of granular contracted kidney, we find commonly further changes : the pia mater is somewhat thickened by fibroid changes, so called milky pia mater ; and there are serous accumulations under pia mater and in ventricles. These cases have been spoken of as cases of serous apoplexy in times past ; we usually find also atrophy of the convolutions of the brain and anæmia of the brain, and often we find cysts or other signs of the remains of hæmorrhage into or on the brain. Large hæmorrhagic effusions commonly occur in these cases, and may be with symptoms so much like uræmia, that the diagnosis is often difficult.

In the course of many years of experience I became increasingly impressed that there were many local, cerebral and other organic morbid conditions, making up the symptoms termed uræmia, of which the chemical view gave no adequate account ; with large white kidneys there was general anæmia, and the pulmonary and other œdema ; and extreme anæmia of cerebro-spinal and other nervous tissues ; and coincidently recurring over-distension of right side of heart, and venous obstruction in the sinuses of the

brain, all of which were potent factors tending to arrest the organic cerebro-spinal function.

And it is well known that anæmia of brain may give rise to convulsions similar to those of uræmia. 'Uræmia' may be said to be due to failure of the circulation and respiration in cerebro-spinal system, with their attendant œdema and other exudations, swelling the structures; that there is also an excessive accumulation of excretory products we could not doubt. In cases with granular contracted kidney there may be gross structural decay of brain and spinal cord; but of such a form as is commonly attended with epileptiform, or apoplectiform seizures, or muscular spasmodic movements without loss of consciousness; or with delirious outbreaks, or dementia—whilst there are no appearances of Bright's disease. Therefore we are led to think that the failure of kidney-function further weakens the decaying structures of brain and cord until uræmia supervenes, especially when there is present at the same time much cardio-vascular and pulmonary disease; yet the cerebro-spinal symptoms, convulsive and other, may arise from this morbid condition in brain and spinal cord themselves, independently of the kidney disease.

In leaving the subject, let me impress upon you that in brain disease death is mostly due to failure of pulmonary function; therefore, in all such cases, we endeavour to maintain the breathing; and therefore avoid too much purging.

BRAIN DISEASE.

In proceeding to study brain disease, we may surely remark that the head is placed on the shoulders that—neck or nothing—we may be enabled to shoulder up to it. But the human shoulder comes by shouldering the earth, and not only taking its lime to make bone, but its activities also.

But the efforts and the climbing must be done very gradually, for there are many pitfalls—breakneckers—until it is a brainless proceeding. We are often top-heavy because we are not light-footed enough, and cannot feel our way for safety and advancement because we are too thick-skinned; or we are intimidated, and too conscious, because too thin-skinned. We cannot resist a little fun, for there is so much in Nature. The ancients knew the necessity for this when they placed a comic goddess amongst the Muses. The whole nervous system is so arranged to afford us the means to reach it, and work easy. But for that there must be nervous energy; therefore let us go on to inquire how it is to be gained. At the outset, let us notice that the great in-takers—digestive and breathing organs—carriers of grosser energies, of food, water, air, transmitting them until they are united in blood and vascular organs—that these organs are covered by the nervous tissues and organic nervous structures, by the great sympathetic and vaso-motor organs; thus it is evident that nervous power, vis nervosa, which I have spoken of so often, is placed there to influence, and have at command when necessary, those energies. And the brain, as may be remarked, is a conglomeration, animal development demonstrates it to be so, an aggregate arrangement of nervous tissues and organic structures covering vascular energies; and these structures are further specialised—optic, vocal, manual, and other—for specific aims and ends. The structures of brain and spinal cord are especially arranged as centralizing communicators; and in each centre there are polarizing cells, with their extremely fine members extending in many ways; it is manifest that they are means to receive, re-arrange, and re-transmit, in a more useful manner, nervous energy.

These ganglionic arrangements have two great communications with the outer world—receiving sensorial impres-

sions from the activities of the things of the outer world and returning through muscular working, constructive or destructive power by means of nervous energy, into the things of the world again. There is thus, we are led to think, an interblending of the conscious energy with the energies of the world—a continued communication between the things of the outer world and the deeper mind, with the 'oneness' also — and we are thereby enabled to be really instructed and stored with nervous power; and human nature, in its natural working, is the perfected intermediate between the outer world and the Great Worker and Maker of all. As the ancients said: 'All is one, because One is all.' Thus are our nervous operations between the earth-productions and the One.

Here let me say to you that there is much erroneous and inimical talking about the nervous. I can say that, for I have met with it, and others have suffered much from the misunderstanding. There is nervousness that distresses much, but it is owing to the fact that persons have been led to be too self-conscious. It is really a grand thing to be nervous. Often much unpleasantness and pain is mixed with it; but that is owing to the abuse of it. The world's work is done by the nervous; and we may see that the greatest workers are the most nervous, most sensitive amongst men, keener than the hawk amongst its kind, they vibrate from head to foot with nervous energies, and when seen airing themselves they help others immediately to take up a safe position for further progress—the 'sovereignty of nature.'

The impressions received from the outer world are 'common' and 'special.' Common by the scattered sense-organs of the skin—so no wonder that we are urged to use our common-sense to take cognisance of things as they really are, matter of fact, so to become men of business by taking in from the great operations of things

in time and tide, thus promoting increasingly the business mechanism of the world; as a celebrated engineer remarked, 'The finest quality an engineer can possess is plain common-sense in the use of materials.' And that applies to all business, and to a medical man is indispensable, for he has certainly to find a way to gain the great common energies of the earth. In the special sense-organs there is provision made to enable us to gain further impressions of the qualities of things—colour and form by the eye, workings of sound by the ear, of sapience by the sapient nervous energies of the mouth, odoriferous energies by the nose—thus feeling into Nature, into the Great Mind's operations, we become instructed as men. Opinions fade behind, like stepping-stones in journeying across the stream. Thus gathering, we are encouraged by discerning that feeling becomes knowing; as we feel into things we learn the qualities and capabilities of things, so we come to perceive them; and day by day as we thus gather and store up in us the impressions of the world's members, we come to remember and recollect; but, oh! when we are crammed with a lot of rubbish that has got no members—dead leavings—so little life in it, what to do then? Such poor sufferers have wandered into my room, murmuring in despair, 'I want to forget;' and to guide them against suicide I have led them to connect the common sense, as Job said, with the stones of the earth. To get rid of the rubbish as quickly as possible. Remember that thus being proportionately stored from things, leads to ratiocination, until we come to realize that there are constantly certain proportionate ways of doing, in the earth beneath and heaven above. Reason, eternal reason! And learn how the astronomers and navigators every day demonstrate the fact that as the earth daily turns before the face of the sun, and its light at a certain time passes across the dial and casts its shadow at Greenwich, twelve o'clock is announced

all over the kingdom, and the little clocks and little doings of us all are thus hourly regulated. Thinking of this, we are not surprised that persons ask us, when we say it is so and so, 'What are your reasons?' nor surprised that one of the most gifted minds of the Protestant Church, seeing the danger of worshipping the God of the dead too much, said: 'Scripture must be read by the light of reason.' If we cannot take it so to promote the world's progress, to enable the Maker's creatures to be present as His servants on the earth, we had better leave it alone.

If any should tell us that it is the influence of sense that leads to sensuality, the answer is ready—What gift in the human body is not abused? And we may reflect that it has been the wonder of ages that the universe goes delightfully onwards, leaving such of us to abuse and abuse until we learn how to get sense and reason, knowledge enough—that is power—enabling us to use in order to reach happiness and usefulness.

We may go on to learn, and it is demonstrated by experience that impressions and energies thus received by contact by the sense organ of skin, are powerful aids to maintain breathing and promote general circulation; the nervous energies of the outer world transmitted through sense-organs of skin to spinal cord, and returned down to intercostal nerves and pulmonary and cardiac plexuses, and vaso-motor system. The nervous operations thus regulating the great vascular and serous circulation, and the limbs and other organs of constructive expression thus influenced, also as well as the organs of destructive excretory expression; the nervous power is therefore able to regulate the excretory function of kidney, lung, skin, bowel, to promote and co-ordinate the getting out of the body the used-up effete compounds accordingly as the constructive expressive

organs are in greater or less activity. Thus there is a mutual co-operation and dependence.

As soon as the breathing, the gaseous circulation, becomes difficult, the nervous is much disturbed, and the mind is alarmed; there is uneasiness, more or less disease. That may be due to morbid conditions in lung structures, the serum not able to exchange its gaseous agents properly with the atmosphere, as in cases of pneumonia, bronchitis, œdema of lungs, and other.

Where the nervous structures have undergone morbid changes, and the co-ordinating nervous working between outer world and breathing is no longer harmonious, then the breathing may be, and commonly is, consecutively rendered very difficult, and death with such conditions is usually due to the lungs becoming much congested, air-cells filled with serum and blood corpuscles, pulmonary circulation is unable to continue, as in cases of hæmorrhage into brain, or other compression of brain, or from diseased growths in cerebro-spinal system, with or without paralysis; or, as in acute myelitis, ascending upwards, or where there is great irritation and disordered tension in the nervous working; maybe due to severe inflammation, for instance, of serous membranes. Peritonitis, pleurisy, usually thus ends life; respiration and breathing becoming thus dangerously interfered with and the mind diseased.

Or, the finer operations of consciousness, feeling and thinking, may become so extremely restless, disordered and fearful, anxious; extreme worry in feeling, until ultimately respiration and breathing in their operations proceed with much difficulty, until they fatally fail, as in epileptic or various insane conditions. Or there is a most impressive demonstration of such failure in cases of severe injury, and severe shock, which I have in the previous lecture alluded to; the shock, shaking and breaking by interfering between

the nervous energies, the blood, and serous circulation of tissues, and the rhythmical operations of the respiration (light and heat). Immediately or very soon after the shock, the temperature of the body falls; skin becomes darker; venous congestion comes on; consciousness is clear, but increasingly feeble; breathing becomes more and more labouring and struggling, cold sweats appear; until mind no longer consciously manifests its presence, pulse ceases, and breathing may come gradually to an end.

By such observations we may consider and in some degree trace how disease occurs: respiration is everywhere operating in the body, and mind and respiration act as one, to say the least; we are in some degree able to glean how it is that daily hindrances in the proper working of the nervous power, hindrances in the feeling, such as are popularly spoken of as worry, may interfere with respiration and breathing and general circulation that, sooner or later, very deleterious effects are left in plasma, and especially in structures where the nutrition has been previously weakened from inherited or acquired proceedings.

Moreover, if the daily associations are such that this nervous power be much weakened—made exceedingly unrestful, too much indoor association, and the air vitiated—so pulmonary function becoming much enfeebled, lung plasma, atrophy, and phthisical destruction supervene. Or it may be the failure occurs in kidney, uterus, or in other structures.

In studying brain disease, bear in mind two sides—structure and circulation. People die from brain disease, as in epilepsy and insanity, and we find after death no morbid sign of alteration of structure, but that the circulation had ceased, that life had disappeared with failing circulation. I have somewhat endeavoured to put before you, but again have to ask the question, What are

the morbid conditions that take away the easy working of the brain ?

Let us first take anæmia of brain. We mean by that the organ is not freely supplied with blood, and there are several ways in which anæmia of brain may come on. One is from bleeding—loss of blood, as is commonly witnessed in women after confinement, or in persons after injury, etc. Another way is from valvular or other failure of heart's action. That acts in two ways : the blood is not able to get through the veins of the brain—venous congestion—and the blood is not transmitted into the arteries and capillaries.

Another is loss of red corpuscles, as is commonly seen in chlorotic girls, and many other forms of anæmia. Another is want of food and air, with or without alteration of temperature, associated with loss of red corpuscles. This is met with from the various cachectic conditions of fever, cancer, cirrhosis of liver, and other organic tissue disintegration.

Now, whatever way anæmia of the brain comes on, it is characterized by uneasiness in the head—increasing distress in the head ; increasing pain—neuralgia, so-called ; mental power is diminished and disordered ; there is restlessness, and that becomes daily more oppressive until it may pass into spasm, muscular twitchings, and convulsions. Anæmia of brain is attended by so much loss of healthy feeling, that we are never surprised to find the mind become more or less 'insane.' There is increasing difficulty in thinking and of perception ; the muscular activities become so irritable and maybe uncontrollable that many such patients have to be sent into an asylum. In its extremest form it ends in coma. Dr. Savage has often impressed upon me the great importance of recognising the relation between anæmia and insanity.

We next pass on to remark that the brain, as an organ, is not very sensitive except at its periphery; that is witnessed in cases of hernia cerebri, where the surgeon may cut away the protruding piece of brain, with little or no feeling to the patient. Then it is notorious that a patient may have a large hæmorrhage into brain without pain; whilst the hæmorrhage occurred he may have been so little disturbed that he slept all night. There is similar experience, as regards pain, with abscess of brain.

The brain is sensitive on its surface area; and where there is pain due to morbid accumulations in the substance of the brain, it is usually due to stretching of the surface of the pia mater. The body generally is sensitive over its surface areas where the coverings of skin and organs come in contact with the outer circulations. So it will be useful now to go on, and consider, first, disease of the surface; and next, disease of the substance of the brain.

All diseases of the surface of the brain are characterized by pain, restlessness, commonly vomiting, delirium, more or less spasmodic movements; maybe trembling, shivering, maybe like to ague; convulsions, which may, and commonly do, end in coma. Paralysis is not a symptom until the substance of the brain becomes involved; therefore, gentlemen, we may say this, All forms of morbid irritation of the surface of the brain are liable to produce an epileptiform convulsion which is indistinguishable from an epileptic fit. It is convenient, therefore, to consider (1) the diseases of surface of the brain as due to irritation and pain; (2) diseases of the substance of the brain, from increasing compression and loss of volitional power.

LECTURE XXII.

BRAIN DISEASE.

It will help us, gentlemen, to study diseases of the brain if we bear this fact in mind, that the circulation on which the function of the brain depends proceeds from the surface inwards; that being so, the greatest sensibility is on the surface, because there are the greatest activities; and as the surface circulation is interfered with, the cerebral function must necessarily be lessened until it ceases. Then, further, bear in mind that in the circulating blood are working many powers—water, gases, solutions in water, corpuscles in suspension, albuminoids, heat, light, electricity, finer and finer operations. These combinations must not be overlooked, for we are now going to study disturbances in consciousness and other symptoms of brain disease; and if any one or more of these be interfered with, there are symptoms denoting that cerebral function is disordered: if the water be lessened, as in severe diarrhœa or cholera, or the gaseous elements, as in very hot, ill-ventilated rooms, cerebral symptoms are complained of; if the albuminoids, by want of food; if the heat, as in very cold weather; or the light, as in dark days of winter; or it may be electrical disturbances that give rise to the cerebral symptoms.

I mentioned in my last lecture that there are certain symptoms characteristic of disease of surface of the brain —*e.g.*, pain or other disturbance of feeling, vertigo, muscular spasms, tremor, convulsions; and that these irregular

actions of motor agents commonly end in paralysis and coma. Whilst these symptoms are appearing, the mind is most disturbed in feeling and in thought, illuded, deluded; it is delirious. These are the kind of symptoms which may occur with all forms of surface brain-disease; but these symptoms vary in intensity and in their course and duration; or some may be absent, according to the morbid conditions producing them.

Take one; for example, meningitis resulting from disease of the internal ear. It very rarely occurs in the early stage of suppurative otitis, that is, within a few weeks of the occurrence of otitis, but that has been known to occur: where scarlatinal inflammation of the internal ear has in course of a few weeks extended to the membranes of the brain and proved fatal. It is generally where the otitis has recurred over months or years. Whilst that is going on, it commonly produces symptoms indicative of much irritation to nervous system, and such symptoms as make us concerned about the brain—pain in head, and often very severe giddiness, maybe a little delirium and tremor, with the temperature of the body raised. But these symptoms subside as the ear inflammation lessens, and we have usually to say that there are no signs that it has left any brain damage. Such attacks may recur over years, and the irritation of the brain may be very severe for awhile, and the patient may lie in stupor several days; and then these symptoms may disappear and the ear irritation and discharges much lessen or cease, and the patient recovers. When meningitis does set in, there is increasing severity in the symptoms day by day, the temperature remains high, and there is increasing tremor, increasing loss of muscular power, delirium, and increasing tendency to coma. The suppuration extends through the petrous bone commonly to the dura mater, and we may find pus on both sides of the

membrane, that is, between the carious bone and dura mater, and dura and pia mater. It extends also through the pia mater, and so reaches the surface and substance of the brain. Or it may extend through the mastoid cells. Then this suppurative meningitis, and such it usually is, more commonly makes its way towards the back of the brain to the posterior lobe or cerebellum ; if the suppuration goes through the petrous bone, it attacks the middle portion of brain more commonly. As it invades the cerebral substance, it softens it, and this inflammatory softening may extend as deep as the corpus striatum and optic thalamus, and so soften them until there be hemiplegia. The suppurative change may thus be widely diffused through the brain without any definite collections of pus visible to the naked eye, or there may be definite collections of pus—one or more abscesses in brain. Dr. Hughlings Jackson asked me one day, 'Has it not been, in your experience, very difficult sometimes to diagnose abscess from more diffuse non-circumscribed suppuration ?' and I had no hesitation in saying I had experienced that in some cases and I could not make a differential diagnosis. We could not determine whether the hemiplegia or other paralysis was due to mere suppurative diffused softening of brain, or an abscess. In some cases this suppurative inflammation extends from mastoid cells and collects much round the lateral sinus ; then pus is seen lying between the mastoid bone and the lateral sinus, the tissues of which are pigmented and softened, and the blood in the sinus is clotted owing to the inflammation having extended into its lining membrane. This clotting may have extended along the sinus, and undergone processes of suppuration ; it may thus travel down, in, and along the outer cellular covering of the jugular vein until it reaches the chest, and so may cause pleurisy, pneumonia or pericarditis, with or without endocarditis, and kill the patient.

In that way a diffuse cellulitis may arise and extend down the neck; or a portion of the softened suppurating clot in the sinus or jugular vein may be detached and washed into the lung from time to time, and the thrombus set up patches of pneumonia, which result in numerous abscesses in the lung. Owing to that there are frequent and usually very severe rigors. So that in disease of the internal ear, with frequent rigors, you may usually diagnose plugged lateral sinus and recurring pyæmic abscesses in lungs.

Gentlemen, do not overlook the fact that scalp-wounds sometimes produce severe disturbance in the head. Never let us overlook that a blow on the head, with or without fracture, may excite inflammation on the surface of the brain, and for awhile it may be exceedingly difficult to make a definite diagnosis. Numbers of times it has happened that persons thus injured have been sent away from the hospital after the scalp-wound had been examined and dressed, and later on they have returned with symptoms of inflammation of membranes of the brain. I may remind you that a blow on the head may crack the skull without any appreciable displacement of the bone, and that the crack may be inappreciable even whilst we are making the post-mortem examination, until we examine the skull most carefully. Suppuration, we are accustomed to say, begins in the crack and extends to the dura mater, to the arachnoid, and produces arachnitis, or goes through the pia mater, producing meningitis. Whilst the suppuration is beginning in the crack, the symptoms are very obscure; patients may go about as usual, and the symptoms are commonly not manifested until eight to fourteen days after the injury. Then comes high temperature, tremor, increasing nervousness, restlessness, pain in the head, delirium, maybe fits ending in coma.

Hemiplegia occurs where the inflammatory softening

extends into the hemisphere and reaches the central ganglia of the brain. In these cases also there may be merely suppurative softening of the brain, or abscesses.

Meningitis may be also excited by growths in skull, cancerous or syphilitic. Simple meningitis—a meningitis without any antecedent injury, without disease of bone, or without any morbid growth on or in brain—is very rarely met with. I have come across it, I think, only once. When it occurred, it was with symptoms like acute mania —pain in the head, acute delirium, increasing tremor, refusing food, typhoid symptoms towards the end, which was due to coma. We found the meninges most extremely and arterially congested, very red, and the congestion mixed with pus.

There are two common forms of meningitis, putting aside disease of the internal ear—syphilitic and tubercular. Syphilitic meningitis furnishes a striking illustration, as showing that not only the kind of symptoms, but the course of symptoms, affords us the guide. It is usually repeated over months, maybe over years; the protractedness in itself makes us suspect that it is syphilitic. It comes on with pain in the head, which usually disturbs the patient much at night; the pain is often severe, and comes on in increasing paroxysms; and with that there are other symptoms of meningitis—increasing tremor, more or less delirium and convulsions are common; epileptiform seizures are common in such cases. If it extends widely, there may be increasing failure of mind, until there be dementia. But it is wonderful how, in some of these extremely demented cases, mind after awhile returns clearly and actively again. As the syphilitic meningitis extends, it thickens the meninges; the lymph evidently becomes organised and passes into a fibroid substance, which becomes firmly adherent to the surface of the brain; dura mater and pia

mater and brain surface are bound together, and in this mass we find a yellow, 'wash-leather'-looking syphilitic node. If that extends far into brain, and it does so extend into brain, then there is thickening and indurating of a portion of the hemisphere, and there may be permanent hemiplegia. Syphilitic gummata are very rarely met in the ganglia of the ventricles, that is, in corpus striatum, optic thalamus; they may occur there, or in cerebellum or pons.

Syphilitic meningitis may be most marked, I will not say limited, to the sheaths of the cerebral nerves, more commonly to third, sixth, fifth, maybe involve seventh, and the symptoms are those of paralysis of these nerves. Or the meningitis may have attacked the arterial structures. For instance, a small gumma formed in the adventitious coat of the middle cerebral artery, and it had later extended into intima coat of artery, until the blood coagulated in the vessel, and plugging it, so led to softening of the corpus striatum, and consequent hemiplegia; and I have known the plug extend across to the other middle cerebral, and the patient killed with softening in both hemispheres.

Some years ago the mental symptoms in these cases led asylum physicians to speak of them as "syphilitic insanity;" they considered that the symptoms were not only distinctive, but of a kind limited to syphilis; but of late years they have come to see that they cannot distinguish such symptoms from those of other cases of insanity—that there are specific features is unquestionable, but there are other causes and symptoms that make the diagnosis difficult and not definite; there may be signs of recurring meningitis, but the patient may have had a blow on the head, whilst there is also a history of syphilitic changes. In some of these cases the symptoms are syphilitic beyond question; but in other cases it is very obscure.

A little while ago this experience happened to me. A poor fellow had had syphilis, but he had been much worried in his affairs, and he had much anxiety about his family; and he had a maddening idea of syphilis. I was asked to decide whether the insanity was the result of money worries or syphilis, and of course I could not.

What I labour to impress upon you is, that we have to bear in mind that these symptoms which seem to denote syphilis may have other origins. I saw another man who was starving to death under fear of syphilis. In that case there were symptoms pointing to spinal cord and brain disease, and I could not say that they were not due to syphilis, but there were other causal conditions.

It has long been recognised, especially at the middle or later periods of life, after many years of toil and worry, extreme exertion, and mental anxiety, until at last the anxiety has become almost unbearable, and common events are madly felt, that in these cases there are slow degenerative changes in the meninges of the brain, rendering them more opaque, thicker, and milky-looking; and this thickening extends along the vessels which supply the convolutions of the brain. This thickening is spoken of as the result of chronic meningitis. This has been called, in its more marked forms, pachy-meningitis. It is distinguished by recurring acute and sub-acute attacks of brain irritation, pain in the head, vertigo, exceedingly harassing dreams, tremor, and other more or less delirious disturbance in mind, etc. It is difficult in some of the cases to distinguish if syphilis be a deteriorating agent; and yet, when a poor fellow is going mad, to saddle him with a fear of poison is, to say the least, torturing; for he is oppressed with that fear already, and he becomes haunted with the idea of being poisoned. This form of pia mater thickening is met with in various forms of insanity.

I do not know that I need delay you much with an account of tubercular meningitis. You will easily remember the symptoms if you bear in mind what I have said. There is loss of flesh, such as is characteristic of tubercular diathesis; this is antecedent to the meningitis. The antecedents guide us as to the kind of meningitis. This morbid condition begins with progressive weakness and anæmia; and after awhile, maybe many months of preliminary failure of health, signs of severe brain irritation set in, maybe feverishness, but that in some is little marked, pain in the head, restlessness, peevishness, frequently repeated retching and vomiting. Soon the symptoms markedly point to meningitis: increased pain in head, delirium, but usually not much; very different in that respect from maniacal forms of meningitis: there is also increasing tremor, pulse becomes slow, breathing becomes laboured and irregular; there is the piercing cry of cephalic irritation and cheeks flushed; convulsions may come on at any period of the attack. I have known them usher in the symptoms. The vomiting is most marked in this, the earlier stage of irritation, but that is succeeded by increasing signs of compression, of paralysis, and coma. As a clinical fact, nervous irritation in an extreme degree leads to paralysis. After about the first week the pulse becomes more rapid and irregular; the breathing becomes more irregular—sometimes very quick, sometimes very slow; the delirium is replaced by increasing stupor, the restlessness by increasing powerlessness; the body is starved, the abdomen sunken, cheeks sunken, the bowels cannot act, the limbs cannot move except by tremor, or violent convulsions; and so the case drifts down to coma and death.

What do we find? Lymph under the pia mater, at the base of the brain, about the optic thalamus and pons, and extending along the fissure of Sylvius, and there are tuber-

cles lying amongst the lymph. The morbid appearances may extend somewhat round the brain, but they rarely reach the vertex. Serous fluid accumulates in the ventricles, where there may also be lymph on the lining membrane, signifying that the meningitis has extended to the ventricles. The accumulated fluid over-distends the ventricles, and so compresses and squeezes the substance of the hemisphere until the convolutions of the brain are flattened against the skull: the fluid accumulates until it paralyses by compression.

There is another form of meningitis, but suppurative; it is called cerebro-spinal meningitis, which may have an infectious origin, and prevails in some districts epidemically or sporadically. We meet with cases from time to time in the hospital. But cerebro-spinal meningitis may be excited by caries of the vertebræ, or of the ribs, or some other suppuration extending to the spinal membranes.

That suppuration may extend from the bladder, or from near the womb. A lad was admitted to the hospital, having lost the power of his legs; and he had signs of spinal meningitis, which extended until it became cerebro-spinal meningitis. He was very young; but I thought that he might have had gonorrhœa, for there was a history of a purulent discharge from his urethra; but I found after death an abscess in his pelvis, and the suppuration had extended into the spinal cord membranes, and then travelled up until it reached his brain.

Now, gentlemen, we have to consider diseases in the substance of the brain. The early most marked symptom differing from those of meningitis is loss of volitional power, which may, and often does, come on at the outset; with the disturbances in the acts of the will, and as the compression increases in the brain, there is lessening conscious expression; and as the convolutions are flattened against the skull there is increasing tendency

to delirium, and there may be pain—and severe pain—but there are increasing signs of paralysis ; there are commonly epileptiform convulsions, or apoplectiform signs leading to coma.

Here, again, the symptoms vary according to the morbid conditions producing them. Let us take cerebral hæmorrhage as an illustration : if the hæmorrhage be small and occur away from the spinal tract and its ganglia, corpus striatum, or optic thalamus, or pons (say, in the middle of the hemisphere), then the symptoms may be few and obscure ; but this has been observed, that there is a sudden interruption of some volitional act, it may be of writing, of speaking, of standing, or walking. That may pass away, and commonly does pass away, maybe in a few minutes, or a few hours, and the patient seems to be well again ; but those small hæmorrhages are commonly the precursors of larger ones. We have seen their remains so often in the brain that we are inclined to think there are always lesser warnings antecedent to major seizures, though the lesser are often overlooked.

Cerebral hæmorrhage is most common in the corpus striatum and optic thalamus ; next in the pons ; it rarely occurs in the cerebellum. If it be large, it breaks up the striatum, or thalamus, often much of both, and the blood commonly makes its way into the ventricle and breaks through into the ventricle of the opposite side, so fills them both ; it also commonly bores down the crus cerebri towards the pons. In other cases the hæmorrhage extends more towards the external surface of the hemisphere, and arises from the outer part of the striatum or thalamus ; in these, epileptiform seizures commonly usher in the seizure.

In some cases of cerebral hæmorrhage, at the outset there is sudden shock ; it is called cerebral surprise. That is recovered from, and then, perhaps after some minutes, or

it may be an hour or two, loss of volitional power may be extremely marked. The seizure is followed in about twenty-four or forty-eight hours by signs of reaction; the temperature rises, and there is inflammation to some extent in the brain substance around the clot: this is the so-called 'cerebral fever.' Coma may come on from the compression of the accumulating blood in the earlier period of the seizure, or later, from the softening or the swelling effects of the inflammation. If the hæmorrhage be large and very rapid the symptoms may pass from the outset in a few minutes into coma. The increased stupor that comes on during the course of the cerebral fever, when the brain is still more softened, is commonly recovered from.

Here let us ask, What do we mean, gentlemen, by coma? We mean that the deeper conscious activities of the mind cannot communicate with the outer world. You may prick the skin, or injure severely—the patient does not manifest any feeling; you may irritate the conjunctivæ—there is no reflex manifestation of sensibility. You may make any noise—patients do not start in any degree; but should the compression be removed, and the breathing and circulation become more natural, consciousness may return and the coma may disappear—but they die of coma. What we always aim to do in cases of cerebral hæmorrhage is to maintain the circulation and breathing.

As the brain function becomes excessively interfered with, and compression sets in, the breathing becomes more and more laborious and the lungs more and more congested, and death results from failure of respiration and breathing. And I have found, on examining the lungs, that the air-cells are choked up with yellow corpuscles—some colourless, of course, but mostly yellow corpuscles. The tension of pulmonary vessels is increased to such an extent that they cannot hold their blood.

Here we have to bestow a little more time on a most important question: How is it that the structures which volition most works with become most paralysed—arms, legs, face, and other? To repeat the question in another form, How is it that the organs of expression, volitional, are the structures that suffer so much from disease? To look at them in various ways, all their natural tensions, are interfered with and destroyed. If we take, for example, the trembling, increasing weakness of oncoming paralysis of arms and legs—due to morbid changes in spinal cord, or hemiplegia, from higher spinal tracts, corpus striatum or optic thalamus; or the atrophy of cerebral convolutions, with its volitional paralysing suffering; or the progressive muscular atrophy of hands and feet; or if we take rheumatic gout changes, with their bony outgrowths and growths into cartilage, with atrophy of cartilage in hands and feet; or the morbid changes in other organs of expression—ocular muscles, vocal organs, laryngeal, lips, tongue,—all these, to say again, have their natural tensions destroyed under volitional influence.

The automatic, more vital, escape disease much longer—intercostal, for instance. It is evident that the automatic go on, so to speak, in spite of our volitional exertions.

The familiar answer might be, the will is not disciplined enough; there is too much liberty that leads to restraint; the immoderate use that leads to loss of power; the extreme of self-will that drives to outward madness; the expression of madness—in the several members of expression.

But how comes the immoderate use, the too much liberty—libertinism? To answer, let us consider that the natural movements of the organs of expression—arms, legs, vocal, and other—are all rhythmical; for they are all dependant on the rhythmical influence of the circulating blood

and governed by that circulation. When that ceases they are completely paralysed.

Further, it is demonstrable that they act rhythmically. It is witnessed in running, in singing, in successful workmanship, in the movements of children, of animals; it is shown every day; in fact, a limb working is a compound of many rhythms, and rhythmical working is easy working.

But in the diseased operations of the organs of expression there is not ease, but increasing difficulty, until there is paralysis—loss of rhythmical strength and activity.

How comes that failure? The will, the volitional power itself, becomes diseased, and that is the result of restlessness; the mind is not allowed to go year by year restfully, in the great natural ways, operating with the power that is willing the growing and development of living things.

Will is persuaded to take liberties, persuaded to restricted thought; self-consciousness, so termed, not reason, leads the will to prefer and take, day by day, the difficult rather than the easy. We do that best which we do easiest, otherwise we may go on straining at the difficult until diseased and paralysed. The strain interrupts the rhythmical.

All that is demonstrable. It is not the use of free will, because that is free which is freeing—enabling to go freely onwards, not restraining and paralysing—that is enslaved will.

But here we must not stay too long, but go on to inquire how the nutritive changes of the diseased structures are to be guided to health again. And, to see that, let us ask, How is it that the automatic movements and structures longer escape disease? To be brief, I may answer, Because they are under the influence and govern-

ment of the elements—of the great servants of the Supreme Will—the air entering lungs and operating on skin, the food and water, by stomach ; in fact, the circulating blood ; and governed by energising unconscious impressions through nerves of skin, from living things, maintaining human breathing and circulation, as animal and vegetable functions are maintained.

The skin structures may be irritated, worried and weakened until the automatic fail.

Therefore, by automatic we mean more natural, more in accord with nature at large, less under our pretensions and professions.

There is another form of expression—the getting out of the body the used-up, effete material—the excreta. With diseased conditions that form usually fails ; there is failure of excretory function, until the excretory organs are charged with morbid material and rendered useless. The excretory (expiratory) function of lungs fail, and the air-cells are filled with tubercular material, or the air is comparatively stagnant, as in vesicular emphysema, and blood poisoned by carbonic acid.

Kidney excretory function fails, and the convoluted tubes are choked up or otherwise destroyed. Liver excretory function fails, and the liver-cells become compressed and destroyed. Excretory function of bowel fails, and rectum may become strictured and choked up with cancer or other morbid accumulation. Skin excretory function interfered with, and eruptions of various sorts clog the skin, until it loses the privilege the crab and snake possess of casting off its outer covering in time and season for beauty and healthy progress.

To obtain a view as to how that failure is brought about, let us recall what the physiologist teaches us, that the oxygen inspired comes in contact with the plasma and com-

bines with it, so releases the used constituents, and they pass down into excretory products. So far we can accept his view, but we have to ask what is the nature of the proceeding that takes away the used-up material? It must be energy of some kind; merely oxidising, quickening onwards, would simply mean to leave the other to get out of the body as best it could, and not get out at all unless it had the power. So we have to ask, What power is there in natural proceedings that takes it away? I have said it often does not get out until the body be destroyed. The accumulation is more deadly than living death; for in living death the plasma takes form in time and season, and keeps it only so long as is consistent with the easy progress, the working further into life; but these accumulations arrest the progress and land the body, evidently in many cases prematurely, in the grave.

In natural proceedings there are constructive and destructive powers, and human nature being, as biology teaches, the consummation and the evolution from all other nature on the earth, we might fairly expect to find both powers acting evenly in us in health.

You hear me remark sometimes that to me it was a great discovery when I found that I had a profound respect for rot—for spring comes by rot; the severe but helpful operations of winter rot the weaker living material down to promote the survival of the fittest: and as the sun energy comes into spring, swarms of organisms begin to stir about and take away the *débris*, and, with the increasing heat, broods of active creatures further put the living plasma of plants and animal life to the severest test—all to engender by increasing power. It is thus traceable that nutrition is a struggle of opposites, that the world's progress is secured by the loving law of necessity; for in that is obedience to the God of power—such is ease. And it is this circulating

power working to make clear definite ends, which executes and performs the functions that make structures. The proof of that is the fact that when circulation ceases there is no function, and the forms disintegrate to the formless again. And disease is due to the natural circulation being interfered with, and so the accumulations collect that are more deadly than the taking organic form with living death.

We have remarked that the circulation is maintained by the great respiratory power working through our natures to things of the earth, making all one.

And we may pertinently inquire if there be not the same necessity in human nature, as in animal and vegetable nature, to contend and look alive, and in so doing, by the aid of contact and contention, the energies of the vegetable and animal world be transmitted whilst we naturally transmit to them—they pulling us down whilst we pull them up—the justice of even-handed proceeding, all handsome in doing. Again, the ease—such, it seems to my thought, may be the great use even of 'germs and bacilli' in us, and how it is we cannot escape in healthy proceeding contact with rot and other contention.

And there is the risk, it would seem, of any of us ignoring our animal and vegetative functions, revealing how conventional restricted views, with their ungenerous, unkind, limited notions, bring about madness and disease, interfering and leading us to ignore the constructive powers until the destructive have too much of their way, and at last the lowest take our remains.

So too much indoor proceedings, too much flattering unction, with its wearing and killing mistrust, taking, but giving little or no energy in return. But whatever may be thought, it cannot be denied 'that all things are beautiful and decent in the true return of their seasons.'

Here, gentlemen, I must begin to cease. I am tempted to say as Raleigh said, 'Fain would I climb, but that I fear to fall.' Climb more into the consideration of disease, but the time allotted me forbids. The beautiful but mysterious mistress—Nature—ever engendering progress, warns me that I cannot now do it boldly, so I had better not do it at all. The more I do court Nature, the more I see that it is meant that we should know; the more I see that it is given to every one of us to know; but to reach that we must believe in her ways—to believe in what is in us, to believe that whatever theories may be put upon us, that whatever explanations they may saddle us with, and whatever discouragements, there is a marvellous order and power for knowing working in us all. I often feel that I should like to take the students, and myself included, and sit upon the earth naked, to know—to feel with the great mind knowing and making all things to go the way to get our senses free into Nature's widespread operations, and to enable us to be a unity with the One. And I am the more vexatiously urged to do so by noticing that policy has not a happy life. It is the oneness that we have always to keep in view; it is everywhere before us—the sands of the sea are millions of ones, the plants in their growing, the birds in their singing, the children wending their way on the other side of the shore. The accountant casting up his rows of figures inculcates that he is lost if he loses sight of the unit—that all his figures are units united. With us, if tubercle, or suppuration, or fever mars structures until, by their differences, they become abnormal and separate, we have to lead them back to evenness again, to make unity again, by easy working—ease being the smoothness of energy.

Ideas hinder that, for they are too hard and fast, too much form without energy—they are abstract. When the

human mind was endeavouring to come out of the darkness of the middle ages, away from abstractions and disease, and to become more capable—when human thought struggled to get free from clogs and enter the Reformation—there was an intense craving and want for some other guidance than mere ideas and tradition—they longed to be more men who could sail o'er the sea and could live with the elements, and wander more usefully and powerfully over the earth. Following that upheaval came Locke's 'Essay on the Human Understanding,' where he taught, on old lines, that human creatures learnt to know by the use of their senses. In so doing, he further opened the way to get a basis of fact for the outer world's co-operations with the mind; he made exact science more attainable, and showed how truth—how the things that are—could be demonstrated.

But the teacher from whom the modern undulatory theory of heat and other energies was taken perceived that we must seek further, or be lost. Descartes asked, 'How is it that I know by my senses?' Answered: 'Because human nature is endowed with a thinking power;' and the proof to his mind of God was the fact that he could think so. The proof was in the possibility, and possession in thinking. The Almighty working and making of everything, mind in everything. The stability is in the continued making of all things: the ordering and the firmness of the firmament, and the solidity of solids; certainty in all things, because changing to order, indestructibility. And, as Spinoza said, there is but one substance—that is, God; the unity of everything; the oneness in human and all other things, from the Eternal One; the Almighty energising, giving ease to all nature, and eternal rest by the freedom in progress.

So, by the nature of things, we may recognise ease as health, and its sweetness in feeling as happiness; and as pathologists we have endeavoured to trace how it is lost and human nature diseased. No course short of that could enable us as medical practitioners to afford the required relief—to help the patient to recover health again.

The world at large demonstrates that as things are happening, they are happening for the best ends; making the most; feeding the largest number; progressing ever: and in that happy state of things is a renewing, reconstituting, healing, healthy power—the vis medicatrix naturæ. But it must be seen. Providence is not fatalism; it is intelligence—seeing detail by detail. Singlemindedness is clearmindedness.

But, again, to secure that, we must keep the unity. Therefore it is well to remember what those taught who have taught us to devote ourselves to the one God. 'Bless God for the good as well as the evil. There is but One' (TALMUD).

But to do that we must, to the utmost, endeavour to do our best, and take it all as it comes: the renewing, healing, circulating; to avoid useless regrets and vain anticipations; to rest in our feelings; to be present in the timed operations of things;—so endeavour to promote the interests of our individual patients, recognising that every individual must rest according to his own temperament, and knowing that the welfare of society is dependent on the well-doing of its individual members. But daily its members are tempted off by passing appearances; illuded, bewitched away, they cannot hold their own natural course enough; so the required progress and ease are hindered and lost—hampered by narrow views, little thoughts and ideas, and by too restricted impressions—until poor self has a hard time of it. Miserable

in its loneliness; nowhere sufficiently understood, because led off to be too superficial; sensuous, because not feeling enough its way to perceive, to reason, and so to know how to go for happiness—it may be expedient, convenient, and conventional, but adapted for what interests?

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THE END.

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