but almost every form that is to be found in the animal and vegetable world. A preference is, however, generally evinced for such objects as are more particularly gratifying to the senses of sight and taste. There is no dependence to be placed upon such testimony. In the larger proportion of the cases included in the statistical table, no cause whatever could be assigned by the parents.

Persons who are afflicted with this deformity possess no available motion in the ankle-joint, which, so far as the exercise of it is concerned, is perfectly useless, the limb in walking being kept stiff from the knee downwards, the anterior superior surface or dorsum of the foot looking directly forwards, the sole backwards, and the inner edge presented upwards, the outer and upper edge being the part trodden upon (Figs. 8, 9). When both feet are affected, the anterior portion of the one foot overlaps that of the other on each step taken, the deformity being more striking in appearance in these cases than in any that we are called upon to treat, as there is no possibility of disguising it. This was the deformity with which Lord Byron was afflicted, and it was, as is well known, a perpetual source of severe irritation to him. Some go so far as to attribute to this cause the blots which marred the character of that gifted man. It is certain that the poorest suffer mentally from the presence of deformity, and will make any sacrifice to obtain relief.

Upon the dorsum of the foot, the part subjected to pressure, a cushion is formed of condensed cellular tissue, which protects the bones from injury, and enables the patient to get about with tolerable comfort. In some cases, however, great pain and irritation are occasioned in walking, which compel many of these patients to follow sedentary occupations, such as those of a tailor, shoemaker, etc. Occasionally, this cushion ulcerates out completely, from inflammation set up by the irritation caused in walking, after which all exercise is attended with severe suffering, from the absence of all protection to the bones. A medical gentleman, aged 32, afflicted with this deformity in its most severe form, was prevented from following his duties by this accident, which induced him to submit to the operation.

As a rule, this deformity is unattended with malformation. I have, however, seen some cases in which there was no muscle in the front part of the leg below the knee, a condition which is generally accompanied by contraction and malformation of the knee-joints. This state is indicated by a total absence of any definite outline, the toes falling in a somewhat contracted position, the foot and toes, in front, presenting a perfectly smooth appearance. So marked is this appearance, that it is immediately recognised after having been once observed.

In some instances of congenital varus, the ligaments of the knee-joint are found to admit of a slight rotatory motion of the tibia upon the femur, so that after the foot is cured, rotation inwards takes place, and unless attention is called to this circumstance, the cure will be questioned; for although the foot may be perfectly flat upon the ground, and allow of flexion to the full extent, yet upon walking the toes will be directed inwards. In delicate children, the deformity, if confined to one leg or foot, occasions an irregularity in walking, which at times gives rise to lateral curvature of the spine, from the undue motion which is kept up in the spinal column, through the lameness of one extremity. This does not apply to cases in which both feet are affected, as in those instances there is no motion which is not common to both sets of muscles. This deformity is met with in every amount of severity, in the infant as well as in the youth and adult. In the infant, the greater severity is owing to slight displacement of the bones, occasionally met with, which gives the foot almost an appearance of compression. In the older patient, there is always contraction of the ligaments, and not unfrequently of the plantar fascia, as I have mentioned. This state, however, differs materially, even in adult cases. For instance, some feet, upon examination, will appear as immovable as a mass of bone, whilst others, in patients of the same age, and with the same amount of deformity, possess a considerable amount of motion. Occasionally, in infants, you will find that with but little force, the foot can be brought into its proper relative position, and even in severe infantile cases a great improvement in appearance can at all times be produced by the hand alone. The foot, however, when released, returns with an elastic impulse to the malposition. This is not the result of spasm, but a return of the muscle to the contracted state after having been forcibly drawn out. It differs from spasmodic action in this, that the foot always returns immediately to the malposition, whereas in the spasmodic action, as we see in non-congenital cases, the foot will be

retained for some short time in the position into which it has been forced. There is also this important difference, that after the removal of the deformity, in congenital varus, the patient possesses perfect voluntary control over the muscles, whilst in the spasmodic cases, the same irregular muscular action continues, and is not to be controlled by the efforts of the will.

[To be continued.]

A Course of Lectures ON URINE, URINARY DEPOSITS, AND CALCULI.

DELIVERED AT THE PATHOLOGICAL LABORATORY,
DURING THE SESSION 1857-58.

BY
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LECTURE VI.

THE ANATOMY OF THE KIDNEY. ITS ACTION IN HEALTH AND DISEASE. *Cortical and Medullary Portions of the Kidney. Pelvis. Mammilla. Infundibula and Calyces. Artery. Vein. Nerves. Lymphatics. Secreting Apparatus. The Uriniferous Tube. Of the Circulation in the Kidney. Epithelium. Of the Basement Membrane of the Tubes and of the so-called Matrix. On some Points connected with the Physiology of the Kidney.* ON THE FORMATION OF CASTS OF THE URINIFEROUS TUBES. *Of the Cast. Circumstances under which the Renal Secretion may be altered in Quantity or Quality. On the Absorption of Substances from the Stomach, and their Excretion in the Urine.* MORBID CHANGES AFFECTING THE STRUCTURE OF THE KIDNEY. *Of Bright's Disease. Dr. Johnson's Investigations.*

[Concluded from page 557.]

Circumstances under which the Urine may be altered in Quantity or Quality. In the remarks I am about to make, I shall consider it as proved that the solid constituents of the urine are separated by the cells lining the uriniferous tubes, while the water filters through the walls of the capillaries of the Malpighian body. Albumen and extractives may escape from the latter capillaries, and also from those surrounding the tubes. The material of which casts are formed probably enters through the walls of the tube, but it may also pass into the tube from the Malpighian body. Diuretics may act in two ways—1. By causing increased transudation of fluid from the Malpighian tuft, in which case pale urine, containing very little solid matter, will escape in considerable quantity; 2. By stimulating the cells to separate from the blood a larger amount of solid material, in which case a highly concentrated urine, rich in solid matter, will be secreted in greater proportion than in health. If the action of the cells be interfered with in any way, congestion of the capillaries around the tubes will occur; hence those of the Malpighian body will be distended, and albumen will probably pass into the tubes. In certain diseases, there seems to be a tendency on the part of the kidneys to throw off morbid material which exists in the blood. If, under these circumstances, the flow of blood to the kidneys is not compensated for by rapid removal of these matters, congestion, perhaps running on to inflammation, occurs, and there is danger of serious damage to the organ.

It is in this manner that the albuminuria following scarlatina, and that coming on from exposure to cold, are to be explained. This subject has received full consideration from Dr. Johnson, in his work *On Diseases of the Kidney*, and also in that *On Cholera*. The action of many irritating diuretics is to be explained in a similar manner. A quantity of cantharides, which would do no harm to a strong healthy man with sound kidneys, would produce dangerous congestion and inflammation, with rupture of the capillaries of the Malpighian body, in a person who was recovering from an illness, or in one whose kidneys were affected by disease. In the one case, the secreting power of the cells appears increased by the action of the drug; while in the other they are incapable of effecting

the increased amount of work suddenly thrown upon them, and the results above described must occur. Kramer and Golding Bird state that squill, copaiba, broom, juniper, and guaiacum, cause the removal of an increased proportion of water from the blood, but do not influence the quantity of solid matter removed from the body in twenty-four hours. It seems probable that these remedies affect the capillaries of the Malpighian tuft, either directly, or through their action upon the nerves distributed to the renal vessels.

In cases where the blood is very watery, the excess of fluid is carried off by the kidneys; but, at the same time, a greater amount of solid matter is removed in a given time, partly arising from the tissues being washed out by the large quantity of fluid, and partly because the formation of urea, etc., is favoured by a dilute state of the fluids.

Many neutral salts (nitrates, sulphates, etc.) seem to increase the secretion of urine by being attracted from the blood in a state of solution, in all probability by the renal epithelium, the kidney being the channel by which they naturally leave the system. Urea has a similar diuretic action. Within certain limits, the greater the quantity of these substances in the blood, the more will be removed by the renal epithelium, supposing this to be healthy. The more strongly the epithelial cells be charged with urinary constituents, the greater the quantity of water required to dissolve them out. This seems to be effected as follows:—When the urinary constituents are not removed from the cells by the water coming down from the tuft as fast as they are separated from the blood, they must accumulate until the surcharged cell ceases to exert that attractive force upon the blood in the capillaries around the tube which it does ordinarily. The tendency to stasis in the circulation thus caused necessarily interferes with the free passage of the blood through the Malpighian capillaries, and the increased pressure which results causes the escape of fluid into the tube, which washes out the solid matter accumulated in the cells. The latter resume their action, the circulation becomes free again, and the normal relation between the action of the cells of the tube and the Malpighian body is reestablished.

Now alkalies, and especially the citrates, tartrates, and acetates, which become converted into carbonates in the system, increase not only the quantity of water removed from the system, but also materially augment the proportion of solid matter. These salts increase the quantity of urea and other matters formed. They seem to favour the conversion of the products resulting from the disintegration of tissue into these constituents. The action of such remedies is very desirable in a vast number of cases; and where the kidneys are healthy, they invariably act favourably. The renal epithelium is intimately concerned in the separation of the carbonates formed from these salts in the system, and the urinary constituents whose formation has been promoted by their presence.

A certain degree of dilution is necessary to ensure the diuretic action of many neutral salts. If the density of the solution be very great, exosmosis of fluid from the blood will take place; and certain salts may be made to act as purgatives or diuretics, according as they are diluted with a small or with a large quantity of water. The observations of Dr. Headland, however, show that this physical explanation cannot be applied in all cases. That sulphate of magnesia is absorbed, at least in the majority of instances, there can be no doubt. It is often excreted in large quantity in the urine; and it is probable, as Dr. Headland suggests, that its purgative action is due to its removal, in the form of a weak solution, from the blood by the action of the intestinal mucous membrane.

The excretion of urine will also be materially affected by all those circumstances which influence the circulation in the kidney. The compensating action existing between the cutaneous secretory surface and the kidneys has been already alluded to. Pressure on the renal arteries, or on the aorta above their origin, will diminish the secretion of urine. Pressure on the veins, on the other hand, will first of all cause an increased flow of urine, and afterwards albumen will escape. In congestion of the liver and portal system, the amount of solids is greatly increased. It would appear that in many cases, where the action of the liver is imperfect, and especially in some forms of organic disease, the kidneys to some extent perform the functions of the liver. In jaundice, both colouring matter and biliary acids are carried off in the urine. In this case, however, it must be borne in mind that these biliary constituents are formed by the liver reabsorbed into the blood, and separated from it, as are many other substances abnormally present by the kidney. In many affections of the liver, the

urine-pigment is much increased; and it is probable that a certain proportion of material which, in a state of health, would have been converted into bile, is transformed into certain extractive matter and other substances, and eliminated in the urine. The crisis of many acute diseases is characterised by the presence of a large quantity of solid matter in the urine, and increased action of the kidney. Free sweating, and the secretion of a urine containing a large amount of urea and urates, in the course of many diseases, are often the earliest and most important indications of approaching convalescence. Dr. Golding Bird showed that abatement in the severity of the symptoms of ague was always associated with an increase in the amount of solid matter in the urine. Now, in all these cases, it is obvious that the activity of the secreting power of the renal epithelium is increased, and that the separation of urinary constituents from the blood cannot be regarded as a mere percolation, but dependent upon a vital property of the cells; while an alteration in the proportion of the water is rather to be attributed to altered states of the calibre of the arteries which supply the Malpighian bodies, and to the variable pressure exerted by the blood as it traverses the Malpighian capillaries, depending to some extent upon the freedom with which it passes onwards into the capillary system, among the meshes of which the tubes lie.

On the Absorption of Substances at the Stomach, and their Excretion in the Urine. The rapidity with which weak solutions are absorbed from the digestive organs, and secreted by the kidney, is marvellous. In Mr. Erichsen's well known experiments, it was shown that ferrocyanide of potassium could be detected in the urine within a minute after it had entered the empty stomach. These interesting conclusions were derived from experiments made on a case in which, from the deficiency of the anterior wall of the bladder and abdomen, the orifice of the ureters could be seen, and the urine collected as it trickled from them. A German suffering from this terrible malformation was in London two years ago, and I think many of you had an opportunity of seeing him, and observing how very soon after a large quantity of water had been swallowed, the rate of the flow of urine from the ureters increased.

Anything interfering with the absorption of fluid from the stomach or intestinal canal will necessarily affect the secretion of urine. In various cases where the contents of the alimentary canal are in a condition unfavourable for absorption, but a very small quantity of urine is formed. Dr. Barlow has gone so far as to say that the seat of an obstruction in the intestine can be ascertained by noticing the quantity of water excreted in the form of urine. When close to the pylorus, it is stated that scarcely any urine is separated. In ordinary cases of what is known as sick headache, where, from temporary stomach derangement, little absorption occurs for some hours, no urine is secreted perhaps for twelve hours or longer. The termination of the attack is marked by the very free and rapid action of the kidneys.

Morbid Changes affecting the Structure of the Kidney. In cases where the blood which passes through the kidney is unhealthy, and especially when it is loaded with noxious matter, as takes place in the majority of cases of long continued beer or spirit drinking, the secreting power of the renal cells is gradually impaired. They lose their healthy appearance, and become much shrivelled, and at last suffer disintegration; while, in consequence of the germs having been destroyed at an early period of growth, their place is not occupied by a new generation. A complicated series of morbid changes in other structures of the kidney gradually ensues; and, in consequence of the blood being rendered still more depraved by the accumulation in it of matters which ought to be removed by the kidney, other organs are gradually involved.

In the kidney, it will be observed that the coats of the smaller arteries become much thickened, the capillaries shrink, while their walls become thicker and often granular. The quantity of blood distributed to the organ diminishes; and many of the capillaries, being no longer required, shrink and cease to transmit blood. The diameter of the secreting tubes decreases, while the basement membrane is thickened and more impervious. The whole organ becomes hard, and at the same time small and shrunken. This decrease in size takes place principally at the expense of the cortical or secreting portion of the kidney, as would be supposed. Such serious changes in the structure of an organ so important as the kidney necessarily affect the system generally, but these we must not now stop to consider. The Malpighian bodies also waste. The remains of many may be seen without a capillary in them being pervious; and not a few of those which still exist are found to be so

altered that they can hardly be recognised as Malpighian bodies at all. The greater part of the blood sent to the kidney passes into the pyramids by the *vasa recta*, and soon reenters the veins, a small quantity being distributed to those tubes and Malpighian bodies nearest the pyramids. The diminished amount of urea, etc., present in the urine, is probably separated in this latter situation; while a certain quantity of water, with a little albumen and the material of which the casts are formed, also escape in this situation, as well as from the straight part of the tubes.

Long before the disease has arrived at this stage, the urine will be found to contain a very small amount of solid matter, which consists principally of salts and extractives, with a very little urea.

By many pathologists these changes are explained by the effusion of inflammatory lymph, and subsequent thickening, condensation, and contraction of the so-called *matrix*; but it seems to me that all the appearances observed may be much more simply accounted for on the view that they depend upon depraved nutrition and wasting, than by resorting to the hypothesis of the inflammation of a structure whose existence has not been satisfactorily demonstrated, and which, if it does exist, according to its warmest advocates, only serves as a supporting tissue to the more essential elements of the gland-structure. It is very hard to see why such a tissue, which takes no active part in the changes going on in the gland, should be the starting-point of all the serious morbid alterations which occur. The idea, I believe, has arisen from a supposed analogy between cirrhosis of the liver and the so-called chronic inflammatory disease of the kidney. Cirrhosis was considered to depend upon inflammation, thickening, and subsequent contraction of another supporting fibrous tissue (Glisson's capsule), which was supposed to surround the lobules of the liver, and by its contraction to press upon the vessels ("On Cirrhosis of the Liver," *Archives of Medicine*, vol. i, p. 118). For the origin of these morbid changes, we must look to the altered actions going on in the secreting structure, and not to inflammations of tissues of doubtful existence, which take no part in the nutritive operations or gland-functions. The conclusions to which I have arrived from my own observations, with reference to the nature of the so-called *matrix* in the healthy kidney, and the changes taking place in disease, are at variance with those usually entertained both in this country and on the continent. The discussion of this question involves the whole subject of areolar tissue and its corpuscles, and I therefore propose to defer it until this has been fully entered into in another place. For an admirable statement of the opinions generally held, with many original observations, I must refer you to a work by Arnold Beer, just published in Berlin (*Die Binde-Substanz der Menschlichen Niere*). The drawings accompanying this work appear to me rather rough. The engraver perhaps has misinterpreted some of the author's representations.

In other cases, the epithelium undergoes a very peculiar change, to which much attention has been given of late years. Fatty matter accumulates in the cells of the uriniferous tubes. The intertubular capillaries and those of the Malpighian bodies are also affected in a similar manner, and little collections of minute oil-globules may often be seen at intervals in their walls. This change often commences in a few of the tubes, and gradually extends until the whole organ is affected. The kidney is in many instances much enlarged, while its colour has become very pale. Fatty degeneration, in many instances, is not confined to a single tissue or organ, but almost every part of the body is more or less involved.

Bright's Disease. This term has been applied to all morbid conditions of the kidney associated with albuminous urine. Of late years many important characters have been made out, by which we are enabled to distinguish several diseases of the kidney essentially different from each other—different in their origin, in their progress, and often in the results to which they lead. Dr. Johnson has accurately described several of these morbid changes, and his researches have been confirmed by other pathologists. However, some physicians still insist that the different conditions above alluded to are merely different stages of one and the same morbid process. Let me ask you to examine carefully the small contracted kidney so commonly found in the bodies of old drunkards, with its rough puckered surface and diminished cortical portion, and contrast it with the large, smooth, and pale kidney, in a state of fatty degeneration, which is not unfrequently met with in young people not more than twenty years of age. The causes of these diseases are different; the conditions under which they occur are different; and, although the result is fatal in both, death occurs

in a very different way. Their chemical characters are different; their microscopical characters indicate the occurrence of changes which are totally distinct. Again, the treatment required in the early stages of these diseases, when alone any benefit is likely to be derived from treatment, is different.

The divisions and nomenclature adopted by Dr. Johnson are the following: *Acute desquamative nephritis*; *Chronic desquamative nephritis*; *Waxy degeneration of the kidney*; *Non-desquamative disease of the kidney*; *Fatty degeneration of the kidney*; *Suppurative nephritis*. Dr. Johnson still supports the same classification, and opposes the theory held by some pathologists with reference to the *oneness* of Bright's disease. He has recently written a paper on this subject, which will be found in vol. xlii of the *Medico-Chirurgical Transactions*. Dr. Johnson says, with regard to the oft debated question if large kidneys, at a subsequent stage of the morbid changes, contract, "The rule is, that a large Bright's kidney remains large to the end, and does not become a small one; and, on the other hand, a contracted Bright's kidney does not pass through a previous stage of enlargement."

We come now to the consideration of the nature of the various substances found in an insoluble condition in various morbid specimens of urine. Under this head I shall include insoluble substances floating upon the surface or suspended through the fluid, and those which, from their tendency to subside after the urine has been allowed to stand for some time, are properly termed *urinary deposits*. In the next lecture, I shall describe the methods of collecting and preserving urinary deposits, and draw your attention to the nature of various substances of extraneous origin which are often accidentally present in urine, and are not always easily recognised, leading thereby to great confusion; and in some instances, the observer, ignorant of their characters, has fallen into the most ridiculous mistakes.

Original Communications.

SCROFULOUS DISEASES OF THE EXTERNAL LYMPHATIC GLANDS:

THEIR NATURE, VARIETY, AND TREATMENT.

By P. C. PRICE, Esq., Surgeon to the Great Northern Hospital; the Metropolitan Infirmary for Scrofulous Children at Margate; etc.

I.—INFLAMMATORY CONDITIONS OF THE EXTERNAL LYMPHATIC GLANDS IN SCROFULOUS SUBJECTS.

[Continued from page 560.]

General Treatment of Acute Inflammation. Active inflammatory lesions of the absorbent system in scrofulous subjects are, as a rule, attended with more or less general constitutional disturbance, whether occurring in infants, in young children, or in adults.

As already stated, the tongue becomes furred, the pulse quick, the bowels costive, the urine scanty and high coloured; to which are added restlessness, loss of appetite, irritation, and pain. It may be that, a few days before the actual detection of any derangement of the absorbent glands, the patient becomes restless, and refuses food; but it is not till the appearance of any marked cause of irritation that the general symptoms create much attention. The derangements, which now become more or less prominent signs of local mischief, are to be encountered in such a way that, while the pressing symptoms are combated, the constitutional powers, which in scrofulous individuals susceptible to attacks of adenitis are often feeble, are not materially lowered. When the patient is of tender years, and it is suspected that the inflammatory lesion arises from a direct cause, and the irritative fever is strongly marked, the following treatment is the one I usually adopt in hospital as well as in private practice. The bowels should be first acted on by means of small doses of hydrargyrum cum creta, combined with a few grains of compound rhubarb powder, administered every or every other night, at bedtime; while small and frequent doses of liquor ammoniæ acetatis and spiritus ætheris nitrici, combined with some bitter infusion, will tend to procure moisture of the skin, and allay the increased heat of the body. Should the pain and distress be severe, and lead to restlessness