A practical treatise on diabetes : with observations on the tabes diuretica, or urinary consumption especially as it occurs in children : and on urinary fluxes in general : with an appendix of dissections and cases illustrative of a successful mode of treatment : and a postscript of practical directions for examining the urine in these diseases / by Robert Venables.

A

PRACTICAL TREATISE

ON

DIABETES,

ETC. ETC. ETC.

LONDON:
PRINTED BY J. MOYES, BOUVERIE STREET.

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ESPECIALLY AS IT OCCURS IN CHILDREN;

AND ON

URINARY FLUXES IN GENERAL.

WITH AN

APPENDIX

OF

DISSECTIONS AND CASES,

ILLUSTRATIVE OF

A SUCCESSFUL MODE OF TREATMENT:

AND A POSTSCRIPT OF

PRACTICAL DIRECTIONS

FOR EXAMINING THE URINE IN THESE DISEASES.

Ει δε πολλακις ουρεοι, η τι του των προσγινοιτο, δεινον.—*Hippocrat.*

By ROBERT VENABLES, M.B.
PHYSICIAN TO THE HENLEY DISPENSARY, &c. &c. &c.

LONDON:
PRINTED FOR THOMAS AND GEORGE UNDERWOOD,
32, FLEET STREET.
1825.

1576

TO

JOHN KIDD, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, REGIUS PROFESSOR OF PHYSIC IN THE UNIVERSITY OF OXFORD, AND ONE OF THE PHYSICIANS TO THE OXFORD INFIRMARY,

ETC. ETC. ETC.

MY DEAR SIR,

I have anxiously awaited an opportunity of presenting you with a public testimony of my respect; and if I have hitherto delayed the satisfaction which I feel in requesting your acceptance of the present performance, believe me, it has not arisen from any insensibility to your professional merits, or your private worth:—

I was fearful, however, had I deferred my acknowledgments till I could have offered you something worthy your attention, I should never have enjoyed the pleasure of subscribing myself,

MY DEAR SIR,

With every sentiment of respect and esteem,

Your very faithful and obliged Friend,

ROBERT VENABLES.

Henley-upon-Thames,
18th May, 1825.

PREFACE.

THE reader will readily perceive that I have presented him with a practical, rather than a literary history of Diabetes. Under these circumstances, of course he is naturally disposed to ask, have I any thing new to introduce, to compensate for the trouble of reading my book? I answer, that I have presented him with two facts in the history of Diabetes* which are certainly worthy of attention: First,

* Dr. Prout proposes to limit the signification of the term "Diabetes" to a saccharine condition of the urine. I think it would prove a useful limitation. Upon these

that an excessive discharge of urine is frequently a cause of Tabes in children: Secondly, that phosphate of iron proves, when properly administered, almost as certain an astringent upon the excessive action of the kidneys, as opium upon that of the alimentary canal. These are facts which I have ascertained; and that the reader may judge for himself, I have subjoined the clinical history of several cases in an Appendix.

In reasoning upon the nature and causes* of Diabetes, I have supported views of its

principles, "Diuresis" would form the genus, of which Diabetes would be a species. The genus, of course, would admit of divisions and subdivisions into species and varieties.

* In enumerating the causes, I have not adverted to irritations of the urethra, which may extend to the kidneys, and thus bring on diabetes.

pathology, which differ very much from those maintained by some eminent professional characters.* The conclusions which I have drawn, I have inferred and adopted from reasoning and experience. What proof have we, that the stomach, as Dr. Rollo maintains, separates the sugar of vegetables, and discharges it by the kidneys? All our organs have specific functions, and different effects consequently result. The mammæ secrete milk and sugar, no matter what the diet of the animal; and will any one assert that this can be prevented by a diet of animal food, or by any other form of diet which we can substitute? The elementary constituents exist in almost every form of diet upon which an animal can subsist, and the different organs

* Pemberton, Rollo, &c.

will mould and combine them according to their state of health or disease.

We find some parts bony, some fibrous, some medullary; and, as far as we know, these are all secreted from the same blood by the peculiar action of the vessels. Surely, then, we need not look to the sugar of vegetable matter separated by the stomach, to account for the saccharine properties of diabetic urine. The morbid action of the kidneys is quite sufficient to account for the fact, and it is certainly infinitely more rational, and far more consistent with the doctrines of physiology, to attribute the evolution of sugar in the urine to a wrong or perverted action of these glands. The right understanding of this subject is a matter of more consequence than may at first sight appear.

I have not attempted any sub-division of diabetes. The division of a subject should always be attended with some advantages, to compensate us for the multiplicity and variety with which our attention may be thus distracted. I have not, I confess, sufficient experience in the history of diabetes to detect the advantages of such distinctions as authorise the division into the insipid and the mellitic forms, nor of the first into the insipid and serous.* I know not upon what peculiarity of mechanism or of function, these varieties depend; nor am I capable of pointing out any essential difference in the treatment of either kind. The diabetes in the adult, and in the patient of more tender age, as far as I am acquainted, arise from similar

* Should such cases be considered as cases of true or genuine diabetes?

causes, and their modes of treatment are similar; and, therefore, no division upon these grounds seemed admissible. It is questionable with me, if diabetes be not a simple disease, incapable of division; the varieties which have been noted being the consequence of its progress, rather than of any specific difference of character.

I have in the Appendix collected some of the most interesting cases which have occurred to me. These I have subjoined, that the reader may judge for himself, from the same facts from which I have drawn my conclusions. If he thinks to find a specific in the phosphate of iron, he will be much disappointed. This he may infer from the clinical part of the work. Other means will be necessary to insure the efficacy of the remedy;

and if, under judicious management, it should prove more efficacious, (though it should frequently fail,) than those usually employed in this complaint, it will fully answer my expectations, and I presume will justify me for submitting these views to the Profession.

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PRACTICAL TREATISE,

ETC. ETC.

THERE is a cause of emaciation among children, which has hitherto attracted but little of the attention of the Profession. I have often observed children to all appearance very healthy up to a certain period, when suddenly the constitution changes, the child emaciates, its health declines, and, without any obvious derangement sufficient to account for the gradual depravation of health, at last dies a most miserable object. In such cases, the head, chest, and abdomen, present no morbid appearances sufficient to account for the wasting and gradual decline of health. Accident led me to a discovery of the real seat of disease in such cases; and when the history of the complaint has been submitted to the reader, he will not be surprised that its nature and seat should have so long escaped general observation.

Several cases of wasting having presented themselves to me, in which I was unable to detect any serious or permanent derangement of function —vital or animal,— I was at a considerable loss to account for the phenomena, as well as to direct the treatment. Occasionally the bowels were out of order, but their healthy functions were readily restored, without, however, any sensible effect upon the progress or severity of the disease. Sometimes dyspnœa attended, but evidently of a nervous nature; for the means which were applicable to the primary or secondary diseases of the head, speedily subdued this symptom, when those directly applicable to pulmonary affections proved, when not injurious, wholly useless.* The head often seems to be the seat of disease, if we were to judge from the dull comatose state of the patient; but yet, upon dissection, the brain in many instances presented no diseased appearance whatever. In other cases, a partial

* I have often seen a nervous dyspnœa mistaken for an idiopathic pulmonary disorder, and children subjected to the irritation of blisters, paregoric, &c. without the slightest benefit. A purge, in such cases, will frequently relieve: or a few leeches to the head, with a proper regulation of the alimentary functions, will effect more in subduing this distressing and frightful symptom, than ounces of paregoric, which is so frequently and so injuriously administered.

but slight degree of vascularity has been observable, by no means, however, sufficient to account for the gradual, but commonly fatal, progress of the disease. From the tumid prominent abdomen, which generally, though not universally, prevails under these circumstances, we are naturally led to anticipate traces of disease in the alimentary tube, or some of the digestive organs. But dissection proves that our speculations are unfounded, for with the exception of flatus, which would of course account for the abdominal swelling, I have not been able to discover any other morbid appearances in these organs. When flatus has not been discovered, some slight thickening of the coats of the intestines may be observed, but in no way sufficient to account for the general symptoms.

Here then the three most usual seats of disease in children seem to be healthy in their structure and functions, and yet symptoms, such as commonly arise in disease of those parts, prevail in their utmost extent and severity. I am far from asserting that disease of the head, chest, or abdomen, never prevails in the cases which I have in view, because I have found the contrary to be in many instances the fact. But the secondary or consecutive nature of these morbid conditions is with me no longer a matter of doubt.

When we find a certain morbid condition associated with certain symptoms of disease, we regard the relation of cause and effect as established. If we discover a morbid condition of two separate organs, attended with certain symptoms, we must regard these as the joint effect of the two morbid states, or we must consider one as a consecutive effect of the other. In determining the nature of such ambiguous cases, we must endeavour, by frequent examination and patient deliberation upon the phenomena, to arrive at a correct conclusion. For example, if we find two orders of functions disturbed, they are so either separately and independently of each other, or the one is the consequence of the other. If they be independent of each other, we shall find those morbid conditions which attend a derangement of function occasionally present, and occasionally absent; and we shall also find that the progress of each disease is independent one of the other, and that the advance of each may be interrupted or arrested by means suited peculiarly to its own treatment. If they be dependent one on the other, then the disease is of a complex nature, and is no longer manageable, unless by means adapted to the complexity of its character. Thus many diseases are secondary to indigestion, and such diseases should be re-

garded as of a complex character, and requiring a complicated mode of treatment. In such cases, the means adapted to indigestion simply, will often prove injurious, generally unsuccessful; the means adapted to similar primary affections of the organ secondarily diseased, are no longer applicable. Neither will a union of the means adapted to each effect our purpose; the complex character of the complaint will require a certain modification of the different means of cure, to adapt them to the peculiar nature of the disease; and these circumstances will be found to call forth the utmost efforts of the judgment and reasoning of the physician, to enable him successfully to combat and arrest the progress of such diseases.

Every one will acknowledge the unmanageable nature of dyspeptic diseases. Perhaps an attention to the principles just laid down, would bring these complaints more under the control of medical treatment. Many have treated these diseases as cases of indigestion simply, others again resort to the means adapted to the primary affections of a similar description; while others again, acting upon more enlarged views, combine the means adapted to each form of disease. It often happens, that all are unsuccessful; but such cases will commonly yield to a modified combination of

both modes of treatment. The proper adjustment will of course depend upon the general features and circumstances of the case.

In the cases to which I am about to call the attention of the reader, I found the treatment founded upon the principle of correcting those derangements of function which I have noted generally unsuccessful. This affords an additional reason for presuming the disease to be a primary affection, wholly independent of those derangements with which we find it occasionally complicated.

As I have already observed, accident first led me to discover the real nature of the case. Upon one occasion, after making inquiry into the state of the different functions, I was given to understand that each was regularly and healthily performed. The head was free from pain, and the functions of the brain regular; the respiration natural, the bowels free, and the secretions from them healthy. Nothing, as I was told, appeared remarkable in the urine, but it was, after some farther examination, stated, that it was discharged in very great abundance; but this was disregarded as unimportant, because the patient consumed a very inordinate quantity of fluid, to satisfy the constant thirst with which the little sufferer was harassed.

We well know that preternatural excitement of any organ, the functions of which are excretive, rapidly produces emaciation. Thus profuse diarrhœa, perspiration, hæmorrhage, &c. rapidly emaciate the animal body, and every practitioner will allow a similar effect to arise from the more ordinary forms of diabetes. When I had ascertained in the above case, that the wasting was attended with an excessive discharge of urine, I felt little difficulty in determining between cause and effect, nor had I any hesitation in referring those cases of emaciation which I had previously considered as anomalous and unintelligible to this genus. On a minuter morbid examination, I discovered diseased appearances in the kidneys sufficient to account for all the symptoms; and I believe I may venture to assert, that many children have been treated for hydrocephalus, mesenteric affections, rickets, and all the other species of scrofula, who have really fallen victims to this form of disease.

Nor will this be considered matter of surprise, when it is recollected that mothers and nurses consider deceiving the practitioner as a principal means of reducing the severity of infantile disease. Those who have had much practice among children, will readily recollect in how many different ways a mother will endeavour to divert the attention of the practitioner from any important symp-

toms, which, in the severity of examination, she has been forced to acknowledge.* A thousand means of accounting for it will be resorted to, and the more trifling and unimportant, the more eagerly will this be fixed upon by the mother. The urine of children is, generally speaking, so little attended to, either by the mother or the nurse, that the attention of the practitioner is not likely to be directed to its derangements through their means; and I believe I may venture to assert, that it does not often obtain much of the spontaneous attention of the professional attendant.

I have accompanied a great number of gentlemen,—men really diligent and zealous in the pursuit of their profession,—and I cannot bring to my recollection a single instance in which it occurred to any of us to examine the state of the kidneys in children. In adults, these organs are scarcely ever examined, unless symptoms of diabetes, or some nephritic disorder, are known to have been present. I have seen many adults treated for various diseases, who yet laboured under diabetes. The inferior orders of society are so accustomed to drink to excess, that they

* This is by no means mentioned ill-naturedly; on the contrary, I respect the feeling which prompts to deception: but still it is necessary that the practitioner in medicine should be put on his guard.

look upon the increased secretion of urine as the natural relief to their intemperance, and never consider it as a symptom of disease, nor hardly ever, of their own accord, direct the attention of the practitioner to it. Thus, if he should not be led to make inquiry into the state of the urine, he may be readily deceived as to the nature of such cases, and treat his patient for an imaginary disease, while the real one is neglected.

The nature and seat of diabetes is still a matter of controversy among the profession, some considering it as a primary affection of the kidneys themselves, while others again regard the digestive functions as the primary source, and the disease of the kidneys as merely a secondary effect. The obscurity of the disease in its incipient stage, may be considered as in some degree a cause of this confliction of opinion. Diabetes escapes more ordinary observation, till it has made considerable progress; and even then it simulates so many other diseases, that the real character of the complaint is not developed, till its history is either wholly lost, or so confounded in the variety and complexity of symptomatic or secondary affections, that it can no longer be unravelled. Having premised thus much, I shall now proceed to lay the history of this disease, as concisely as the subject will admit, before the reader.

CHAPTER I.

SYMPTOMS.

The disease seldom if ever appears till after the child has been weaned. The reason of this, perhaps, is, that the exciting causes are seldom applied till after this period. A child which has continued healthy up to this time, will perhaps suddenly lose its usual flow of spirits, become dull and inactive, and although no obvious disease may be recognisable, yet the child will not appear in its usual health. It begins after a very little time to waste in flesh, and then gradually continues to emaciate. The skin becomes harsh, dry, and flabby, and seems to hang loosely about the body. The temperature is generally very much elevated, and, in the description of nurses, it will be said that "they burn like a coal of fire."

In the early stages of the disease, the bowels are regular, and little or no deviation from the natural and healthy appearance of the alvine discharges is remarkable. The tongue also at the beginning indicates no symptom of disease, but when it has continued for some time, and produced some degree of fever, then the tongue becomes covered with a coat of mucus. After a

continuance, the bowels begin to act irregularly, the appearance of the evacuations deviating from that of health. Sometimes they are of a greenish hue, at other times they appear natural when passed, but become greenish some time after being voided. In adult cases, constipation very generally attends.

At a more advanced period, the abdomen seems preternaturally full and distended. The abdominal prominence frequently leads to the supposition of mesenteric disease, an opinion which is still farther confirmed by the progress of emaciation. I doubt much if the mercurial purges, which are exhibited under such circumstances, be wholly innocent. I have some reason to suspect that they have done considerable harm.

The pulse from the first is generally accelerated, and has a hard, wiry feel. Those who are much in the habit of examining the pulse in children, would recognise in the sensation which the pulse at this time gives, an indication of very great irritation in the vascular system.

The most remarkable symptom, however, although it frequently escapes observation, is the inordinate discharge of urine. This discharge increases in quantity so gradually, that it is not usually noticed. By the time it has become more remarkable, great thirst prevails, and hence it is neglected or unnoticed, because the parents

and friends conceive an excessive discharge of urine, and an excessive consumption of fluid, as naturally associated. They entirely overlook the circumstance, that thirst and a very great consumption of fluid often prevail, and frequently with little or no discharge of urine.* But it cannot be too forcibly impressed on the minds of the patient and friends, that the quantity of urine discharged in this complaint bears no regular proportion to the quantity of fluid or other aliment consumed. From fifteen to thirty pints of urine have been known to be discharged in the course of twenty-four hours; and this is a quantity which greatly exceeds the whole of the aliment, both solid and fluid, consumed.†

With respect to the qualities of the urine, they will be found to vary in different cases. In some, the urine appears quite limpid; in others, it appears milky, or like a mixture of chalk and water. Sometimes it is of a pale straw colour; and in a case which is at this moment under my care, I

* I have often found it difficult to obtain a correct account from mothers and nurses. They will say the urine is natural; and if, by insisting to know the actual quantity at which they estimate it, you remark upon its great abundance, they will instantly reply, that it is owing to the great quantity of drink which the child consumes.

† Dr. Prout doubts that the quantity of urine unexceeds the ingesta.

find it is of a green colour. The urine sometimes seems milky, dense, and its specific gravity is much increased. It frequently coagulates by heat, or by the addition of the different reagents. When the quantity of coagulable matter bears any thing like an equal ratio to the watery portion of the urine, and the discharge is much increased, the emaciation under such circumstances proceeds rapidly and extensively.

The urine of diabetic patients seems to be sometimes tinged with blood, mucus, or with pus. This, I believe, always arises from some serious disease either of the bladder or kidneys.* The nature of these deviations will be readily understood, when we have considered the morbid anatomy of diabetes.

There is another remarkable circumstance attending the urine of diabetic patients, namely, its holding in solution a large proportion of saccharine matter. The proportion which may be evolved from the urine, varies in different instances, but the quantity is not a matter of any practical importance.

Some have supposed that diabetes admits of a division into the insipid and mellitic, but it may admit of some doubt whether such a distinction

* To discriminate the source of these fluxes, see Prout on Calcareous Disorders.

be well founded. Sugar may be detected in the urine of most diabetic patients who have laboured under the disease for any considerable time. At what period of its progress the urine begins to be sensibly sweet, it is not easy to determine; but I have not met with cases in which the urine did not become saccharine, if the disease had continued for any great length of time. Cases, however, of an opposite description, are reported by others, but I have not met with them.

The quantity of urine discharged varies in different cases. I remember a case which occurred in my own practice, in which the discharge in twenty-four hours was, by admeasurement, twelve quarts one pint; and this excessive discharge continued for eight successive weeks. However, from ten to twelve pints may be regarded as the average extent in adults, and about four or five in children.

As the duration of the disease is prolonged, other symptoms, proportioned in some degree to its severity, set in. Frequently the sensorium becomes affected at an advanced stage; hence headach, vertigo, and even temporary delirium, occasionally attend. When a fatal termination takes place, the patient often dies comatose, and sometimes apoplectic.

The organs of sense are frequently so much disturbed, that their functions are perverted.

Thus, we hear patients complaining of bad tastes, unpleasant odours, dimness of sight, &c.; but such are merely occasional symptoms, and by no means essential to the nosological character of the disease.

The skin is usually dry and harsh to the touch, and this whether there be fever or not. Generally, however, at an advanced period, there is a considerable degree of fever. As the disease advances, the patient is attacked with remittent fever, occasionally accompanied with profuse perspiration at night. This fever has been regarded as partaking of the character of hectic; and should any cough, with or without expectoration, be present, (by no means an unfrequent occurrence,) the patient may be considered as labouring under phthisis, intances of which I have occasionally seen.

When diabetes has continued for a long period, it frequently terminates in anasarca or general dropsy. Hence the ancles become œdematous, and the patient, from having been reduced to nearly a skeleton by emaciation, becomes bloated from the accumulation of dropsical fluid in the cellular membrane.

In children, about this period, the abdomen becomes sensibly enlarged. This enlargement, by a careless observer, may be mistaken for ascites, or some mesenteric affection. Ascites frequently supervenes in adults, but more rarely

in children. Disease of the mesentery is to be regarded as an adventitious rather than an essential occurrence.

The respiration is said to be always affected in diabetes, but when pulmonic affections occur, I believe they should be generally regarded as of a secondary or symptomatic nature. Dr. Bardsley says, that he does not recollect a single instance of the disease which was not attended with some affection of the chest. The pulmonary affections in children are purely of a nervous nature; and I have seen several instances in adults, in which there were no pulmonary symptoms whatever. However, it must be acknowledged, that cough, dyspnœa, and frequently expectoration, attend; and under such circumstances, the disease is not unfrequently considered and treated as a pulmonary affection, till it has arrived at a very advanced stage.

I have already remarked upon the pulse in children: in adults, at the commencement, it is full, hard, and frequent; especially if there be fever with much elevation of temperature. I have, however, seen instances in which the pulse has been little if at all affected. Perhaps it may feel somewhat fuller than usual, but no other remarkable circumstance has been cognisable. In such cases the temperature of the surface is not elevated, or is even below natural.

Of all the organs, however, the functions of which are liable to become affected during the progress of diabetes, those of digestion are the most prominent. The structure and functions of these organs are so frequently deranged, that some have regarded a wrong or perverted action of them as the principal cause of the disease. Having had some opportunities of seeing, or, I should rather say, having detected, the disease in its earlier stages, I am inclined to believe the disorder of the digestive organs to be the consequence rather than the cause of the disease.

In some cases, the fault seems to be in the stomach; but in different cases different parts of the alimentary canal seem to be the seat of disease. In some cases there is pain on pressure of different parts of the abdomen, indicating the presence of inflammation, and in others again there is no pain felt on pressure.

Acidity of the alimentary passages is frequently a symptom, and often the evacuations indicate a deficient or unhealthy secretion of bile. In some cases, there may be swelling or puffy tumours of the hypochondres; and if the disease advance without interruption, these tumefactions become permanent, and inflammation succeeds.

I have met with cases attended with palpitations, and sometimes with syncope. They gene-

rally arise from organic affections of the heart, and are then unconnected with the diabetic affection. When not arising from organic disease, I have never known them unaccompanied by dyspeptic symptoms, and then their nature is readily understood. Such, as far as my information extends, seem to be the principal circumstances to be noted in the symptomatology of diabetes.

CHAPTER II.

MORBID ANATOMY.

The morbid anatomy of diabetes is properly confined to the kidneys and urinary organs. Diabetes never exists to any extent, without the kidneys presenting on dissection manifest changes. These changes vary from a trifling vascularity to severe organic derangement. Sometimes the kidneys are much inflamed, and present a florid vascular appearance, in other cases the venous system of these organs seems enlarged and turgid with blood. In a case which I examined about five years ago, the kidneys were enlarged in size, dark-coloured, and seemed turgid with blood. On cutting into the substance, there was an instantaneous effusion of fluid dark-coloured

blood, as happens when a congested liver is cut into. Sometimes the veins, on their external surface, form a complete net-work of vessels. In some cases the kidneys are found in a loose, flabby state, being at the same time much increased beyond their ordinary size. They are often of a pale or ash colour.

In some instances the substance of the kidneys is much inflamed, and then they present an appearance of a high degree of arterial vascularity. Their substance feels dense, and their structure firm. Frequently, under such circumstances, a whitish fluid resembling pus is found secreted in some quantity in the infundibula.

The kidneys do not often contain abscesses, but I have seen two cases in which they were ulcerated. In these cases, the pus occasionally passed with the urine, and was mistaken for flakes of coagulable lymph, which it very much resembled. The ureters are often enlarged in diameter ; and a respected medical friend informed me, that he once saw a case in which the internal surface of one ureter was ulcerated. It is natural enough to expect that these vessels should be enlarged in such a disease; but I have not met with a case of ulceration. This, however, may have been owing to my not having been prepared to expect, and, consequently, not having uniformly looked for such an effect. The renal or emulgent

arteries are very often found larger in diameter than natural. Generally speaking, both kidneys are diseased, but sometimes only one, or at least only one to any great extent.

The bladder is sometimes found rather vascular, and turgid on its mucous surface; sometimes the mucous surface is inflamed. The substance of this organ, is, in some cases thickened, and very firm in its texture. I saw a case, which was examined by an eminent surgeon* in Dublin, about fifteen or sixteen years ago, in which the mucous coat of the bladder was tuberculated, and elevated into large, thickened, hard, and irregular plicæ. In several spots it was exulcerated, and, in this case, I learned that there was frequently a considerable discharge of sanio-purulent urine.

There are diseased appearances occasionally observed in the other viscera, as the brain, lungs, heart, liver, spleen, pancreas, and the other digestive organs; but, as a great variety of these occur, and as diabetes frequently prevails without as well as with them, and sometimes with one description, and sometimes with another,—they are to be regarded rather as accidental occurrences, than as absolutely and essentially a part of the morbid anatomy of the disease; and therefore their consideration can have no place here.

* Mr. Peter Harkan.

CHAPTER III.

OF THE CAUSES.

SECT. I.

Remote Causes.

The causes of diabetes may be distinguished into remote and immediate. I shall not attempt the usual division of the remote causes, into predisposing and exciting; as, in a disease, the nature of which is still involved in so much obscurity, it would be extremely difficult to preserve the distinction.

Among the exciting causes are to be ranked all agents which may become an unnatural stimulus to the kidneys, whence their excitability is preternaturally increased. In this class may be ranged, excess in the use of spirituous and fermented liquors. I think an excess in the use of acids may be considered as an exciting cause of a diabetic discharge of urine. The case of a little boy about eight or nine years old, is in my recollection, in whom an inordinate discharge of urine was excited, and kept up by an immoderate use of vinegar. The little fellow was

extremely fond of vinegar, lemon juice, &c., and, by some means or another, he continued to get at the pickle pots, from which he used to drink the vinegar in large glassfuls at a time. He was pale and emaciated, and his health began to decline. He passed from six to eight pints of urine daily. On discovering that he was in the habit of using vinegar to such an excess, the necessary precautions were adopted to prevent a repetition of the practice, when his health rapidly improved, and he ultimately recovered.

The alkalies and alkaline salts seem to exert an unnatural degree of stimulus over the urinary organs, and may thus induce diabetes. Perfectly neutralised, and in moderate quantity, they seem to be innocent;* but in the state of sub or super-salts, if used to any extent, I think they are likely to induce diabetes in the predisposed.

Excess in the use of fermented liquors frequently brings on a permanently increased discharge of urine. The most pernicious of the spirituous class, I believe to be gin. It attacks the kidneys immediately, preternaturally exciting them. All spirituous liquors effect this to a certain extent, but gin in a greater degree than any of the others.

* This is to be understood as applied more especially to those formed with the mineral acids.

What are usually known by the name of malt liquors, have a similar effect; and as many persons prefer them when a little hard, or when they are just beginning to get sour, their increased power of inducing diabetes under such circumstances may be readily understood, from what has been already observed with respect to acids. Many persons, in the country especially, are in the habit of brewing their own beer, and when done on a large scale, it is apt to become sour, before entirely consumed. To remove the acidity, it is a very common practice to neutralise it by the addition of the bi-carbonate of soda; and thus a diuretic salt is introduced into the circulation,* which, by its stimulus, preternaturally excites the action of the kidneys.

Strong diuretics frequently induce diabetes, and thus in our efforts to cure dropsies, we may excite a diabetic discharge of urine.

Mercurial courses may excite diabetes, and where it arises from the use of mercury, the urine generally coagulates by the application of heat. Dr. Blackall particularly notices mercury

* It is not a matter of importance, in a practical point of view, whether the acetate of soda pass to the kidneys directly or through the circulation. The effect is more immediately our object.

as an exciting cause of diabetes, and he considers this mineral as exerting a pernicious influence on the structure and functions of the kidneys. "Stimulating diuretics," he observes, "have appeared to me to produce it.* I have less hesitation in saying, that mercury has that effect; and the state of the kidneys in two dissections, after excessive mercurial courses, would induce a belief, that it is not wholly unconnected with a local affection of those glands."† In the cases to which Dr. Blackall alludes, and the history of which are detailed at pages 109 and 184 of his work on Dropsies, the kidneys on dissection were found solid and hard, and their structure, as he describes it, "somewhat confused."

As in some measure allied to mercury by a similarity of morbid action, may be regarded the exanthemata and other eruptive fevers. Cases are recorded in the Appendix, in which diabetes not only followed, but even seemed to have been brought on, by such diseases. Of this description are, variola, scarlatina, cynanche maligna, measles, erisypelas, and miliary fever. Indeed, all febrile diseases capable of assuming a malignant character, as typhus, puerperal, and

* Diabetes serosus. † Blackall on Dropsies, p. 240.

miliary fever, may be regarded as occasionally exciting diabetes.

Particular articles of diet, if capable of directly exciting the kidneys, may increase their action; and, if too long persevered in, may thus bring on diabetes in the already predisposed. I have heard individuals declare, that asparagus invariably caused in their own persons an increased flow of urine; but such effects, in all probability, depend upon particular idiosyncrasies, not sufficiently understood to be of general practical utility.

In infants, acescency of the mother's or nurse's milk, I believe, may, at least, give a tendency, if not actually produce a predisposition, to diabetes, which at a more advanced age will become a confirmed complaint. I am inclined, from some observations, to form such an opinion, but as my facts are not sufficiently decisive of the question, I merely advance the proposition as a subject deserving the future attention of the profession.

The foreign acescent wines, I believe, may be regarded as agents capable of exciting diabetes, and our own home-made wines, being of the same nature, are to be considered as possessed of similar pernicious properties.

All kinds of excess and intemperance have been usually ranked among the exciting causes of this disease; and of a similar nature are regarded

excess in venery, severe evacuations of every description, and every thing capable of producing an impoverished state of the blood, or general debility.

Severe bodily exertions, which produce what have been vulgarly termed sprains of the loins, have been stated by patients as the only source, within their own recollection, of the disease. I remember a man, of about fifty years of age, who told me that he attributed a diabetic discharge of urine, with which he was afflicted, to his great exertions in endeavouring to raise a very heavy weight. Blows upon the loins, and falls by which the kidneys have been injured, may cause an increased flow of bloody urine, which may ultimately terminate in diabetes.

Cold has been stated by Dr. Marsh* to be, in some cases, an exciting cause of diabetes. If a predisposition exist, it is very probable that the effects of cold upon the constitution may be thus manifested. But I believe cold to be incapable of bringing on diabetes, unless by exciting inflammation of the kidney; and then the inflammation may terminate in any other morbid affection as well as diabetes.

Fright and sudden mental emotions† have

* Dublin Hospital Reports, vol. iii.

† Fright and sudden impressions upon the nervous system, it is well known, frequently cause an evacuation of the urine.

been supposed to have some effect in exciting diabetes. In such cases, a predisposition from some cause has probably been established.

An hereditary disposition to diabetes may certainly be entailed by the parent on the offspring. As hereditary tendencies to other diseases unquestionably exist, the same can be readily imagined with respect to diabetes. But not only an hereditary tendency may be entailed, but even a congenital predisposition may arise from some imperfection in the generative system of one or both parents, impairing the functions of procreation. Hence, such a structure or mechanism of the kidneys may exist, as will render the offspring liable to diabetes from the action of very slight causes; and this does not necessarily infer the existence of any similar renal malconformation in either of the parents. It is

This is well exemplified in vulgar phraseology. The diuresis, however, from these causes is seldom permanent. At all events, the urine is of low specific gravity when the diuresis is of nervous origin: such cases are speedily relieved by sedatives and antispasmodics. If the nervous excitement does not subside spontaneously, it may be reduced by opium, hyoscyamus, prussic acid, the fœtid gums, and a rather soluble state of the bowels. But if the specific gravity of the urine be high, then the disease is of a more serious character, and will require a more active treatment.

probably under some such circumstances, that cold, fright, and mental impressions, suddenly affecting the nervous system, have probably, if ever, produced a diabetic discharge of urine. However, I would be understood as considering predisposition much more frequently acquired, than either entailed or transmitted.

Derangement of the digestive organs has been regarded as the principal cause of diabetes, and the late Dr. Rollo very strenuously supported this opinion, which he himself first originated. However, his plan of treatment, founded upon this view, has not proved generally successful. It is well ascertained, that diabetes has existed to a considerable extent, without any very manifest disorder of these organs either preceding or co-existing with it; and morbid anatomy has clearly proved, that it may proceed to a fatal termination, without any recognisable disease of this nature. That indigestion may lead to such a change of structure, and increased functions in the kidneys, as may induce a diabetic discharge, no one acquainted with the nature and history of indigestion will attempt to deny; but that it invariably arises from dyspeptic derangements, in the present state of pathological knowledge, can scarcely be conceded. From the evidence afforded by dissections of diabetic patients, we

may fairly infer, that indigestion, or any affection of the digestive organs, may be occasionally an exciting cause of diabetes; but it as often exists independently of such affections, and they are more frequently symptomatic or secondary of diabetes as a primary affection. However, all the occasional or remote causes are to be considered as acting by directly applying their stimulus to the kidneys, and thus preternaturally exciting them; or else by inducing certain organic changes, the effect of which is an increased flow of urine, insipid at first, but which at length manifests saccharine properties.

SECT. II.

Of the immediate Cause.

Dissection has shewn that this disease is always attended with some manifest change in the structure of one or both kidneys. Hence we may conclude, that a mere functional change is hardly adequate to the production of the permanent disease. Of what nature are these changes, or wherein their difference consists, we probably shall never be able to determine. We know that the kidneys may be readily excited by

some stimulating agent, and the flow of urine increased; but this, if the stimulus be not too long continued, again subsides, and the natural action is recovered.

Upon referring to the works of authors who have written upon this subject, and comparing their observations upon the morbid anatomy of the disease, the reader will find that the kidneys have been invariably found in a morbid state. Other organs have undoubtedly manifested diseased appearances; but these appearances are not constant, for they have been in some instances present, and in others absent, and hence they cannot be considered as essential to the production of the complaint. From the best observations, and information which I can collect, upon this subject, I am inclined to consider the kidneys as the seat of the disease; and its immediate cause, some organic change in these organs, by which their functions are both preternaturally excited and perverted.

SECT. III.

Pathology.

Pathology may be defined the doctrine of those morbid operations by which morbid effects

are produced. Such a limitation will naturally confine this part of our inquiry to the application of the remote or exciting causes, in explanation of the morbid condition and its effects. The nature of diabetes appears to be enveloped in considerable obscurity, if we are to judge from the variety of conflicting opinions which have been advanced and maintained upon this question.

The late Dr. Rollo supposed the cause of diabetes to exist primarily in the stomach, the kidney being the organ through which it manifested its deranged action. I think we must pause, however, before we admit such a doctrine in its fullest extent. I cannot here enter into a full discussion of Dr. Rollo's views, and must therefore refer the reader to his work. It may, however, be observed, that they will not stand the test of logical examination. Dr. Rollo assumes as true, propositions which may be readily disproved. Thus the assumption, that the saccharine matter is evolved from its vegetable connexions, by the deranged action of the stomach conveyed with the chyle, and thus intermixed with the blood, from which it is separated, not secreted, by the kidneys, and voided with the urine, is purely gratuitous. That the blood of diabetic patients is, in some

instances at least, destitute of saccharine matter in the smallest appreciable quantity, I myself have lately verified by chemical examination.* Were Dr. Rollo's views not otherwise objectionable, the fact that the urine, in many instances, is not saccharine, until after some continuance of the disease, would be alone sufficient to invalidate them. If the saccharine properties of the urine were owing to the separation of this substance by the kidneys, from its commixture with the blood through the faulty action of the stomach, it naturally follows that the urine, from the first augmentation of its quantity, should contain saccharine matter. Here, then, are two strong objections to Dr. Rollo's theory; first, the blood does not in every instance contain sugar; secondly, the urine is not saccharine until the disease has lasted for some considerable time. Many objections have been urged, and others still farther might be raised, against the universality of his doctrine; but enough has been stated to induce us to look for some other solution.

When we reflect upon the occasional causes which have been enumerated, we must acknow-

* Upon this subject, see London Medical Repository for March or April.

ledge, that they are mostly such as are capable of exerting an immediate and directly stimulating effect upon the kidneys themselves. We know that fluids will occasionally pass off by the urine, so soon after their introduction into the stomach, that it is impossible they could have passed regularly through the circulation to these organs. The agents most powerful in exciting diabetes, are those which are supposed to exert a specific effect in exciting the kidneys, such are gin, the more acrid diuretics, as cantharides, turpentine, and the different diuretic tinctures, and also the alkalies and acids. Those children who have suffered most severely, I have generally found in the lower orders of society, where the parents are in the habit of allowing them to drink spirituous and fermented liquors whenever they can procure them. In high life, children are exposed to the same dangers from the improper conduct of nurses and others who may have the care of them. When we consider the very great excitability of both the vital and animal organs in early age, we can be at no loss to account for inordinate discharges of urine, under so frequent an application of such powerful stimuli. We know that a too frequent or too vigorous excitement of the brain by severe mental exertion, in youth more especially, is capable of

bringing on hydrocephalus, phrenitis, &c.; and at a more advanced age, mania and other diseases of excitement are apt to supervene the same exertions. Is it then to be wondered at, that stimuli which are so immediately and directly applied to the kidneys, should manifest their deleterious effects most sensibly upon the structure and functions of these organs? In confirmation of this view, I shall relate the following experiments, for the accuracy of which I can pledge myself.

A gentleman, after having voided his urine and fæces, fasted for twelve hours, and then drank a pint of water,* and in half an hour afterwards passed eleven fluid ounces, seven drachms of urine, slightly coloured. Some few days after, the same experiment was repeated, with this difference, that milk was substituted for the water. No urine was passed for nearly an hour and a half, when three ounces of very high-coloured urine were voided.†

Here we naturally inquire, why there should be such a disproportion between the lengths of time and the quantities of urine discharged

* Sixteen fluid ounces by admeasurement.

† The specific gravity of the first urine was low, that of the latter experiment high.

in the two experiments. There is no great difficulty, in my apprehension, in the solution of the problem. In both cases a bland fluid, exerting only the mild and natural stimulus, was made use of, and consequently the kidneys were not preternaturally excited, but acted in the natural way. However, though both fluids were bland, one was infinitely more nutritious than the other, consequently it underwent digestion. In the case of the water, some passed more directly to the kidneys, some entered the circulation, was elaborated into animal matter, and the remainder became excrement and urine. Hence it was that the urine in the first experiment was more abundant and less high-coloured, because the urine secreted or separated from the blood was diluted with that which passed more directly to the kidneys. In the case of the milk, by far the greater portion was assimilated; and the urine, being separated by the more elaborate process, was less diluted, and therefore its properties were more highly urinous, as was inferred from its smell and deeper colour, while at the same time its quantity was much less.

The same gentleman, having prepared himself as before, took, at the end of twelve hours' fasting, two ounces of brandy with eight ounces of warm water, and in less than fifteen minutes passed

ten ounces of urine, in some degree partaking of an orange colour. In twenty minutes after, four ounces more were passed. This was much redder than the former, and in about three hours more, six ounces of a deep-coloured, highly concentrated urine were passed.

The experiment was repeated, substituting two ounces of gin for the brandy. In about ten minutes, a pint of pale-coloured urine was passed, devoid of any peculiar smell. In an hour, ten ounces more were voided, somewhat deeper in colour. In four hours more, six ounces of more concentrated urine were discharged. At this time food and drink were taken, and the quantity of urine discharged very manifestly exceeded that which would have followed, had not the kidneys been previously excited.

The same experiments were tried with equal parts of strong gin and water, and also strong brandy and water. The effect was similar, only very much increased.

It was the intention to have tried the effects of the different stimulating diuretics, but a severe inflammatory affection prevented the attempt. A mixture of spirits of turpentine with tincture of cantharides, in the proportion of two drachms of the former to ten minims of the latter, produced a violent inflammation of the kidneys with

hæmaturia, swelled testicle, and a discharge of matter from the urethra; consequently these experiments were abandoned, and the health has not been sufficiently restored to make a second attempt, or even to test the accuracy of the first experiments by their repetition.

From the facts above stated, I am inclined to believe, that diabetes more frequently arises from a peculiar excitement of the kidneys, originating in the direct application of stimuli to their substance. At first the excitement is only occasional, and the effect subsides; but the repeated irritation of organs, we well know, brings on inflammatory action, and at last disorganisation. It has been observed, in discussing the morbid anatomy of the kidneys in diabetes, that they generally exhibit morbid vascular appearances, and frequently considerable disorganisation of their structure. The first effect of the irritation is merely an increase of their natural functions, and more urine is separated, than under their natural action would be effected. The qualities of the urine, too, are not affected, or at least not sensibly so, at first, nor until after the repeated application of the stimuli. But, by repeated excitement, not only are their functions increased and sensibly perverted, as is indicated by the coagulation of the urine, and its saccharine pro-

perties, but also their structure and organization become seriously affected.

With respect to the sugar which gives to the urine it sweetish taste, we can no more account for this circumstance, than why the kidneys secrete the urine rather than bile.* The circumstances which determine the peculiar functions of particular organs and structures, seem to be placed beyond the limits of anatomical and physiological investigation. If, then, we cannot develope the circumstances which determine one function in preference to another, surely we cannot expect to discover that greater delicacy of mechanism which causes morbid instead of healthy function.

Dr. Rollo supposes that certain articles of diet, as vegetables, by containing a greater quantity of saccharine matter in their composition, may furnish that which is found in the urine. This is rather too mechanical a view of the subject. It must be recollected, that the constituent principles of sugar are contained, though differently

* Dr. Prout, in his work on Calculous Disorders, observes upon this very question: "I have often thought, however, that there is nothing more wonderful about this than any other animal process; and that if we understood how the animal economy forms fat, or the liver bile, we should be at no loss to understand how the kidneys sometimes form sugar." pp. 71, 72.

combined, in almost all the varieties of matter which serve for the subsistence of animals. The constituents of sugar are oxygen, hydrogen, and carbon. On what materials can an animal live, which will not furnish the whole of these elements? Water contains the two former, and animal matters will furnish the latter. In the wrong or perverted action of the animal organs, elements are conjoined, and compounds formed, wholly independent of the laws of chemistry.

I fear the views of Dr. Rollo, by substituting a heating and inflammatory diet, to the total exclusion of one more refrigerant and antiphlogistic, may have led to the exciting of serious diseases. In diabetes, the urine will continue saccharine, in spite of every restriction in diet, till the proper functions of the kidneys are restored. Not long since I saw a case in which animal diet, to the exclusion of all and every description of vegetable matter, had been adopted and persevered in for nearly four months, to the serious injury of the health, without in the slightest degree sensibly altering the saccharine qualities of the urine. The diabetes, in this instance, seemed to me to have been excited by an immoderate use of the vinum colchici and tincture of opium, to prevent attacks of gout. The colchicum, through means of the opium, being prevented from passing off by the bowels,

was directed to the kidneys, which were thus most inordinately excited, and the mellitic form of diabetes speedily induced.

Spirits of turpentine, and the saline compounds into which the vegetable acids enter, act as stimulants to the kidneys, when administered in small doses. The former, we may infer from its peculiar effects upon the urine, to which it communicates the odour of violets, is carried, in part at least, directly to the kidneys; the latter undergo decomposition *in transitu*, by which the acid is separated, and the alkaline base being eliminated, and in the course of the circulation carried to the kidneys, excites them into action, and promotes the excretion of urine.* Those salts compounded with a mineral acid, are less under the control of the decomposing powers of the chylopoietic organs, and therefore they do not undergo decomposition *in transitu*. They therefore act upon the bowels. Some of the more soluble ones, however, are absorbed, and stimulate the kidneys by their contact. "This," observes Dr. Paris, "happens with *nitrate of potass*, which may be chemically detected in the urine of those persons who have taken it."†

* See this subject ably discussed in Paris's Pharmacologia. Art. "Potassæ Acetas."

† Ibid.

Hence, then, it may be logically inferred, that certain agents, dietetic and medicinal, are capable, either mediately or immediately, of exciting the action of the kidneys, and causing an increased flow of urine. If this preternatural degree of excitement be frequently repeated or permanently kept up, an inflammatory state of the kidneys, and subsequent disorganisation, will be induced. The increased flow of insipid urine constitutes the incipient stage of diabetes; the presence of coagulable or of saccharine matter in an unusual quantity, is a consequence, not only of the preternatural excitement of the kidneys, but also of certain changes in the structure and mechanism of these organs, which, in the present state of anatomical and physiological research, are placed beyond the reach of the discriminating powers of our perception.

The disturbances observable in the other functions, are to be considered as accidental or occasional phenomena, none of them invariably and constantly attending on diabetes. We must, however, except the great thirst, voracious appetite,* and dry harsh skin. The theory of these symptoms is readily comprehended. In the discharge of so great a quantity of fluid from the system, nature points out the means of recruiting

* The appetite is not invariably affected.

the waste, by exciting thirst, which compels the animal to drink. A similar explanation applies to the voracious appetite. The dry and hard state of the skin is a natural consequence. No two excretive functions can readily be inordinately excited at the same time. A knowledge of this law is important, not only as explanatory of the suppression of the cutaneous functions in diabetes, but as enabling us to obtain different effects from the same remedy, by corresponding adjustments of the dose. Thus, for instance, from ℈j. to ʒj. of the acetate of potass will excite diuresis, whereas, ʒiij. or ℥ss. will produce catharsis: so, ʒij. of oil of turpentine will, in some instances, so excite the kidneys, as to induce a discharge of bloody urine, while ʒvj. or ℥j. acts merely as a carthartic, without affecting the urinary system. In diarrhœa, the urine is scanty; and under profuse perspiration, both the alvine and urinary discharges are reduced. Less urine is passed in summer, *cæteris paribus*, when the perspiration is free and copious, than during the winter, when it is less abundant.*

* A very intelligent gentleman, a friend of mine, informs me, that in winter he dreads any situation or society which may render it inconvenient to void the urine frequently. In summer he can go for hours together without any inconvenience; in winter he is obliged to empty his bladder very frequently, the secretion of urine being abundant. Another singular circum-

All the other affections, as of the organs of sense, the head, chest, and abdominal viscera, seem to me to be secondary. The derangement in the digestive system, I know, has been regarded rather as the primary source of the disease, than as a secondary effect. How far I may have succeeded in establishing the probability of a different view, I shall leave to the reader to determine. I by no means venture to assert, that diabetes can never be a secondary affection, because I believe the contrary has been fully established. However, a true diabetes cannot be fully established, till the kidneys have become organically engaged. That a wrong action in the digestive organs may prove a source of irritation to the kidneys, as well as to any of the other

stance with respect to this gentleman is, that liquids, almost instantly after taking them, prove with him diuretic. He tells me, that were he to drink a bason of hot green tea in the winter season, and not have an opportunity of immediately emptying his bladder, it would produce the greatest distress. Green tea is also to him a diuretic, whereas black is not.

The effect of suppressing the action of the skin on the kidneys will be acknowledged by bathers. When the person has been stript and exposed to the cool air, very frequently the urine is immediately passed; but upon putting the feet into the cold water, a kind of spasmodic constriction is experienced generally over the whole surface of the skin, and the urine is immediately voided.

viscera, I do not mean to deny; but I think, that in a great proportion of instances the kidneys are the primary seat of irritation and disease.

In young subjects, I am convinced that the application of improper stimuli frequently induces inordinate action of the kidneys and excessive discharges of urine. Thus, the other functions are suppressed, alvine accumulations are produced, the skin becomes dry and harsh, and often hot and feverish, from the suppression of perspiration. Hence arise dyspeptic complaints, with a train of nervous symptoms and diseases, as hydrocephalus, dyspnœa, purulent expectorations, hæmoptoe, and aphthous exulcerations of the mouth, fauces, tongue, &c.; and all these may be induced, and the patient fall a sacrifice to an adventitious or accidental evil, while the primary source of the mischief has escaped observation.

CHAPTER IV.

DIAGNOSIS.

THERE is no disease of which the nosological character is so clear and well marked, and yet, perhaps, there is none more frequently confounded, than diabetes. Emaciation, thirst, vo-

racious appetite, dry harsh state of skin, with a frequent and copious discharge of urine, especially if it be saccharine, seem to be characters sufficiently distinctive for all the purposes of diagnosis. The emaciation, thirst, and voracious appetite,* with a harsh and dry state of skin, attend on other diseases, and as these are the most obvious, they thus tend to deceive and mislead. Whenever, therefore, we find those symptoms, we should immediately inquire into the quantity and qualities of the urinary discharge. If we find it to exceed the proportion which should naturally result from the drink and aliment consumed, of a pale or greenish straw-colour, and of a high specific gravity, we may presume the disease a diabetes, at least in its incipient stage; but if the urine be coagulable by heat or by the less powerful re-agents, or if it be saccharine, then there can be no doubt as to the nature of the disease.

A number of casual or accidental symptoms may occur, which, though in no way essential to stamp the character of the complaint, but yet, if misunderstood, may tend to confound it with other diseases. Thus, in some cases severe

* This symptom is more constant in the mellitic form of diabetes: in the insipid or serous affection it is sometimes absent.

pains in the loins and back may be felt, and may be mistaken for lumbago.* A discharge of bloody urine, as already observed, may arise from ulceration, and may lead to the presumption of calculous affections. A discharge sometimes takes place from the urethra, which may lead to the supposition of strictures: and if there be numbness of the thigh with retraction of the testicle, which occasionally happens, if there be much irritation of the kidneys, the complaint may be mistaken for gravel.

Very often there is considerable inflammation and swelling about the external orifice of the urethra, and if there should be a purulent discharge, it may be mistaken for gonorrhœa.

The ulcerations of the tongue, gums, &c., the affections of the organs of sense, of the head, chest, &c., are probably secondary of the *dyspeptic* diseases which arise during the progress of diabetes. This may be fairly presumed, as they seldom appear till the primary disease has become complicated in some degree, with indigestion.

However obscure the nature of the disease may be rendered by the supervention of intervening and consecutive diseases, the practitioner

* See Appendix, Case XVI.

can scarcely err if he properly attend to the state of the urinary functions. The quantity and qualities* of the discharge will prove an unerring guide, by which we may arrive at a correct diagnosis in spite of every source of obscurity.

CHAPTER V.

PROGNOSIS.

The prognosis in diabetes may be considered in two different points of view, namely, as to the probability of a fatal event, and as to the probability of a cure. The prospect of a cure in diabetes has not been generally considered as encouraging. This may probably have arisen

* The urine may be both serous and saccharine, and these qualities may tend to obscure each other. Dr. Blackall observes upon this subject : " The saccharine and serous diabetes may perhaps be combined; and the quantity of serum present may possibly conceal the sweetness of the taste. Mr. Watts of Glasgow, in the case before mentioned, where the urine was insipid, first obtained by heat a large coagulum, and then by evaporating the strained fluid, an unusual proportion of extractive matter, which, when treated with nitrous acid and water, afforded a considerable quantity of oxalic acid," p. 240. The different modes of ascertaining the coagulability of the urine, I have stated in the Clinical Report on Dropsies.

from the disease having commonly made great progress, before the patient has called the attention of the profession to his disorder. The longer a disease has continued, the more obstinate are the symptoms, and the more difficult it becomes to effect a cure. When, therefore, we are called upon to give an opinion upon this question, we should endeavour to ascertain the length of time the disease may have continued, and to estimate the extent of its progress.

We may generally infer, (*cæteris paribus*,) the earlier medical treatment has been instituted, the greater the probability of a perfect recovery. When, from the duration of the disease, we have reason to suspect serious organic changes in the structure and mechanism of the kidneys, we must then be more guarded in our prognosis, and not excite hopes or expectations which probably will never be realised.

The disease, however, may advance to a considerable degree of severity, and yet not be absolutely beyond the control of medical treatment. I have seen recoveries effected even under the most unpromising circumstances. But the reader will readily perceive, that such facts cannot be considered as establishing any general principles.

Perhaps it may be fairly stated, that the

disease is more manageable in young subjects than in those more advanced in life; but it is a principle which must not be lost sight of, that the earlier the stage of the disease, under all circumstances, the more tractable it will prove. If serious disorganization of the renal structure have taken place, then, as organic diseases are more beyond the reach of medicine, the more circumscribed will be the salutary effects of our endeavours. We may palliate, but we cannot confidently nor reasonably expect to remove symptoms, when serious organic disease has been once perfectly established. It may therefore be laid down as a principle, that the longer the duration of the disease, the greater will be the disorganization of the kidneys, and consequently the less the prospect of a successful treatment.

The circumstances which enable us to judge of the severity of the disease of the kidneys, depend upon symptoms felt in other parts in their neighbourhood. Thus, very severe pains of the loins point out, that the irritation of the kidneys and system at large has produced disease of the spinal marrow* in this part. Violent irritation of

* In a morbid examination of a case in which dreadful pains were felt in the loins, the spinal marrow in the lumbar region was found very much diseased. Can this part have any thing to do primarily in determining the nature of the disease of the

the testicle, of the urethra, with a great degree of numbness or paralysis of the thigh, are to be regarded as unfavourable. These, however, should be permanent, not transitory, to warrant an unfavourable prognosis.

The number and degree of severity of the secondary affections, will greatly assist us in forming an accurate prognosis. If there be severe or painful dyspnœa, especially if it be permanent, we must be guarded. The same observations will apply to the state of the head.

The state of the digestive organs is a matter of great importance in making our prognosis. The derangements of the digestive system, whether primary or secondary, so speedily effect the disorganization of vital parts, that we have always serious cause for apprehension, whenever the dyspeptic affections are severe. To discuss the symptoms which distinguish the different degrees of severity in such affections, would lead me beyond the limits which are necessarily prescribed to this work. It may, however, be observed, that when extensive and severe, they should be considered as portending an unfavourable result.

kidneys? It would be well if morbid anatomists would examine in this disease, the state of the spinal marrow situated in the loins.

The supervention of dropsy is to be considered generally, though not invariably, a fatal indication. It shews that the cachexy of the habit is such, that though the tendency to diseased action is unsubdued, yet the constitution is so vitiated, that it is unable to free itself in the usual manner. On the whole, dropsy is to be regarded as affording rather an unfavourable prognosis.

On the contrary, a gradual abatement of the thirst and appetite, the skin becoming soft and moist from the recovery of its functions, the bowels becoming regular, the gradual recruiting of the flesh, the urine being voided less frequently and in less quantity each succeeding day, and losing at the same time its serous and saccharine qualities: its colour, taste, smell, and specific gravity, becoming more natural, the bodily strength and mental powers increasing, and the dyspeptic affections, of whatever nature or description, diminishing in severity, are to be looked upon as portending a favourable issue.

Upon the whole, however, diabetes is not to be regarded as so obstinate or so formidable a disease, as it was formerly considered to be. Practitioners are now better informed of the most effectual way of combating symptoms, and are more bold in their endeavours to arrest the progress of disease, and consequently their practice

is more uniformly successful. That diabetes is more manageable than from a perusal of the opinions of Aretæus, and other ancient authors we should be inclined to believe, I think the reader will admit, when he has read the cases, the history of which I have subjoined in an Appendix.

CHAPTER VI.

TREATMENT.

Application for advice is so seldom made till the disease has arrived at an advanced period, that it is not suprising the profession should generally consider the cure of this complaint as a difficulty of no ordinary nature. In children, too, the symptoms have been perhaps so overlooked, and the nature of the disease consequently misunderstood, that they have been often treated for imaginary diseases, while the real one has been neglected. When we compare the histories handed down of tabes, marasmus, atrophy, rickets, &c., can we doubt that many cases may have passed under these names, and been treated accordingly, which, if thoroughly understood, should have been referred to this

genus? It is, indeed, generally allowed that atrophy, arise from whatever cause it may, is usually very difficult to cure, and often terminates in dropsy.*

I am by no means urging that diabetes is always the cause of wasting, either in young or in old subjects; but I am convinced that a urinary flux is a frequent cause of emaciation in adults, and much more often the source of similar effects in young subjects, than our medical records would lead us to imagine.

The treatment of this disease consists in reducing the inordinate action of the kidneys, diminishing their preternatural excitability, and in endeavouring to correct the perverted functions by which a morbid urine is produced. When we have effected this, we must endeavour to guard against relapse. When disease has been once established in a part, there is always left behind, at least for a considerable period, so great a degree of susceptibility, that it is readily re-excited, and that even by the operation of causes, which, under ordinary circumstances, would have little or no effect. The treatment, then, resolves itself into two principal divisions,—the therapeia and the prophylactics,

* See "Hooper's Medical Dictionary." Art. ATROPHIA.

in which order I shall now proceed to discuss the most efficient means for the attainment of each object.

SECT. I.

Therapeia.

The first indication is to restrain the inordinate action of the kidneys, by which an excessive flow of urine is kept up. It was observed, when discussing the pathology of diabetes, that certain agents seemed capable of strongly stimulating the kidneys; and that through an injudicious use of them, a preternatural excitability of these organs might be established, and so induce a urinary flux. A primary object, therefore, will be, to endeavour to ascertain the real exciting causes; and having discovered their nature, to prevent, as far as possible, their application in future. It must be recollected, that no treatment whatever can prove successful in the cure of diseases, under the continued or renewed application of their causes. If the patient be an infant at the breast, the nurse's milk should be examined; and should acescency be discovered to constitute one of its properties, it will be

advisable to change the nurse, or else to alter the diet of the child. If the disease has made but little progress before its nature has been discovered, the alteration in the nature or quality of the diet will frequently be alone sufficient to effect the cure. But when, from the duration and severity of the symptoms, we have reason to conclude that the disease has arrived at a more advanced stage, then a more active treatment will be required.

If the disease appear in those more advanced in years, we must institute a strict inquiry into the habits, indulgences, and general mode of living of the patient. We must then reflect carefully upon the history which we shall receive, and if any part seem calculated to account for the appearance of the symptoms, we should direct the patient's attention to the circumstance, and enjoin the strictest caution in avoiding all future exposure to the exciting cause, whatever it may be.

Avoiding, however, the renewed or continued application of the exciting causes, will not always be followed by a removal of the effects of their previous application. It has been already stated, that the excessive action of the kidney in all probability depends upon some alteration in its mechanism, however delicate or

subtile, which escapes our observation. There is one fact, however, which we have learned by experience, that excessive discharges are frequently considerably diminished by blood-letting. And this is an effect, which seems to be entirely independent of that control which bleeding exerts over inflammatory action. There are many discharges which come within the control of bleeding, but which yet do not exhibit, in the organs engaged, any of those appearances which have been considered as more essentially characteristic of inflammatory action. Thus, I have known leucorrhœa, which had resisted all other means, subdued by venesection; diarrhœa will also yield to the same means, when no effect whatever can be obtained from opium and other astringents. Puerperal hœmorrhage from the uterus will also be restrained by bleeding, and yet in such cases it often happens that we cannot detect a single symptom indicative of inflammatory action. With these facts before us, we cannot be surprised that bleeding should prove a powerful means of reducing the excessive action of the kidneys, in cases even where we have no indication whatever of inflammation of their structure.

But the reader will recollect, that when detailing the morbid appearances, a turgid vascu-

larity of these organs was often observed; and venous plethora or turgidity, it was stated, was no uncommon appearance. A distended state either of the arteries or veins, especially of organs which are not endowed with a very acute sensibility, may exist, and yet not manifest those symptoms of severe pain and constitutional disturbance, which we generally find to attend on the more acute forms of inflammation. It may be still more forcibly urged in favour of venesection, that experience has confirmed not only the safety, but the efficacy of the practice in this disease,* and that, too, under circumstances which would be considered rather as discouraging than inviting its adoption. These are a loss of strength and spirits, a low feeble pulse, with cold and œdematous extremities. Mr. Watts in one case bled and repeated the venesections till he had drawn off 180 ounces of blood, and the health was thus perfectly restored. Mr. Watts still farther observes, that the blood was at first black, with only a small proportion of crassamentum, but as the bleedings were repeated, the blood gradually assumed the appearance which it usually exhibits in persons who labour under

* See No. lxvii. of the Medico-Chirurgical Review, and also Mr. Robert Watts's Cases of Diabetes.

inflammatory fever. Since Mr. Watts's publication, several other cases, establishing the utility and success of blood-letting in diabetes, have been published in the various medical journals.

My own experience, independently of all theoretical views, is in unison with these principles. I now almost invariably adopt venesection, either as a preparatory or curative means. Nor am I in the habit of confining the practice of depletion to those cases only, which manifest the more unequivocal signs of inflammatory or febrile action. If the discharge be much increased beyond the usual quantity, I generally direct venesection, and repeat the operation, according to its effects upon the system in general, and the disease in particular.

We should not be deterred from repeating the bleedings, merely because the blood does not exhibit the buffy coat, the usually received characteristic of inflamed blood. I have in another place* suggested the probability of the characters of the serum being capable of indicating an inflammatory state of the system. I have generally found that a dense milky appearance of this part of the blood indicates inflammatory action,† and

* Clinical Report on Dropsies, &c. Preface, p. xvi., note.

† Dr. Dobson found the serum in diabetes turbid and wheyish.

this independently of the appearances presented by the coagulable part. I have found the pulse rise under such circumstances after venesection, and a repetition of the operation required; although the crassamentum should not exhibit the buffy coat, but even seem unfirm and dissolved.

With respect to the quantity of blood, and the mode of its subduction, they must depend upon circumstances which admit of no specific rules. We must be guided in the quantity by the effects. I think, however, I may venture to assert, that a repetition of the venesection, so as to draw off the requisite quantity at several operations, rather than the whole at once, will be found to exert a greater control over the disease, and at a less sacrifice of the strength. Such cases differ materially, both in the severity and urgency of their symptoms, as well as in the activity of the means to be instituted for their relief, from those of peracute and acute inflammation. These require for their reduction an immediate and powerful influence, by the speedy adoption of the most vigorous means, carried, too, to the fullest extent; whereas the former are more safely controlled by the repeated and permanent, but more gradual operation of the same means, applied in a lesser degree.

Of all the means of drawing off blood, none

are so efficacious as the lancet. Whenever, therefore, the age, health, and strength of the patient will admit of general blood-letting, it is, however small the quantity, to be preferred, especially if fever be present. And even in cases where the discharge of urine is profuse, and unattended by fever, general bleeding seems to control the flux much more speedily and effectually, than a much larger quantity abstracted by local means. If, however, there be pain on local pressure, and if this pain be of the obtuse or subacute kind, then both means will be advisable. In many cases, leeches to the loins will prove eminently serviceable; and I shall have an opportunity of submitting a case or two, in proof of their efficacy in controlling and reducing the excessive action of the kidneys.

In infants, it is frequently impossible to institute general blood-letting. In such cases leeches must be substituted. The scarificator and cupping glasses may be used with persons more advanced in years, but such severe means cannot be safely attempted with children. The situation most eligible for the practice of local blood-letting, when there is no sensation of pain to guide us in our application, seems to me to be the region of the kidneys, on each side of the lumbar spine. I have my doubts, whether the spinal marrow be

not in this situation if not always, at least very frequently, the seat of disease. I trust such of the profession as have extensive opportunities will not fail to institute inquiry upon the subject, and ascertain the correctness of the opinion; and I myself promise faithfully to neglect no opportunity of deciding the question.

Another means of reducing local plethora or vascular turgidity is, the application of blisters, as near the region of the plethoric organ as they can be placed. They may be applied, either in succession, or the discharge from the first may be promoted by the unguentum lyttæ, or the ceratum sabinæ. Lytta, however, is known to irritate the urinary system in a very distressing degree. Nor is this effect confined to its internal use, for the application of a blister will often produce strangury, or a flow of bloody urine. In a disease in which the kidneys are to be deemed in a highly irritable state, the effects of blistering must be regarded as questionable. With respect to their efficacy in fulfilling the indications intended by their use, I entertain no doubt whatever; but I merely question the propriety of a remedy, which is calculated to overstimulate organs which are already in a state of too great excitability. Should, however, the practitioner wish to try the effects of blistering, I

believe the promoting the discharge by the ceratum sabinæ will be found preferable to the successive application of fresh blisters, or the keeping up the discharge by the unguentum lyttæ. The irritation of a first blister is often carried to the urinary organs by absorption, and therefore the possibility of this effect is increased by the successive application of the lytta to an irritable or ulcerated surface. A mustard cataplasm applied to the loins and lumbar spine, will be found a very efficacious substitute, and devoid of the inconveniences which may arise from the absorption of cantharides. Indeed, sinapisms may be applied in succession, till an ulcerative and discharging surface be produced.

If we have reason to suspect disorganisation of the structure of the kidneys, or severe disease of the marrow of the lumbar spine, then caustic issues will certainly prove the most efficacious remedies.* When once established, the operations of these drains upon disease are unattended by those irritating effects upon the general system, (and, if blisters be used, upon the urinary organs besides,) which usually accompany the other modes of counter-irritation, as it has been

* Upon this subject, see the Theory and Treatment of Organic Disease, &c. in the Appendix to the Clinical Report on Dropsies.

termed. It may also be farther urged in favour of the use of issues, that their operation is permanent, and thus the disease is kept constantly under the salutary influence of the issue, for the discharge is incessant. This is an advantage which neither a succession of blisters, nor the repeated application of any other epispastic, can command. It will not be necessary to consider the different modes of exciting irritation of the surface more at length; every practitioner of the slightest pretensions must be already conversant with them.

The use of various internal remedies has been recommended as restringents upon the inordinate action of the kidneys; such are chalybeates, opium, kino, catechu, and the other articles which compose the class of astringents. The action of these has been differently accounted for. Some suppose they act specifically upon the kidneys themselves; others imagine, that they promote the other secretions, as those of the skin, and thus indirectly diminish the action of the kidneys: and probably this latter opinion is the more correct, and it is the principle, as far as regards these remedies, which I shall adopt.

We have, in the history of the disease before us, an example of the excess of action in one organ being balanced by a diminution, or even a

total suspension, of the functions of other parts. Thus we find in diabetes, that the cutaneous perspiration is suppressed, and the alvine evacuations are retained. Of course, the restoring the natural functions of these parts should form a chief object in the treatment of diabetes. A soluble state of the bowels, therefore, should be kept up, and this will prove serviceable upon other grounds than merely preventing that constitutional irritation which usually attends obstipation.

Upon similar principles, exciting the functions of the skin may probably diminish the inordinate action of other parts. May we not thus obtain a ready solution of the advantages which have been derived from the use of the alkaline sulphurets in the treatment of diabetes: and may not the encomiums bestowed on the hydro-sulphuret of ammonia by Dr. Rollo and Mr. Cruickshank, be referred to the same principles? We know that the alkaline and metallic sulphurets promote the action of the skin; and it has been abundantly proved, that this action directly affects the function of the kidneys. The hydro-sulphuret of ammonia is powerfully emetic in a large dose, and in a diminished dose it excites nausea. The same may be said with regard to tartar emetic; and in these diminished or nauseating doses, they both induce diaphoresis, and may thus prove

serviceable in diabetes.* Be this as it may, exciting the natural functions of the skin will be found valuable auxiliaries in the treatment of diabetes.

Opiates are highly useful in this disease. Dr. Warren has published some very interesting facts upon this subject, which the reader will find in the fourth volume of the "Transactions of the London College of Physicians." I myself can bear testimony to the efficacy of opium, but I must observe, that I have generally found its

* Perhaps it may be here urged, that it signifies little how the remedy effects the cure, if experience confirm its efficacy. To this I reply, that the *modus operandi* is of the greatest importance. It is principally in this latter branch that the scientific practitioner differs from the mere empiric. They both know the value of a certain remedy in a certain disease; but when this proves obstinate and resists the specific, the empiric is at a stand, —he can proceed no farther. The man of science, however, knows the principles upon which each remedy acts, and when he finds that, from idiosyncrasy, or from continued exhibition, the constitution is no longer susceptible of the impressions of his remedy, he infers that he may apply with some prospect of success to a different remedy, but of the same class; he also knows that there are various means by which he may successfully combat and subdue the resistance which a stubborn diathesis opposes to the action of remedies: in a word, the resources of the empiric are but few and speedily drained, whereas the man of science has an inexhaustible fund at his command, upon which he draws largely without fear or hesitation.

value much enhanced by combination with an antimonial. It then generally affected the skin and the bowels, and in this proportion its powers seemed increased. With respect to catechu, kino, and those astringents which more directly suppress the secretions from the bowels, I can offer but little from experience. Whenever I have used them, it has been with a view to direct the action of other remedies, by preventing their evacuation from the bowels, and then I always endeavoured to obviate constipation by the exhibition of appropriate purgatives.

Hyoscyamus, conium, and the different narcotics, have been tried; but, indeed, were we to judge from the state of medical opinion generally upon the mode of treatment most suited to diabetes, we should be inclined to imagine, that nothing very decisive or satisfactory has as yet been established.

The emaciated and apparently debilitated state of the patient, has induced some practitioners to trust the cure of this disease to tonics. Dr. Ferriar states, that he succeeded in three cases of confirmed diabetes by the exhibition of cinchona and uva ursi, of each a scruple, and half a grain of opium, three times a day. I question much, however, if the success in such cases is referrible to the tonic powers of the remedies upon the system.

They probably increase the powers of the stomach,* and enable it to bear the doses of more appropriate remedies. It appears, lime-water was directed at the same time with the bark, &c. in Dr. Ferriar's cases. How far lime-water, or indeed any of the alkaline earths, may be serviceable in such cases, I am not prepared to say. Dr. Rollo objected to the sulphuret of potash, because he conceived that the alkali produced a deleterious effect upon the kidneys.

Of all the remedies which seem to exert a restringent influence upon the action of the kidneys, none seem so powerful as the phosphoric salts. Many cases of rickets are attended with a considerable discharge of urine, and I verily believe many cases of this disease have been brought on through the excessive action of the kidneys. The profuse flux of urine, which often precedes and frequently accompanies the progress of rickets, has not been sufficiently attended to. The action of the kidneys is so increased, that the absorbents, throughout the whole frame, are

* It will often be necessary, in treating diseases, to resort to remedies which are not essentially indicated, but which are required to enable the constitution or particular parts to bear up against the debilitating effects of other means. Thus, bark may be necessary to enable the system to support the depressing effects of blood-letting.

put in requisition to supply them with materials; hence the removal of the solid parts, the gradual emaciation, and the voracious appetite to supply the waste.

The phosphate of soda has long held the reputation of lessening the action of the kidneys, and thus diminishing the flow of urine: I, myself, have noticed this effect in my own person, even when in a state of health.* It is the only salt which I can take as a medicine, and I generally take it in a little broth, in which way it has little or no taste perceptibly different from the common muriate. The diminution, too, in the flow of urine is not in consequence of the increased action of the bowels, because, when the salt purges, the effect is not so sensible. On this account I find opium, kino, catechu, with small doses of the phosphate of soda, more efficient than when purging is induced.

My friend Dr. Sharkey, of Cork, has published two cases in the 4th volume of the Transactions of the Dublin College of Physicians, illustrative of the efficacy of the phosphate of

* It may be objected, that the diminished flow of urine is merely an equivalent for the increased discharge from the bowels; but this is not the case, because with myself, another aperient salt will not diminish the flow of urine: on the contrary, it rather augments it.

soda in the treatment of diabetes. Some other respectable authorities might also be cited to the same purpose. May we not thus obtain some clue to the solution of the *modus operandi* of phosphate of lime, in the cure of rickets? Surely, if the softening of the bones depended on the earthy basis passing off by the urine, should we not exhibit caustic lime, or any other insoluble salt of this earth, rather than that into the composition of which an acid enters, which by mere superaddition "converts it from an insoluble to a completely soluble salt?"

But the efficacy of the phosphate of lime seems to me to be owing to the controlling influence which the phosphoric salts, in general, exert over the functions of the kidneys. Taking this as a principle, and of its correctness I believe there can be very little doubt, it is rather questionable if an alkaline phosphate be the best suited to fulfil the indication. The alkalies and alkaline earths, I have some reason to think, excite the kidneys; and although this property may be considerably modified, I have my doubts as to whether it can always be wholly neutralised.

But, independently of these objections, phosphate of soda is too apt to excite the bowels, and pass off by stool, before its effects upon the kidneys have been secured. This was an incon-

venience which I frequently found to attend the exhibition of the phosphate of soda,—an inconvenience which, even could it be remedied by the addition of kino, catechu, opium, &c., yet that of the alkaline basis would still remain unaffected.

These facts led me to the conclusion, that some of the metallic phosphates might be advantageously substituted for those with an alkaline base. The tonic and astringent properties of iron and zinc pointed them out as the best suited to the object in view. I selected iron * for my first trial, and I have felt so satisfied with its powers, that I have not attempted any farther investigation. I have been really struck with the efficacy of the phosphate of iron in excessive discharges † of urine. The quantity is rapidly

* "This metal," says Dr. Murray, "is the one which has been regarded as most salutary to the animal system. It exists as a constituent part of the blood and other varieties of animal matter, and it acts as a powerful tonic, increasing the power of digestion, quickening the circulation, and causing the blood, it is said, to assume a more florid hue, promoting the secretions, or *restraining them where they have been morbidly increased.*"—Materia Medica, vol. i. art. FERRUM.

† In rickets, carbonate of iron is usually combined with the phosphate of lime, and the combination is found more efficacious than either singly. I have no doubt that decomposition takes place, for in the animal laboratory, the laws of chemical affinity

reduced under the use of this salt, and indeed its qualities sensibly altered. The bulimia which also attends on diabetes is reduced, and the powers of digestion invigorated and increased.

The phosphate of iron is readily formed by the admixture of solutions of sulphate of iron and phosphate of soda. The resulting salts are sulphate of soda, which, being soluble, passes through, while the insoluble phosphate of iron* remains on the filter.

Phosphate of iron may be given as an astringent in doses of one or two grains, which may be gradually increased to a scruple or half a drachm three or four times in the day. In children, smaller doses should be given, but the exposition of the rules for apportioning them according to the ages of patients, belong to a different branch of medicine. It may be observed, that after a continued use of any medicine the dose must be gradually increased, or otherwise its effects will begin to diminish. Sometimes it is useful to suspend the use of the medicine for a short time, and then to recommence it again. In this way

are set at defiance, and those compounds evolved which are most suited to the living purposes.

* This salt and the oxyphosphate have been highly extolled by Mr. Carmichael as remedies in cancer.

the susceptibility of the system is often revived, when it would not be safe to attempt the same object by any other means.

It may happen that the medicine may sit heavy upon or oppress the stomach; in such cases it is useful to combine it with rhubarb, or some other light bitter, which, by invigorating the stomach, enables it to resist the depressing effects of the medicine. I have occasionally seen such difficulties occur in the administration not only of this, but of various other remedies. Mercury is particularly apt, especially in the form of blue pill, to be attended with such inconveniences. In these cases, I have found great advantage in giving a light bitter draught of infusion of gentian, of orange-peel, cloves, or some other aromatic bitter, with a proportionate dose of some corresponding tincture, about an hour before the dose of the medicine: by these means, the oppression, nausea, and general languor, which often succeed to a dose of active medicine, are prevented.

When the powers of the stomach are very weak, and the plan just now noted is not sufficient, then leeching and blistering the stomach frequently answer every purpose. These will be found, in the hands of a judicious practitioner, a valuable means of rendering the stomach capable of resisting the oppressive effects of any

remedies which it may be necessary, under such circumstances, to prescribe. Nor is this plan applicable solely in cases where there is evidence of inflammatory action: it will be found equally successful in cases where there is neither fever, nor pain on pressure, nor any other symptoms indicative of inflammation. In many instances, patients complain of a sense of sinking in the stomach, such indeed as is experienced from hunger, attended with languor and lassitude; and if any thing, either food or medicine, be taken, it brings on nausea, restlessness, fever, vomiting, and other distressing symptoms. Leeches and blisters, alternately applied, are the proper remedies. If blisters be inadmissible, then mustard cataplasms, or the emplast ammoniaci, may be advantageously substituted.

A very excellent plaster, and which I have found extremely beneficial in similar cases, is the emplastrum ammoniæ of the Medico-Chirurgical Pharmacopœia. It consists of two drachms of soap, lytharge plaster half an ounce, and muriate of ammonia one drachm*: the lytharge plaster and soap are to be melted together, and when

* Dr. Paris, in the fourth edition of his Pharmacologia, gives the following:—"Soap ℥i. lead plaster ʒij; liquefy them together, and add of muriate of ammonia ʒss."

nearly cold, the sal-ammoniac, finely powdered, is to be stirred in. The value of this plaster depends upon the decomposition of some of its ingredients. The alkali of the soap separates the muriatic acid from the ammonia, which being thus slowly but abundantly liberated, acts as a powerful stimulant and rubefacient; therefore it should be applied immediately after it is formed, and renewed after a proper interval,* otherwise the decomposition of the sal-ammoniac, and the evolution of the ammoniacal gas, upon which its virtues depend, will become nugatory.

In the progress of diabetes, various symptoms of secondary or accidental occurrence may set in, which, if wholly neglected, will not only render the disease intractable, but also frequently counteract the effects of our remedies, so that the proper results will not be obtained. As these symptoms do not properly nor essentially belong to the character of the disease, their mode of treatment does not come under the general plan of cure. Were I, however, to pass them over in silence, this work would have been much more incomplete than it is; and I am unwilling to add to its imperfections by such an omission. I shall therefore appropriate the following chapter

* It should be renewed every twenty-four hours.

to their treatment. In considering the occasional symptoms, I shall be guided rather by the frequency of occurrence, than by that of their situation, their anatomical, or their physiological relations.

CHAP VII.

OF THE TREATMENT OF CERTAIN OCCASIONAL SYMPTOMS WHICH DO NOT PROPERLY BELONG TO THE GENERAL PLAN OF CURE.

It has been already observed, that in the course of the disease other organs become more or less affected. Some of these are immediately the consequence of that connexion which exists between the different parts of which the system is composed; others, again, owe their origin to the same source, but in a more indirect manner: for instance, a local disease will affect the functions of the stomach, producing considerable derangement; this again will soon involve the liver, and the disease of this organ so induced will soon attack the lungs, producing hepatization of their structure, rendering them impenetrable to blood, and even to air. Through these means the brain will be oppressed, in consequence of the circu-

lation of dark-coloured blood through its substance; the brain being disordered, the functions of other parts are soon interrupted or deranged.

In this view it must be evident, that the disorder of the stomach and that of the brain are both alternately referrible to the same local affections, but that the former is a more immediate or direct consequence, while the latter is induced through a series of intervening consecutive disorders. It will be necessary to keep these circumstances in our recollection, that we may be enabled, by attacking the immediate cause of each symptom, to derive all the advantages of a judiciously instituted practice.

Of the various affections which arise in the progress of diabetes, those of the digestive system are the most frequent, so much so, that, as already observed, they have been regarded as the primary cause of the disease. A severe pain, or more often only a soreness and tenderness, on pressure, of the præcordia, is felt. On taking food, it sometimes happens that what was previously a mere tenderness becomes an acute pain, producing vomiting and other distressing symptoms. This arises from inflammation of the mucous membrane of the stomach, or of the transverse arch of the colon: sometimes the pain is felt lower down in the epigastrium; frequently the pain is felt in

the hypochondres. It is occasionally felt in the abdomen, in the seat of the small intestines. The seat of these pains is very various, but wherever situated, they are to be regarded as indicating the presence of inflammatory action.

If there be no fever, leeches and blisters should be applied in alternate succession till the pain be completely subdued; if, however, there be fever, then, in addition to the means just noted, general blood-letting, proportioned to the extent and severity of the fever, will be advisable: sometimes the symptoms will be merely those of deranged function, without any indication of a structural derangement. If the functional disorder be attended with fever, then moderate venesection, repeated occasionally and at proper intervals, will be useful; and, if judiciously applied, will often prevent the disorder from spreading to other parts.

The functional disorders of the stomach and bowels are acidity, flatulence, diarrhœa, constipation, or tenesmus, attended with griping, and mucous or bloody discharges.

Acidity is to be corrected by absorbents and aromatics. The alkalies are the best absorbents, but if the views laid down with regard to the exciting causes of diabetes be correct, the alkalies in such cases are objectionable. Magnesia or

lime may be tried with less prospect of disadvantage. Flatulence may be treated with carminatives and the fœtid gums.

Flatulence and acidity may often be prevented by an attention to the diet. Certain articles of food, in a disordered state of the stomach, are disposed to undergo the different species of fermentation; thus, vegetables in such cases more readily undergo the acetous fermentation, and animal food the putrefactive. We must endeavour to ascertain which is the prevailing tendency in the stomach, and suit the diet according to circumstances. Recently prepared carbon will often remove this tendency to fermentation, and may be advantageously added to the absorbents which we prefer. It will be necessary to attend to these circumstances in children, as sometimes very violent effects have arisen from the exhibition of mercury, when acidity of the stomach prevailed. In such cases, not only have hydrocephalus and other severe diseases been induced, but even life sacrificed by the unguarded administration of a mercurial.

Diarrhœa more frequently attacks diabetic children than adults; it often arises from acid matter, preternaturally exciting the irritable and delicate intestines of young subjects; it frequently arises from the injudicious exhibition of mercury, under

a mistaken notion of the scrofulo—mesenteric character of the disease, a view to which the hardened, tumified abdomen and general emaciation readily lead.

This symptom is to be corrected by mild mucilaginous injections, absorbents, and astringents. Small doses of Dovers' powder answer remarkably well; but as opium, generally speaking, does not accord with the delicate constitutions of children, I have advantageously substituted hyoscyamus for the opium in the same formula. The proportion of the hyoscyamus may be increased, according to the views of the practitioner. When the violence of the symptoms have been reduced, the stomach and bowels may be strengthened by doses of rhubarb, which, if well managed, will be found an excellent stomachic.

Constipation so frequently attends on diabetes in adults, that it, and a voracious appetite, have been considered as essential parts of the definition. However, I believe diabetes may prevail without either.* Constipation generally attends, because it seldom happens that two excretive functions are

* In Magendie's Journal, a case is related in which the patient passed fifteen pints of urine daily. This case was successfully treated by blood-letting. It is also stated, that the appetite was not considerable at any period throughout the progress of the disease.

preternaturally exerted at the same moment. When the constipation seems to depend merely on a torpor of the alimentary tube, purgatives must be given. Colocynth, aloes, and soap, formed into pills, present us with a useful and efficacious purgative; and when not sufficiently active, if taken over night, and their action quickened by a senna draught on the following morning, they will thus be rendered more effectual; if, however, they should still be found inactive, the addition of a little camboge will generally answer our purpose. When camboge is prescribed, the soap, unless under particular circumstances, should be omitted, because the camboge is already too soluble in the stomach, and requires to be combined with aloes, or some other substance of more sparing solubility, to prevent its passing off too quickly.*

There is, however, another cause of constipation, which is now too well understood to admit of much discussion here—I mean a deficient secretion of bile. A change in the chemical constitution of the bile may lead to the same result, but as the mode of treatment is similar in both, it is not necessary to consider them separately. Mercury is avowedly the most decisive agent with which we are acquainted in such complaints.

* See Paris's Pharmacologia.

When the disorder of the liver is merely functional, but that fever prevails, venesection, as already recommended in the disorders of the stomach and bowels, must be practised. Frequently, where there is no fever, but that the disorder proves obstinate, leeches alternated with blisters will render it more tractable.

Of the different preparations of mercury, calomel, if not otherwise objectionable, is the most efficacious. Where acidity,* however, prevails,

* Dr. Prout has stated, that the muriatic acid frequently prevails in the stomach of dyspeptics, and Dr. Graves has found free lactic acid under similar circumstances. Calomel readily undergoes decomposition, but if muriatic acid should be the prevailing one, we readily understand the formation of corrosive sublimate.* Where the lactic, or any other free acid, is the prevailing one, probably the base is shared between them; consequently, with lactate of mercury must also be formed corrosive sublimate. With respect to the powers of attraction exerted by a mineral acid, and a weaker one for the same base being in opposition to this doctrine, I would beg leave to remind the reader, that the insoluble muriates, and those in the dry state, are merely simple binary compounds of chlorine and the simple base, and therefore undergo decomposition more readily than those salts, the composition of which is more complex. Thus,

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* Dr. Grattan, I think, states, that calomel is not affected by muriatic acid;—under ordinary circumstances this may be true, but in the stomach new combinations are often not only assisted, but promoted.

calomel is often attended with such irritation and violent symptoms, as will prove extremely troublesome. I have seen repeated instances of this description, and many have sacrificed their prospects, and hard but well-earned reputation, from inattention to these circumstances. When acidity, therefore, prevails, we must give, at the same time, some absorbent earth, as magnesia, lime, &c., to neutralise the acid, and prevent it from decompounding the calomel. Perhaps, however, some other preparation will be found more advisable. The salts of mercury, composed with a mineral acid, are generally too acrid for internal use. The sulphate and nitrate need scarcely be pointed out as examples. The oxide, with a minimum of oxygen, will frequently answer; thus, the ash-coloured oxide, especially with children, is an excellent preparation. The hydrargyrus c̄ creta, and also that with magnesia, especially if acidity prevail, are mild and effec-

chlorides and iodlides are more readily decomposed than salts composed of an acid and an oxide. Chloride of potassium is more easily decomposed than sulphate of potass, which consists of oxygen and potassium, with sulphur and oxygen; whereas the former is a mere compound of chlorine and potassium. In the one case, it is evident that only one order of affinities merely is to be broken through, whereas in the other we have two, at least, if not more, to be overcome, before decomposition takes place.

tual preparations; the absorbent earth neutralising the acid, while the mercurial oxide gently excites the liver. The black sulphuret may also answer.

Sometimes, however, these preparations will not prove sufficiently active for our purpose. In such cases, I have used, with considerable advantage, the acetate of mercury. I have frequently seen the acetate prove a very mild and innocent mercurial, when calomel would produce severe griping, with irritation, and mucous, bloody, or purulent stools. With children, this will often be found the case. Indeed, calomel sometimes produces green stools, disordering the functions of the bowels and intestines; and, in children, this is particularly apt to happen, when it is incautiously or too freely used. The acetate of mercury is certainly worth attention where other preparations disagree.

I have, in a few instances, used the phosphate of mercury, but my trials have been too limited to admit of any general conclusions of practical utility. It is certainly an active mercurial, but what special indications it is capable of fulfilling, I am not prepared to say. It is too active as a mercurial, to be specifically applicable as a phosphate to the treatment of diabetes.

In resorting, however, to mercury, we must

not lose sight of the pernicious influence of this mineral upon the structure and functions of the kidneys. Dr. Blackall has remarked upon this subject, and I need scarcely add that I perfectly agree with him. The urine frequently becomes loaded with serum or coagulable matter* during mercurial courses. Under an active exhibition of mercury, disorganisation of the glandular and parenchymatous viscera is frequently induced. It is of importance, then, to know if we can substitute any other remedy for mercury. Two have been highly extolled, namely, chlorine and taraxacum. Of the taraxacum I have not had a great deal of experience, but from what I have had, I am inclined to think rather favourably of it. Chlorine I have used more extensively. Chlorine has been recommended as evolved in the nitro-muriatic acid bath; but I have generally preferred a saturated solution of chlorine given internally. Ten, twenty, or thirty minims may be given in an ounce of distilled water, twice, thrice, or oftener, in the day, and this dose may be afterwards increased according to circumstances. More lately, I have narrowly watched the effects of this solution upon the functions of

* See Blackall on Dropsies, also Clinical Report on Dropsies, by the Author. Case XII.

the liver, as indicated by the appearance of the stools. I have generally found the dark colour corrected, and even the bowels seem to be gently acted on. The secretion of bile seems also to be promoted, for when the stools are of a bright yellow colour, indicating a deficient secretion of the hepatic fluid, under the use of chlorine they gradually become of a deep brown. Whenever, then, either from the tendency to scrofula, or severe organic affections of the kidneys, or other organs, mercury becomes inadmissible, the solution of chlorine will be found a valuable substitute.

This solution is readily formed by passing a current of chlorine gas through distilled water, reduced to a sufficiently low temperature. The gas is absorbable by water at a reduced temperature, and is again expelled by elevating the temperature of the liquid.

In cases where scrofulous affections of the mesenteric glands are combined, the protiodide of mercury, I presume, will be found useful.

The affections of the organs of sense, of the brain and nervous system, of the respiratory and circulating systems, are more frequently consecutive of those of the digestive organs, which intervene between them and the primary disease, than the direct consequence of the primary itself.

When a disease arises thus third in the series, it generally assumes at first more of the functional character, but speedily the inflammatory one succeeds. When the sight is affected, the affection generally depends upon the state of the brain and nerves. Purging is the most effectual remedy; however, it seldom happens that any affection of the sight is severe in diabetes, unless indeed the disease has made considerable progress.

Headach often attends, and, if it be a mere nervous affection, it soon subsides, when the disease on which it depends has been properly treated and subdued. In these cases, it is to be treated like the same affection under any other circumstances. It is, however, to be noted, that as these disorders assume more of the inflammatory character, they become more independent of their source, and so far resemble original diseases. They then require bleeding, blistering, purging, and antimonial diaphoretics, together with those means suited to the disease from which they arise, but modified according to the circumstances of the case. When the cephalœa proves obstinate and troublesome, an issue inserted in the thigh or arm is often extremely serviceable. Attention to the digestive functions will be essentially necessary to perfecting the cure.

We frequently meet with palpitations in diabetic

patients, but they depend either upon flatus or the derangements of the nervous system, and are relieved by the means applicable to the treatment of those affections.

It has been already observed, that the pulmonary functions are stated to be so frequently engaged in diabetes, that these derangements have been considered by some as almost a part of the disease. In children, however, I am thoroughly convinced, the dyspnœa is merely nervous, and speedily ceases on the correction of the digestive functions. I have seen so many instances of this, that I have no hesitation in submitting the assertion to the test of future experience. Often have unfortunate children undergone the ordeal of blistering the chest, through the fears of their parents or the whims of their nurses, and these symptoms of imaginary danger have yielded readily to much less severe, but more judiciously directed measures.

When the dyspnœa is a purely nervous affection, bleeding and blistering the chest are very seldom necessary. It generally depends upon some oppression of the brain, probably a plethoric state of the vessels, and a soluble state of the bowels will be found the most efficacious means of subduing it. If there should be a considerable fulness of the vessels, then leeches

applied to the temples, and a blister to the nape of the neck, will be found very effectual. When the age of the patient will admit, and that the symptoms are very severe, opening the jugular vein is a very effectual mode of bleeding, and in many cases, I believe, preferable to opening the temporal artery.

It must not, however, be overlooked, that all these secondary affections, though at first only nervous or functional disorders, are disposed to assume the inflammatory character, and then speedily run on to change of structure. The inflammatory stage, therefore, of secondary affections is the most critical, because any error or inattention may be speedily followed by fully formed organic disease. The aphthous ulcers of the tongue, gums, fauces, &c. are examples; and if occurring in parts of more vital importance, would in all probability soon terminate existence.

When the secondary affections have assumed the inflammatory type, they must then be treated more as independent diseases. The primary may be relieved, or even wholly removed; but if the secondary have assumed the inflammatory character, it will seldom cease spontaneously under such circumstances, but will require a plan of treatment more immediately applicable to the same affection when an independent disease.

The treatment of inflammatory disease can hardly form an object of consideration here. The principles of treatment are pretty generally understood, and it merely requires that the vigour of the means be properly adjusted, and suited to the circumstances of the case.* It should be recollected, that the constitution generally suffers during the progress of these diseases, and that the same activity of measures, indicated under other circumstances, can not be safely adopted in the cases under consideration. Indeed, I have, in a few instances, been obliged to recruit the strength by a cautious administration of tonics, to enable the constitution to resist the debilitating effects of depletive measures, so that their salutary effects, only upon the actually diseased part, might be obtained. The proper treatment of such cases is perhaps one of the most complex objects of our science, and the physician, who is much engaged in such practice, will readily acknowledge, that upon occasions of this kind it is much less difficult to teach by precept than by setting example.

* See the Theory and Treatment of Organic Disease, &c. by the Author.

CHAP VIII.

PROPHYLACTIC TREATMENT.

When we have succeeded in relieving or removing the more urgent symptoms, and especially in controlling the profuse discharge, as well as correcting the morbid qualities of the urine, we must next turn our attention to fortifying the system, and instituting such regimen as may tend to prevent a relapse. Relapses are always dangerous, and the symptoms are generally both severe and obstinate. In the first place, we must enjoin a strict adherence to temperance both in food and drink, and when we can perfectly trace the origin of the disease to any irregularity, either in the quantity or quality of the diet, these circumstances must be pointed out to the patient, and the danger of any future excess or irregularity forcibly impressed. Not only those causes which may seem to have induced the disease in each particular instance should be shunned, but also those which have been enumerated as occasional or exciting should be carefully avoided. It should be remembered, that a convalescent is always more susceptible than a person in the vigour of health, and is therefore very liable to the morbid

effects of causes, which, perhaps, in a more perfect state of health, he would have readily resisted.

It will be recollected, that not only the disease itself, but the means of cure, are both powerful agents in inducing debility of the system. It will, therefore, be necessary to endeavour to increase the general strength; but we must be extremely cautious in our efforts to effect this object, lest we do it at the expense of some vital organ. It is commonly in the treatment of general debility, that the foundation of organic diseases is laid. This may be readily understood: all parts of the system do not partake equally of the debility, and consequently the excitability and activity of some organs are more easily aroused than that of others. There are none which retain their excitability to such an extent, nor whose activity is so speedily aroused, as that of the heart. Hence the necessity of temperance, for the heart is soon stimulated to preternatural action by any excess or irregularity. Hence, too, the caution necessary to be observed in the administration of tonics, or exciting remedies. The heart is speedily stimulated by their use, the momentum of the circulation increased, and thus more blood thrown into the debilitated organs than they can dispose of. Thus are

induced inflammations, congestions, and other diseases of the circulating system. Bark and steel, wine and brandy, are frequently thrown in so immoderately, that not only is the stomach completely oppressed, and its functions overpowered, but fevers and inflammations excited where previously they did not exist. I think it may be laid down as a general principle, that tonics and stimulants, more especially those above noted, should hardly ever be exhibited when there is much fever present. The exciting effects of bark may certainly be subdued, or considerably diminished, by combination with antimonials, but such a combination cannot always be given to the full extent necessary to insure only the advantages to be derived from the tonic influence of the bark.

I myself have great faith in the powers of sarsaparilla. It seems to elevate the tone of the system generally and equally, and it certainly promotes the action of the skin,—a circumstance of considerable importance during the convalescence from a disease, in which the functions of this organ have been wholly arrested. Sarsaparilla is really a valuable remedy: if judiciously administered, it softens the pulse, relaxes the skin, and, while it promotes all the functions, elevates the general strength. The mind at the

same time becomes cheerful and composed, and, indeed, a general exhilaration of the spirits takes place, without the risk of any important general or local sacrifice.

In some cases, however, sarsaparilla seems to oppress the stomach, and then it thus indirectly induces nausea, languor, and other distressing symptoms. These effects may, in most instances, be obviated upon the principles already laid down for obviating the same effects from mercury and other remedies. The exhibition of a bitter draught about an hour previously to the dose of the sarsaparilla, will so strengthen the tone of the stomach, as to enable it to resist the depressing effects of the remedy. In many cases, the combining the dose of the sarsaparilla with the bitter draught answers remarkably well. The draught should usually be composed of the infusion of some of the milder bitters with an aromatic, which renders it still more grateful to the stomach.

The sulphate of quina is a valuable remedy, and from the few trials which I have made of its effects upon the constitution, I do not think it, even in a much larger dose than that usually prescribed, so objectionable as the bark itself. However, upon this subject I cannot as yet speak positively, and therefore the reader must

either depend upon his own experience and judgment, or else look to more competent sources for information and guidance. Upon the whole, it may be observed, in conclusion, that the prophylactic treatment consists generally in increasing the strength and promoting the healthy action of the different functions, and the proper regulation of diet, air, and exercise,* and shunning intemperance.

* Upon the last subject, the reader may consult the "Theory and Treatment of Organic Disease in General." See Appendix to Clinical Reports.

APPENDIX

OF

DISSECTIONS AND CASES, &c.

DISSECTIONS.

A LITTLE boy, aged five years, had enjoyed but a very indifferent state of health for upwards of two years. He first became dull and listless, and quite averse to his usual playful exercises. He soon after began to emaciate, and the wasting at first proceeded very rapidly, but afterwards more slowly. He frequently complained of headach; his eyes were somewhat prominent, and the pupils rather dilated. The bowels were occasionally out of order, but at the commencement their functions were easily corrected. In the progress of the complaint, the abdomen became slightly enlarged, and then mesenteric disease was suspected. The appetite continued good till nearly the last. A cough frequently set in, and then the patient was considered phthisical.

Several practitioners were consulted upon this case, and various opinions as to its nature de-

livered. These seemed to have been formed from the symptoms most prominent at the moment of seeking advice: thus, if the head was the part most remarkably engaged, the case was regarded either as actual or approaching hydrocephalus. When the abdomen was most affected, the disease was considered as a mesenteric affection; but when severe cough and dyspnœa were present, tubercles were presumed to exist in the lungs. Medicine, however, exerted no control over the progress of the disease. There was no distortion of the spine, nor any enlargement of the joints apparent.

This child ultimately came under my care; and I adopted, and subsequently abandoned, each of the above opinions, and this, too, several times in succession. No plan of treatment adopted, (and a great variety had been recommended and pursued,) seemed to exert any influence over the disease. The patient at last became generally anasarcous, and died. When the dropsical symptoms set in, it was ascertained that the urine had been previously discharged in great quantity—at times exceeding eight pints in the day—but, on the appearance of the dropsical symptoms, the discharge of urine greatly abated. The child died very soon after the appearance of the dropsical symptoms, and I examined the body.

On opening the abdomen, the bowels presented a natural appearance, except that they were somewhat distended with air. There was a little serous fluid in the cavity of the peritoneum, but in no great quantity. On opening the stomach, the mucous membrane seemed slightly turgid in several places, and similar appearances presented in different parts of the alimentary tube. But this vascular fulness was by no means sufficient to constitute disease. The liver was healthy in its structure, but wasted. There was nothing remarkable in the appearance of the pancreas or spleen. There were scarcely any appearances of disease in the mesentery—here and there a gland slightly enlarged. The abdominal viscera were now removed, and the kidneys examined. These organs were found in a very diseased state. The right kidney was greatly enlarged, and its vessels turgid with blood. The substance of the kidney felt soft and flabby to the touch. On cutting into it, dark-coloured fluid blood flowed out in abundance. A considerable quantity of a whitish, thin, glairy fluid was found in the pelvis and ureter. The left kidney presented nearly the same appearances, only, perhaps, not quite so much diseased as the right. The emulgent arteries were much enlarged.

The bladder was not diseased, but contained a

quantity of a whitish fluid, similar to what was found in the pelvis of each kidney; but, when washed off the surface which it lined, the mucous membrane underneath appeared quite healthy.

In the chest a little watery fluid was found, but the structure of the contained viscera was perfectly healthy. The brain presented no appearances of disease.

Remarks.—I have not thought it necessary to submit particular examples of the morbid anatomy of diabetes: but this, and the succeeding dissection, seem to me sufficiently interesting to justify my bringing them specially under the notice of the reader. The present case will naturally suggest the propriety of attending more particularly to the urinary discharge of children; more especially, in those cases of emaciation which are intractable and otherwise unintelligible; while the disorganised state of the kidneys will shew to what extent disease may proceed, without any manifestation of those symptoms* which specifically characterise its nature.

* Undoubtedly the urine was discharged in great quantity, and, if examined, it is highly probable its character would have been unhealthy; but this was never once thought of. This is hardly to be wondered at, when we consider how seldom practitioners trouble themselves about the morbid characters of the urine, especially in children.

DISSECTION II.

A WOMAN who had suffered from diabetes for a long period, and who had tried a great variety of remedies without any benefit, at last became dropsical, and died. This patient always complained of a very severe pain in the loins, extending from about the tenth or eleventh dorsal vertebra to the middle of the sacrum. I shall not trouble the reader with the general appearances, but merely detail those which presented on examining the spinal marrow.

The theca vertebralis, or sheath, was very vascular, and its vessels turgid. The veins appeared enlarged, full, and prominent. The marrow itself felt unequally hard throughout its length. In one spot it seemed dissolved or softened down into a kind of excavation of its substance. This excavation did not resemble in its appearance one proceeding from ulceration, but seemed rather as if it had been scooped out at that spot. The excavation was about half an inch in length, of an oval form, and was situated between the lower part of the last dorsal, and upper portion of the first lumbar vertebra. A degree of *low* inflammatory action seemed to have pervaded a considerable portion of the column, both above and below the excavated part, as several flakes of coagulated

lymph were found deposited upon the marrow and internal surface of the theca, or sheath, which was itself inflamed in several spots.

Remarks.—One or two interesting questions arise out of this history. Was the disease of the spinal column the cause, or merely a consequence, of that of the kidney? or was it an accidental circumstance, neither directly nor indirectly—mediately or immediately—connected with the diabetes? I regret much, that, in the only opportunity which has since occurred to me of prosecuting this inquiry, I was at first assured of permission to examine the body, yet, on my attending with a friend* for that purpose, the permission previously granted was now peremptorily refused. If we could discover a single instance in which no diseased appearances could be traced in the spinal column, then it could no longer be doubted that the primary seat of the disease is not confined to this part. I have been unable to come to any decision upon this subject, and I have, therefore, been anxious to direct the attention of the morbid anatomist and pathologist to the inquiry; that such gentlemen as have opportunities may be induced to institute a proper investigation, and such as may prove decisive of the question.

* Mr. James Brooks.

CASES, &c.

CASE I.

MAY 20, 1818.—I accidentally saw a little girl, about eighteen months old, and which had been weaned about ten or eleven. The child, during the time it was nursing, throve remarkably well; but suddenly, after weaning, its spirits failed, its health declined, and it gradually wasted, till it had at last become almost a skeleton. The appetite continued good, or, it should rather be stated, was voracious, and there was an insatiable thirst. The abdomen appeared full, and prominent, and felt somewhat hard to the touch. The bowels were alternately costive and relaxed, and the stools frequently green coloured. The skin hot and dry, felt harsh, and seemed quite loose and flabby. There was a soft, moist cough, without any dyspnœa, but the respiration was a little hurried.

This infant's complaint was at one period supposed to be tabes mesenterica, and was treated accordingly. When the cough set in, the lungs were considered as beset with tubercles. As the parents resided in a very bleak situation, it was deemed advisable to remove the child for change of air. This plan was tried for a month or six

weeks; but no improvement having been effected, the child was brought home again. Six weeks after this period I saw it, and a more miserable-looking object I never beheld. The tongue was moist, but covered with a whitish mucus. The head was rather large; but there was no swelling of the joints, nor any distortion of the spine.

Upon inquiry, I was told, among other things, that the urine was natural; but having requested that the quantity passed between this and the next visit should be preserved, it was found, by admeasurement, to amount to very nearly four pints during the twelve hours, independently of what was passed during the night, and could not be saved. The urine had a wheyish appearance, but little taste, and no smell. Its specific gravity, on the average of several trials, 1·018. It neither coagulated by heat nor by nitric acid. A solution of acetate of lead and of corrosive sublimate rendered it more turbid immediately on the addition, but, after standing, it became more transparent.* A whitish powder precipitated from the muriate of mercury.

The child's bowels being at this period irregular, and the stools rather greenish, they were

* This was, no doubt, owing to the coagulation of mucus and other animal matters, which, having precipitated the urine, became clear, and more transparent.

emptied by laxative enemas, and a few drops of the saturated solution of chlorine were given in distilled water three times a day. I then directed two grains of phosphate of iron, half a grain of rhubarb, and three grains of aromatic powder, to be given for a dose, and repeated thrice every day. In about a fortnight or three weeks, the quantity of urine was reduced to a quart in the twelve hours. As the quantity of the phosphate had been gradually increased, the dose amounted at this period to five grains, three times a day. No inconvenience whatever arising from the medicine, the dose was gradually increased; and, at the end of six weeks, eighteen grains were given in the twenty-four hours, and the urine was reduced to very nearly its natural quantity.

The appetite had been reduced considerably, but it now began to fail altogether. The dose of the phosphate was therefore reduced to six grains in the course of the day, and the urine at last becoming natural, it was entirely left off.

The appetite, however, did not improve, and the skin continued dry and harsh. The warm bath was now directed, and small doses of the James's with Dover's powders given to relax the skin. The abdomen continued full and tumid; and the powders, though evidently relaxing the skin, seemed to disagree with the stomach. The

bowels were now cleared out by an infusion of senna and tincture of jalap; and then a light bitter draught, consisting of infusion of wormwood with tinct. of cascarilla and rhubarb, were given about an hour before each dose of the diaphoretic powder. Under this plan the abdomen rapidly decreased in size, the skin became moist and soft, and all the functions assumed their healthy character. At the end of three months the convalescence was perfectly established; a course of sea-bathing was now directed, and this child is at present one of the most healthy members of the family.

Remarks.—The reader will readily conclude, that the emaciation, in this instance, arose from the inordinate action of the kidneys; and it is also evident, that such cases may be easily mistaken, and the patient fall a victim, from attention to an imaginary disease, while the real one is neglected. The change, perhaps, from the mild, bland diet furnished by the mother, to one of a more oppressive, and probably more stimulating nature, might easily affect the functions of the kidneys, especially if there existed an unusual excitability of these organs. It frequently happens, on the weaning of children, that they emaciate, and often die; and yet no obvious disease, or cause of disease, is detected. Such

cases, I believe, are often dependent on a wrong or excessive action of the kidneys; and, unless I am grossly deceived, phosphate of iron will be found one of the most effectual astringents and corrigents of this action hitherto tried. None, I presume, will dispute its efficacy in the present instance, nor assign the success to any other part of the treatment.

CASE II.

M. T——, a little girl, aged sixteen months, though born of scrofulous parents,* yet seemed very healthy for nearly a twelvemonth after its birth. The child's health, however, began to decline soon after weaning,† which took place at about eight or nine months old. The appetite had increased to a most extraordinary degree; and when I commenced my attendance, although the child ate and drank voraciously, yet it seemed almost a perfect skeleton. The bowels were generally irregular, green-coloured stools being frequently passed. The skin was dry and rough,

* The scrofulous diathesis, too, was strongly marked in the other children, of which there were two.

† The mother was unable to nurse the child herself, and therefore another nurse was provided.

but there was no unnatural elevation of temperature. The spine was slightly distorted; the abdomen full and prominent, but not to any very extraordinary degree.

The symptom, however, of most interest in this case, and which has induced me to introduce the history here, was the profuse discharge of urine, the quantity of which frequently exceeded three quarts in the day. This circumstance the mother had not noticed to the professional gentlemen who preceded me, neither would she, of her own accord, have directed my attention to it, as she conceived it to be a natural consequence of the great quantity of drink which the child made use of to relieve its thirst. However, it was found, upon instituting an inquiry, that the fluid consumed seldom exceeded three pints. On the first appearance of illness, thirst was the most remarkable symptom, and the nurse usually indulged it with whatever happened to be near. The urine was neither saccharine nor serous, nor did it appear to abound in urea. Its specific gravity was 1·010. It was acid, however, reddening litmus-paper, and discharging the red colour given to turmeric-paper by a carbonated alkali with effervescence.*

* The superabundant acid in this case seemed to be the phosphoric. This I presumed from the following trial. Healthy urine

I endeavoured to correct the bowels; and having effected this, I gave the phosphate of iron in active doses, and small doses of the subcarbonate of soda. However, notwithstanding my efforts, the child grew rapidly worse: I therefore requested the parents to seek farther advice, and Dr. Barker, Professor of Chemistry in the University of Dublin, was consulted. He advised carbonate of iron with phosphate of lime; but nothing seemed capable of arresting the disease. The child soon after became comatose, and in less than a week died, slightly convulsed.*

Remarks.—This history presents us with interesting matter for reflection. Were the rickets

contains the phosphates of soda and ammonia. Having filtered a portion, a solution of sulphate of iron was cautiously added, till phosphate of iron ceased to precipitate. The decanted urine was again passed through a filter, and was still found acid. The acid was neutralised by a solution of soda, and again a solution of sulphate of iron was added, when phosphate of iron was precipitated. Dr. Prout conceives, that healthy urine will affect the colour of litmus-paper, in consequence of the lithate of ammonia, which it contains in solution, reddening vegetable blues. However, if a weak solution of carbonated alkali be used to colour turmeric-paper, this will indicate the presence of an acid, not only by the discharge of the colour, but by the effervescence which attends, and may be perceived.

* I could not obtain permission to open the body.

the cause, or merely a consequence, of the diuretic discharge? or, are the two so closely and intimately connected, as to preclude the possibility of developing the nature of the association? I think an increased flow of urine will be found to attend the commencement and progress of rickets, much more frequently than is generally imagined. The urine in these cases is often acid, and probably contains a large proportion of free phosphoric acid.* I have related the case, not as an example of successful practice, but as calculated to excite professional attention to a subject of inquiry, which hitherto has been too much neglected.

I am unable to detail the earlier history of this case, because the child was absent from home at the commencement of the attack, so that I did not see it till a considerable time after, and when the disease was far advanced.

CASE III.

July 5, 1819.—J. F——, a little boy, aged ten years and two months, was just returned from the sea-coast, whither his parents had sent him, at

* The earthy basis of the bones is said to pass off by the urine, as oxalate of lime, in this complaint.

the suggestion of a professional gentleman, to try what effect bathing and change of air might have upon his health, which had been declining for upwards of two years. I accidentally saw him on his return.

There was at this time great emaciation, with headach, thirst, and sometimes nausea, which occasionally amounted to vomiting. The pulse was hard, frequent, wiry, and contracted. There was cough, with dyspnœa and hurried respiration, slight expectoration of a glairy mucous-looking fluid. The abdomen full and prominent; the bowels sometimes constipated, sometimes relaxed, but the evacuations generally well coloured. The skin dry, with a good deal of febrile heat; the appetite remarkably good. The urine was discharged in great abundance, frequently amounting to eight pints daily. It contained a good deal of coagulable matter, as appeared from the effects of heat. It was also sensibly saccharine: its specific gravity 1·020—1·025.*

This boy complained of a dull, obtuse pain of the back, in the region of the kidneys. This pain, or rather tenderness, for it hardly amounted

* When the quantity is taken into account, the specific gravity of this urine will be considered very high.

to pain except upon certain occasions, gave him so little uneasiness that he did not complain of it. Upon pressure, however, he felt it acutely; and if continued, or strong compression used, it made him sick, and even brought on vomiting. The nausea and vomiting frequently came on spontaneously, on which occasions the cephalea became more urgent and severe. The disease was presumed to be water in the head; and under this belief mercury was pretty freely used, which excited considerable irritation in the constitution. The cough, dyspnœa, hurried respiration, with the nausea and vomiting, also excited the suspicion of a phthisical taint, but no relief was obtained from the different modes of treatment adopted.

Immediately after the treatment devolved upon me, I took away six ounces of blood from the arm, and directed small doses of antimonial and Dover's powders to be repeated at proper intervals. The bowels were also kept regular by infusion of senna with powdered jalap. The blood having buffed and cupped, the bleeding was repeated at first every week, and afterwards at intervals of a month;* gradually diminishing the quantity at

* This patient was bled, in all, eight times, and about twenty ounces of blood were drawn off.

each subsequent blood-letting. Leeches were also applied to the loins; and a mustard cataplasm, extending over the region of each kidney, was laid along the lumbar spine.

The effect of this treatment was a reduction of the febrile heat, with relaxation of the skin, and softening of the pulse. The urine diminished about a quart a day from the former quantity, and the coagulable matter disappeared. It became, however, more sensibly saccharine.*

I then directed the phosphate of iron, in combination with a light bitter and rhubarb. The phosphate was taken at first in doses of three grains, three times a day, and was afterwards increased to fifteen. At first the medicine oppressed the stomach, but a cumin plaster, and a few bitter draughts, speedily subdued this effect.

The antimonial, &c. was discontinued, when the phosphate of iron was commenced; but as the skin began again to manifest its dry, harsh, febrile condition, the Dover's powder, &c. was resumed, with an occasional use of the warm bath.

The improvement soon became remarkably

* This, independently of the diminution of the watery part, was probably owing to the disappearance of the coagulable matter allowing the saccharine to become more sensible.

evident; the thirst and increased appetite subsided, and the urine, which had greatly diminished in quantity, gradually lost its saccharine taste. The patient soon recovered strength and regained his flesh, and the urine at last became natural. Whenever the bowels seemed tardy, they were gently excited by infusion of senna with tincture of jalap; and what seemed at first almost a hopeless case, assumed at length a most promising appearance. At the end of four months this boy's health was perfectly restored, and, as far as I know, has not since been in any way affected.

Remarks.—I could not, in this instance, discover what had been the exciting cause of the deranged action of the kidneys.* Indeed, in such young subjects, the causes of disease are so varied, and so involved in obscurity, that it is frequently difficult to ascertain their nature, or to discover any thing in the history which may lead to even a probable conjecture. The organs, generally, seem susceptible of various impressions from different agents; but, in young subjects, they are so much more excitable than at an advanced age, that an agent which would

* Dr. Prout considers an hereditary disposition a frequent source of diabetes. See also Chap. III. p. 27, of this Treatise.

scarcely affect an adult, will excite an infant in a dangerous degree.* For instance, diuretics seem capable of exciting the urinary functions; but at different periods of life, or under different circumstances of health in the same individual, the effects of the same diuretic will vary considerably. Some individuals, too, are affected by certain agents in a manner which differs considerably from the general law. These effects are explained by supposing a peculiarity of the organic sensibility, and which is technically termed idiosyncrasy.† I understood that this patient indulged in unripe acid fruits; but the statements made upon the subject were by no means satisfactory.

I have no doubt that structural, as well as

* This is true, not only of the quality, but even of the quantity of the same stimuli.

† In a conversation which I lately had with some medical friends, one gentleman stated, that four juniper-berries fresh plucked, and which he ate, proved so powerfully diuretic with him, that he passed nearly a chamber-potful of urine in the course of the night. I was also informed by another, that gin ‡ and water has precisely the same effect in his person. I have already mentioned the case of a gentleman with whom hot fluids are diuretic. He can take cold brandy and water without inconvenience, but hot would immediately excite such a diuresis, that he could not resist emptying the bladder.

‡ Gin is a spirit of juniper.

functional, derangement of the kidneys had taken place; and had not active measures been instituted, there can be very little doubt that the case would have terminated fatally. The relief obtained will probably be attributed to the general means, rather than to the phosphate of iron. There can be little question of the superior efficacy of an active plan of treatment. Whether this would have succeeded without the phosphate of iron, I shall not venture to determine; but I think it may be boldly assumed, that neither phosphate of iron, nor any other remedy, could have succeeded as a specific in such a case, and that, under such circumstances, vigorous antiphlogistic measures should form an essential part of any plan of treatment, whatever its description. We well know that medicines are often prescribed in vain, and have been even persevered in, under such unpromising circumstances, to an unwarrantable extent. In such cases, a single blood-letting will often bring the system in general, and the diseased organ in particular, so completely under the influence of the medicines which have been already administered, that recovery instantly commences, and goes on progressively till completed, without any farther assistance from internal remedies.* Were this

* See Case XII.

a proper opportunity, I could adduce many facts in illustration of these views.

CASE IV.

Ann Sandys, aged eight years, March 9, 1820, complains of great weakness, with headach, cough, dyspnœa, and a variety of other symptoms which simulate a phthisical affection of the lungs. There was a great degree of emaciation, rather more than generally attends a consumptive case. The thirst was urgent, and the appetite voracious. There was fever, with a hard, frequent pulse; the tongue furred, and the bowels constipated. The alvine discharges were unnatural in their appearance, being generally dark coloured, frequently approaching pitch in colour and consistence. The abdomen felt full, and was rather prominent. A pain was occasionally felt in the hypochondrium, but it was not a permanent pain; when present, there was a manifest fulness of the part.

The most remarkable symptom, however, was the discharge of urine, which, by admeasurement, varied from six to eight pints in the twenty-four hours. The urine was sweetish to the taste, pale, and transparent: specific gravity from 1·033 to

1·035. There was considerable pain in the loins, and the patient could seldom sit up long without feeling great weakness and aching in the lumbar spine. When the region of the kidneys was forcibly compressed, nausea was excited, and if the compression was continued, vomiting was induced. I received the following history:—

This child had been delicate from the period of its birth. About eighteen months ago, it was attacked with small-pox, and during the convalescence from this complaint, pertussis or hooping-cough came on. About six months before the present date, the child was attacked with scarlatina, which was immediately followed by measles. The exanthemata run what might be called a mild course, no very urgent symptoms having appeared. But upon the subsidence of the measles, the child was attacked with pulmonary symptoms and emaciation, which proceeded rapidly. A kind of hectic fever, with thirst and voracious appetite, set in; and under these circumstances I saw her.

As there was considerable fever, with a harsh, dry state of skin and contracted pulse, I drew off blood, and applied leeches to the hypochondre where the pain was felt. The evacuations being discoloured, I prescribed calomel in small doses, with the view of exciting the liver. The calomel

irritated very much, and seemed rather to increase the unnatural appearance of the fæces. I tried several preparations of mercury, as the grey oxide, the hydrargyrus c̄ creta, the acetate, &c., but mercury, in every form, seemed to disagree. In this exigency I gave the extract of taraxacum, and the saturated solution of chlorine. These seemed to agree very well, and the evacuations assumed a more healthy colour and consistence under their use.

But little effect, however, upon the urinary discharge was thus obtained. The diuresis still continued excessive. Leeches were now applied to the loins, and the phosphate of iron given in doses of three grains three times a day. This dose was gradually increased. The phosphate, although it seemed to control the urinary discharge, oppressed the stomach very much, and therefore a mustard cataplasm was applied to the epigastrium. By these means the depressing effects were counteracted; but on the subsidence of the irritation externally, the depression was renewed internally. This inconvenience was remedied by the application of a cumin plaster, the sinapism being considered rather too severe a remedy.

The sweetness of the urine was gradually but slowly removed, under the continued use of the

phosphate, and the discharge itself was considerably reduced in quantity. There was, however, a certain point, beyond which the amendment could not be urged by these means. As there was severe lumbago, with a nauseating pain, felt on strong compression of the loins in the region of the kidneys, and a degree of hectic fever, with a harsh, dry state of skin, antimonials, with an occasional warm salt-water bath, were directed. An issue was also inserted on each side of the spine, immediately over the tender part. These measures seemed to exert some control over the symptoms, but the strength seemed to be much exhausted. The powers of the constitution were, therefore, supported by a cautious exhibition of bark, which was now less objectionable, as all the pulmonary symptoms had disappeared. The antimonial was therefore suspended, and the bark and phosphate of iron trusted to, while the bowels were kept free by the infusion of senna with vinum ipecacuanha.

At the end of five months I considered the patient so far convalescent, that the issues were allowed to heal up, and she went to the coast and bathed in the sea,* from whence she returned

* Here she took powdered sarsaparilla, suspended or intermixed with the compound infusion of orange peel, which im-

the following November perfectly well; nor during two years, in which I had an opportunity of frequent communication personally, was there the slightest tendency to relapse.

Remarks.—This case is interesting on several grounds. It appears to me, that the exciting causes of the different derangements which took place were the exanthemata. I know of no diseases more pernicious to the health of children than these. It has been remarked from the earliest records of medicine, that the sequelæ of these diseases are far more dangerous and fatal than the actual diseases themselves. Nor has this any relation to the severity of the exanthematous symptoms; for it often happens that an apparently very mild form produces a very severe and aggravated order of sequelæ. The lungs, brain, liver, spleen, eye, &c. are often severely attacked on the subsidence of measles and similar diseases, and in scrofulous habits the most direful consequences frequently ensue. It often happens, that a child which has gone through these eruptive diseases, without any remarkably severe symptoms before the convalescence has been completed, emaciates, without any obvious

proved the appetite, renovated the strength, and at the same time relaxed the skin.

cause to which such an effect can be attributed. In such circumstances it is advisable, at least, to examine into the health of the urinary functions, for hence, perhaps, may be discovered a cause of disease which often escapes more ordinary observation. The earlier this discovery is made, the more tractable we shall find the complaint. But as the sequelæ of eruptive fevers are apt speedily to terminate in organic derangements, it is evident we can have but little chance of benefiting a patient, if this state of things have been allowed to supervene. The functional disorders of other organs, as the brain, lungs, heart, skin, &c. are generally attended with effects too remarkable to escape even common observation; but the functions of the kidneys must be inquired into by the practitioner himself, or otherwise, if he be not deceived, he will not be fully informed in the minute and more important history of the case. In young patients, such symptoms excite no attention; and even in those of riper experience they scarcely attract any notice, till they have attained to a considerable degree of severity.

CASE V.

April 4th, 1822.—I was requested to visit the son of a gentleman belonging to the Civil Department of the Ordnance. This was a boy about nine years old, who, having been attacked about sixteen months before with measles, almost immediately after the disappearance of the eruption, emaciated, at the same time becoming hot, feverish, and thirsty. The disease continued to advance without any interruption; and cough, dyspnœa, hurried respiration, with an expectoration of muco-purulent matter, set in. The boy complained very much of his head, and the cephalea was sometimes so severe as to threaten delirium. The pulse was unequal; sometimes it was frequent, quick, and contracted; at other times it was more slow and full: however, it was invariably hard. The tongue was moist, but felt clammy in the mouth, and was coated with a whitish mucus. When uncoated, it was of a bright red colour. The bowels were irregular, generally constipated, and the evacuations discoloured. The abdomen was somewhat tumid, and to the touch gave the sensation as if loaded with feculent matter. The appetite was tolerably

good: a pain was very sensibly felt on pressure of the epigastrium.

The urine was discharged in the quantity of seven pints daily, but how long this had been the case could not be ascertained, as the circumstance had not attracted notice till my inquiries. It was neither saccharine nor serous; on the contrary, its taste was intensely bitter and saline. It was rather pale coloured and transparent, but nitric acid deepened it very much, and urea was abundantly precipitated. Specific gravity 1·0288.

I directed the bowels to be emptied by a sufficient dose of the compound powder of aloes with calomel. Leeches were applied to the epigastrium where it felt tender. About six ounces of blood were taken from the arm, and the bleeding was repeated four times in the course of six weeks, diminishing the quantity drawn off at each subsequent operation. Leeches were repeatedly applied, till the tenderness of the epigastrium was almost entirely subdued, and then the emplastrum ammoniæ was put on, and renewed at the proper intervals.

By these means, the head and chest were relieved, the bowels freed, and the quantity of urine reduced to about four pints in the twenty-four hours, the specific gravity brought down to 1·022, and the general health seemed much

improved. The evacuations, however, continuing discoloured, I prescribed the acetate of mercury in grain doses, at first twice, and afterwards three times a day; and the bowels were at the same time kept soluble by infusion of senna and tartrate of potash. Under this plan, the colour of the alvine evacuations was soon improved; but the urine continued to be discharged in the same over-proportion. The skin continued hot and dry, and the thirst remained unabated. I now directed the warm bath and small doses of Dover's powders. The patient also took the phosphate of iron in doses of five grains, with a grain of rhubarb, at first twice, and afterwards three times a day.

The quantity of the urine was thus soon reduced, the skin relaxed by the warm bath and Dover's powders, and these two functions gradually resumed their natural and healthy relations. The patient was so far recovered by the middle of July, that I considered the convalescence fully established. However, as a good deal of debility remained, I directed an infusion of bark with tincture of cascarilla as a tonic, and that the patient should bathe in the sea daily,—a practice which was followed by the most happy consequences, as this boy soon recovered his flesh and strength, and became perfectly well. I have not heard of any relapse.

Remarks.—This, I think, is another example of the pernicious consequences of an exanthema. I regarded the kidneys as the organs principally and primarily affected,* while the chest, head, and bowels, were merely secondarily engaged. When the action of the heart was reduced by venesection, and the epigastrium and bowels relieved by leeches, purging, &c. the secondary affections gave way, and were ultimately removed by acetate of mercury. This plan also reduced the excessive action of the kidneys, but, although partially reduced, it was not wholly subdued. The phosphate of iron seems to have been the efficacious agent in removing this symptom; and indeed I think, from the facts which I have already, and shall still farther state, there can be little doubt of the restringent powers which phosphate of iron exerts over the functions of the kidneys.

Although the disease seems to have existed so long, I cannot imagine that any thing like serious disorganisation had taken place, otherwise I think more active and continued measures would have

* This patient had been seen by other practitioners, who entertained different views upon this subject; and a practice founded on these views was instituted. Some regarded the head, some the chest, and some the mesentery, as the primary seat of disease; and the treatment was directed accordingly. The plans of cure, however, seemed to have proved generally unsuccessful.

been necessary, had they even ultimately proved successful.

CASE VI.

—— Burningham, an infant, in the arms of its mother, was brought to me for advice in the autumn of 1823. The forehead of this infant was prominent, the head large, and the joints swollen. There was a protrusion of the sternum, which was distorted into a kind of angular elevation, somewhat resembling the shape of a cuirass, and the ribs were flattened in, so as to exhibit a considerable degree of deformity, which was still farther increased by an ill-applied bandage.

There was no fever; respiration difficult and laborious, but seemingly not painful; the abdomen tumid, hard, and tense; the bowels irregular, alvine evacuations green coloured, and intermixed with lumps of matter of a cheesy appearance, and a tough, curdy consistence. The urine was voided in considerable quantity, and had a milky or wheyish appearance. It was not sensibly saccharine, nor coagulable by heat. The quantity amounted to from three and a half to four pints daily.*

* I did not examine the specific gravity of this urine.

This patient had been under professional management before application was made to me; and from all I could learn, I have every reason to presume that the medical treatment adopted before I was consulted, had been not only active, but generally judicious. Notwithstanding, the disease continued to increase, and the child had become a most miserable-looking object, being merely, as the mother emphatically expressed it, "skin and bones." The features, from the progress of emaciation, had become completely sharpened.

I certainly entertained a most unfavourable opinion of this case, and undertook the care of it with a degree of despondency and hopelessness, which the termination has not justified. I immediately directed a discontinuance of the bandage with which the mother had so imprudently swathed it, and desired particular attention to be paid to the diet, not so much of the child as of the nurse.* As the secretions from the bowels evidently contained some acid and acrimonious principle, the protiodide of mercury, in conjunction with chalk, was given in half-grain doses three times a day. The phosphate of iron, in

* The mother's health being but indifferent, this was also attended to.

combination with aromatic powder, was also administered, to the extent of three grains in the course of the twenty-four hours. This quantity was gradually increased till it amounted to nine grains daily, beyond which it was not necessary to increase it. The bowels were kept soluble, and their tone at the same time increased by a combination of the infusions of rhubarb and cascarilla with tincture of gentian, and, when necessary, a few drops of tincture of senna. An aromatic plaster was laid over the epigastrium and abdomen. This plan was pursued for about six weeks, occasionally suspending and then resuming the mercurial iodide. At this period,—the convalescence seeming to be completely established, the bowels having become regular, and the urine natural,—the medicine was now wholly omitted. Some slight tumefaction of the abdomen remaining, a few active doses of the compound powder of jalap were administered, which completely succeeded in reducing it, and every vestige of disease had disappeared in three weeks more.*

* I find the following note appended to the history of this case.—"May 12th, 1824. I accidentally met this patient walking with her mother. She is strong and healthy. It would be impossible to form any conception of the contrast between her appearance now, and when I was first applied to."

CASE VII.

April 27th, 1824. — Martha Guise, aged ten months. About four months ago, this child was attacked with variola, and, as described, the disease seemed to be of a malignant kind. Soon after the disappearance of the eruption, the patient was seized with a difficulty of breathing, resembling, in some of its characters, the croup. The breathing now rattling, with a stridulous cough. Constipation, febrile heat, thirst, laborious respiration, and a hard, frequent pulse, are now present. Great emaciation, with a pendulous, flabby state of the skin. The alvine evacuations, which are scanty, are of a green colour. The appetite very good. The urine remarkably copious,* of a straw or pale green colour, and emits a peculiar odour. It is not sensibly saccharine, but seems highly acid: no coagulation by heat. No immediate deposition of urea, which however precipitates abundantly after standing some time. Specific gravity of a portion passed early in the morning 1·022—1·025.

This case had been under professional manage-

* It was estimated at nearly four pints, independently of what could not be saved.

ment before application was made to me. The scrofulous diathesis was strongly marked; but there was no enlargement of the head or joints, nor any distortion of the spine. There was, however, a degree of lassitude and an inability to assume the erect posture, and, therefore, the child seemed to prefer the recumbent position. An unfavourable prognostic had been delivered in this case, an opinion in which, from the general features, I felt fully disposed to concur.

I prescribed calomel with hydriodate of potash * and James's powder in small doses, repeated at short intervals. A saline refrigerant mixture was also directed, and the bowels opened by laxative enemas. By these means the skin was relaxed, the febrile heat reduced, and a more healthy action restored to the bowels. A considerable quantity of thick, viscid, frothy mucus was ejected by vomiting. The quantity of urine was somewhat diminished, but it still continued excessive, and out of proportion to the drink and aliment consumed. I now directed the phosphate of iron

* If the reader will refer to the Clinical Report on Dropsies, &c. p. 231, or to my paper in the Medical and Physical Journal, No. 307, he will perceive that by mere triture of calomel and hydriodate of potass, a double decomposition is effected: protiodide, or, as the French term it, proto-ioduret, of mercury and submuriate of potass resulting.

in the usual manner and doses, and a galbanum plaster to be applied to the sternum. The bowels were still emptied by the repeated use of the enemas, and the skin still farther relaxed and the febrile heat reduced by the compound powder of ipecacuanha and the occasional use of the warm bath. The mercurial iodide was alternately omitted and resumed, as circumstances permitted or required. The bowels, however, occasionally became constipated, with a kind of muttering during sleep, and restless nights; but an active dose of calomel and jalap, or the compound powder of jalap, always subdued these symptoms.

May 6th.—The symptoms increased, shewing some tendency to inflammatory action. Leeches were now applied to the chest and loins, and a Burgundy-pitch plaster put between the shoulders.

17th.—The urine had diminished to its natural quantity, and although its specific gravity still continued rather high, the phosphate of iron, which had been increased to fifteen grains daily, was now omitted. The child by some means or other got cold, producing an asthmatic difficulty of breathing. A change of residence more into the country was therefore recommended.

During its absence from Henley, I learned it

enjoyed but indifferent health, and it returned again not perfectly recovered.

September 3d.—It was admitted a patient at the Dispensary, unequivocal symptoms of rickets having made their appearance. The mercurial iodide and phosphate of iron were again resumed, and, as the child was now fifteen months old, these medicines were exhibited more actively. The urgent symptoms were thus reduced, and the ricketty manifestations disappeared; but scrofulous inflammations made their appearance in the skin about the face and ancles. I now transferred the care of this case to Mr. Jeston, the attending surgeon at the time. He opened the abscesses in proper time, which discharged and speedily healed. The child's health was ultimately restored under the use of peruvian bark.

CASE VIII.

John Fossett, aged one year and seven months. Henley Dispensary, 6th April, 1825.—This child was brought to the Dispensary in apparently a most hopeless state of disease. The child was emaciated, the brain seemed greatly oppressed, the bowels were full and hard to the touch, and

constipated. Dark green-coloured evacuations were passed in small quantities and at long intervals. The child was thirsty, but not remarkably so. The eyes had a dull heavy appearance, but did not seem preternaturally sensible to the light. The skin hot and dry; the pulse quick and frequent. There was a trifling dyspnœa, with slight cough, and an exudation of frothy mucus into the bronchia and trachea, which was sometimes expectorated in small quantity. The child could neither hold up its head nor support its weight, and therefore it hung down upon the mother's shoulder. Six grains of calomel with three of ipecacuanha and a scruple of rhubarb was divided into eight equal powders, and one ordered to be given three times a day. These powders were repeated on the eighth, and the effects to be increased by an enema.

11th.—This patient was again brought to the Dispensary, and the mother informed me and Mr. Moran, who happened to be present, that the appearance of the alvine evacuations were improved, but that they were very scanty. The other secretions she stated to be healthy and natural. We therefore conceived that the brain was oppressed, through an overloaded state of the alimentary canal. Consequently, three grains of calomel with one of antimonial powder and some

sugar were ordered to be given immediately, and repeated according to circumstances; and an aperient saline mixture to be given in proper doses every four hours.

15th.—Leeches were applied to each temple, in consequence of some slight degree of coma. The stools had again became greenish, therefore the mercurial and mixture were continued, and the warm bath directed.

20th.—The mercurial seems to have increased the green colour of the stools, and besides, seems to have produced considerable irritation. I therefore prescribed as follows:—℞ *Solut. Chlorin.* ʒj. *Aquæ distillatæ* ʒvj. *Tinct. Carophyll.* ʒj. *M. st. coch.* j. *bis terve in die.*

At this period I discovered, for the first time, that the urine was passed too abundantly,—to the extent of five and six pints daily. It was of a greenish colour,* its specific gravity 1·033. Wherefore I began the phosphate of iron in grain doses, combined with colombo and rhubarb, three times a day.

22d.—The bowels more regular, and the evacuations less discoloured. The urinary discharge as before. *Augeatur dosis Phosph. Ferri ad* gr. ij. *ter in die. Perstet usu Chlorini.*

* This urine was acid, and probably bilious—hence the green colour.

25th.—The secretions from the bowels being natural, the chlorine was discontinued. The quantity of the urine has also been reduced about one pint and a half. *Cont. Phosph. Ferri.*

May 2d.—Urine reduced to about four pints: but the bowels are purged, and the stomach oppressed. Six grains of kino and two of opium were therefore added and equally divided into twelve papers of the powders of phosphate of iron, &c., and a draught of the compound infusion of gentian, with a few drops of the tincture of cloves, given about an hour before each dose of the powders.

9th.—Urine reduced to two pints: specific gravity high 1·028, still acid. The child sits erect, and recovers its spirits and healthy appearance. Flatulence. *Augeatur dos. Phosph. Ferri ad* gr. iij. *ter in die.* Some aromatic powder was ordered as a carminative, and the bitter draught continued.

13th.—Urine has increased in quantity about one pint, three pints being discharged in the twenty-four hours. Slight expectoration of mucus, bowels regular, respiration free. The phosphate of iron increased to five grains three times a day. Otherwise as before.

20th.—The symptoms nearly as at last. Three grains more of opium were added to the powders.

23d.—The urine again diminishing and becoming more natural in its appearance. *Perstet.*

30th.—Skin dry, hot, and harsh, with slight cough and dyspnœa: the diuretic symptoms as at last. ℞ *Pulv. Antimon.* gr. vj. *Pulv. Doveri* ℈j. *ft. pulv.* x. *St.* j. *ter in die. Cont. Phosph. Ferri, omitt. autem Opium. Admov. emplast. Picis Burgund. sterno.*

June 3d.—Stools unhealthy, and of a greenish or blackish-green colour.* ℞ *Solut. Chlorini* ʒij. *Aquæ distill.* ℥viij. *M. st.* ℥ss. *ter in die. Aliter ut ante.*

8th.—The urine much reduced in quantity, but the bowels still out of order; I therefore determined to try a mercurial. ℞ *Acet. Hydrarg.* gr. iij. *Ipecacuanhæ* gr. vj. *Rhei* gr. xij. *M. ft. pulv.* no. viij. *St.* j. *bis in die. Cont. Phosph. Ferri.*

17th.—Urine three half pints in twenty-four hours. Specific gravity 1·018, strongly acid: no excess of urea. Bowels much relaxed, but the appearance of the discharges much improved, and the child seems much more healthy and animated. Six grains of the compound powder of chalk with opium were ordered to be taken immediately. The mercurial continued.

* The iron, of course, would have a certain effect in this way, but it was from an inspection of the appearance and consistence of the evacuations, that I considered this symptom as meriting attention.

24th.—The child seems now tolerably well, the urine natural in quantity, the specific gravity about 1·015. The bowels regular. *Omitt. med.*

29th.—Convalescent. Discharged.

Remarks.—These three cases are interesting: in the first, a diuretic profluvium was evidently obstructing the formation of healthy osseous matter. This may be inferred from the reduction of the urinary discharge to its natural quantity and specific gravity, restoring to the child its health and strength, which it still continues to enjoy. The next was a case of a urinary flux prevailing in a scrofulous habit, still farther vitiated by an attack of small-pox of a malignant character. In this instance the symptoms were much more obstinate, and consequently counteracted with greater difficulty. However, the disease was ultimately subdued; and I feel much gratified in stating, that the time which has intervened since the discharge from professional superintendence, has confirmed the efficacy and permanency of the cure. The last was also a very hopeless case, but yet the plan of treatment adopted seems to have been successful; and I have every reason to hope that the cure will be permanent.*

* Since this case was sent to the publishers, I have had severa opportunities of observing its progress, and I have the satisfaction to find that a permanent cure has been effected.

CASE IX.

JESSE WALLIS, aged three years, was admitted a patient at the Henley Dispensary on the 6th of April, 1825, with the following symptoms:—Languor and inability to support the body or the head erect. Considerable dulness, approaching to coma; enlarged head, prominent eyes, the pupil large and dilated; thirst and febrile heat. The skin harsh and dry, the pulse frequent, quick, and indicative of considerable irritation. The bowels tumid and constipated, the evacuations dark coloured, and intermixed with lumps of curdy matter. The tongue furred, the mouth clammy, the appetite remarkably good. I examined the spine and joints, but could not perceive any deformity. There was great emaciation, all the bones protruding through the skin. As there was some flatulency, a combination of calomel, ipecacuanha, and aromatic powder, was ordered; and a febrifuge mixture of sulphate of soda, antimonial wine, and water, to be given in small and frequently repeated doses. The child became more lively and apparently in better health from the continuance of this medicine, and therefore it was not brought again to the Dispensary till the 18th of May.

It was now brought, because, although the health generally had improved, the weakness increased and the emaciation proceeded, and the child was frequently oppressed with a degree of coma. The febrile heat, thirst, and appetite still excessive. I found that the urine was discharged in superabundance—about four pints in the twenty-four hours. The colour * was a pale green, specific gravity high;† but the note which was made at the Dispensary, where the examination took place, has been unfortunately mislaid or lost.

The bowels having been stated to be somewhat irregular, three grains of calomel, with two of antimonial powder, were directed, to clear them out. Two grains of phosphate of iron, in combination with rhubarb and colombo, was ordered to be taken twice a day, and eight grains of Dover's powder at night, to relax the skin.

23d.—The phosphate was increased to six grains twice a day.

30th.—The urine was very much reduced in quantity, being but little more than a pint in the

* The colour is frequently that of new-mowed hay.

† This patient was brought to my house out of the visiting hours, at the request of a subscriber. The parents had lately come from Newbury; this attack was attributed to exposure to cold during the journey.

day. Its colour had become more natural. The specific gravity 1·018. The phosphate of iron was continued in the same doses as above, but the Dover's powders, which had been used only at intervals, were now wholly discontinued. The bowels kept free by infusion of senna, with tincture of jalap.

This plan was persevered in till the end of June, when the patient's urine having become natural both in quantity and specific gravity, and having continued so for nearly three weeks, this patient was discharged on the 11th of July.

CASE X.

Mary Crutchfield, a delicate-looking girl, bloated appearance, scrofulous habit, aged eight years. Henley Dispensary, May 6th, 1825.—General ill-health, with fever, but without disease of any particular character predominant. This girl had been under the professional care of another gentleman for some time, and any urgent symptoms which might have been remarkable had been corrected or relieved. The urine was in its natural quantity, or if increased, it was so to a

very small extent. The colour was pale green, and the specific gravity about 1·029, neither serous nor sensibly saccharine, nor was there any remarkable excess of urea.* The appetite very good; there was considerable thirst, and the emaciation was proceeding so, that the mother was in the greatest trouble lest the complaint should turn to a decline, as she expressed it. The skin was harsh and dry; the tongue coated with a whitish mucus, except at the tip, where it was of a bright red or scarlet colour. There was occasionally a tenderness of the epigastrium, which, however, was not permanent. Temper very peevish and fretful.

The high specific gravity of the urine, and its pale green colour, determined me to try the efficacy of the phosphate of iron in this case. Accordingly, half a drachm of phosphate of iron, with twelve grains of rhubarb and a scruple of aromatic powder, were divided into twelve equal parts, and one directed to be taken three times a day. The following mixture was also prescribed: ℞ *Infusi Aurant. comp.* ℥viij. *Pulv. Sarsaparillæ* ʒij. *Tinct. Cascarillæ* ℥ss. *M. st. coch.* j. *amp. ter in die.*

By these means, which were persevered in for

* It was perhaps slightly acid.

a month, the specific gravity of the urine was much reduced, and its colour improved. On the 6th of June, her mother thought her sufficiently recovered, and therefore anxiously desired she might be allowed to discontinue medicine, as there was such difficulty in getting her to take it: but as the urine had not become perfectly natural, I think it probable she may relapse.

Remarks.—In this instance, the preparative means had been instituted before I undertook the professional management of the case. Therefore, all that was left for me to do, was to try the effects of a remedy not in general use, but which, from the circumstances, appeared to me to be indicated.

Such is a clinical history of this urinary flux as it appears in children. That such a flux does actually exist, the above history places beyond the possibility of doubt. That it is also frequently a cause of many of those diseases of infancy which have been hitherto considered as idiopathic, or as arising from widely different causes, seems likewise equally well established. I have no doubt but that an attentive observation, where superior

opportunities to what at present I possess, will establish many important circumstances in the history of this disease, which have escaped my penetration. When, by continuance, severe organic derangement has been established, then we cannot reasonably expect more from medical treatment than we do in other cases of a similar description. The phosphate of iron seems to reduce the excessive action of the kidneys, so long as this seems to be dependent on mere functional derangement, or what may be termed irritation * of these organs. This may be fairly presumed from the diminution of the quantity and reduction of the specific gravity of the urine. But when the functions of these organs are perverted, as may be inferred from the unnatural substances dissolved or intermixed with the urine, then a more serious disease has set in, and requires for its removal a more general and more active mode of treatment. Inflammatory action then, in all probability, pervades the structure of the kidneys, and, if this be not subdued, actual disorganisation will most likely speedily ensue, and leave us but little to hope from any mode of treatment. Examples of each kind in children having been submitted, I shall now

* See the Theory and Treatment of Organic Disease, &c.

proceed to relate the history of some cases in adults.*

CASE XI.

MAY 4th, 1819.—James Coley, labourer, aged 45 years. General wasting, hot and dry state of skin, with considerable fever, of the remittent type. Appetite indifferent; respiration hurried and oppressed; pulse hard, frequent, and full; bowels constipated; tongue dry and furred; epigastrium painful, and general tenderness of the abdomen; cough frequently troublesome, with expectoration, which occasionally assumes a purulent appearance. He passes about ten pints of urine daily. The quantity, however, varies, being sometimes a pint more or a pint less, but the above is the average quantity. This urine coagulates on the application of heat, and has a sweetish taste. Its colour pale yellow, approaching to green. Specific gravity about 1·038.†

* I thought it the more advisable plan to separate the cases into two series,—infantile and adult.

† Dr. Henry has constructed a table exhibiting the quantity of solid extract in a pint of urine of various specific gravities: thus a pint of the specific gravity 1·038 contains 728 grains of solid matter. Hence the quantity of solid extract passed by the

This patient had been continually quacking himself, had lived hard, and indulged very freely in spirits, porter, and other fermented liquors; indeed, he lives principally upon malt and spirituous liquors, with very little solid food.

This patient was bled to twelve ounces, and the bleeding repeated several times, at intervals of ten or twelve days, the quantity being diminished at each subsequent bleeding. The bowels were moved by cathartic extract, and the effect promoted by infusion of senna and powdered jalap. Leeches were applied to the epigastrium, and blisters followed, and he was strictly enjoined to leave off drinking.

By these means the tenderness of the epigastrium was subdued, and the bowels excited to a more regular action. The alvine evacuations, however, being discoloured, it was attempted to correct this by a gentle mercurial course. Mercury disagreed under every form.* The phos-

above patient in the day is easily determined; for example, $10 \times 728 = 7280 \div 480 =$ 15 oz. 1 dr. 1 scr., or upwards of a pound and a quarter of solid extract was voided by this patient, in his urine alone, in the course of each twenty-four hours. The table has been copied from the Annals of Philosophy by Dr. Prout, in his work on the Diseases of the Urinary Organs. The reader will find it a valuable and useful transcript.

* This is frequently the case in those habits in which a nervo-

phate was tried, but it also was found to irritate. Extract of taraxacum and solution of chlorine were now substituted, and with the best effect, as the colour of the evacuations speedily improved under their use. He now complained of a dull or obtuse pain in the loins, much increased on pressure. Leeches were applied in frequent succession, by which this pain was relieved.

During the pursuance of the above measures, the quantity of the urine was reduced to about five or six pints in the twenty-four hours. At this period, also, it ceased to coagulate by heat, and its specific gravity was brought down to about 1·029. He began with the phosphate of iron, by which the quantity of urine was rapidly diminished, but the saccharine qualities became more sensible. The phosphate was continued for a long time, and the diet strictly animal, but at the end of four months the saccharine properties were as predominant as ever. The warm bath was tried, but he did not seem to benefit a great deal from its use. The insertion of issues on each side of the spine seemed to exert a great effect, and by the use of sarsaparilla and wormwood in large doses, and a bitter infusion, the

sanguineous temperament has been induced by a free indulgence in spirituous potations.

sugar became no longer sensible in the urine. At the end of twelve months this patient was considered so far convalescent, that the issues were allowed to heal, and proper directions given to him for his future guidance. These, however, he neglected, and as he recovered he betook himself to drink, relapsed into his former state, became dropsical, and shortly after died apoplectic.

Remarks. — It may be fairly presumed, that intemperance, and the abuse of fermented and spirituous liquors, and, I have some reason to suppose, too free a use of mercury, by deranging the structure and functions of the kidneys, brought on the diabetic symptoms in this instance. The disease was so far subdued by the treatment, that perfect recovery might possibly have been effected had he attended to the directions given him. The relapse was soon followed by organic derangements of some of the important viscera, and speedily proved fatal.

CASE XII.

A GENTLEMAN, an officer in the Royal Artillery, requested my assistance under the following circumstances. He complained of an inability to

keep his urine for any length of time, without suffering the most excruciating pain. When passed, it was voided in superabundant quantity. Frequently he passed a quart at a time, and this was repeated at very short intervals, especially if he drank any fluid. The urethra was extremely sensible, and the pain felt, as the urine flowed along the canal, was sometimes so acute, that it brought on rigours which nearly resembled a fit of ague. The urine was neither saccharine nor coagulable by heat, nor by the addition of nitric acid. This last, however, precipitated the urea very abundantly. The urine had a strongly saltish taste, and its specific gravity was about 1·028.

The history of this complaint was as follows:— He had suffered repeatedly and severely from gonorrhœa, and had generally endeavoured to remove it by astringent injections, and latterly, in addition to these means, he took large doses of the cubebs. These measures were generally attended with great suffering, and followed by local irritation, and frequently spasmodic stricture. This led to the introduction of bougies and catheters, by which the sensibility of the canal was preternaturally excited, and the irritation spread to the kidneys, as appeared from the pains felt in

the loins, numbness of the thigh, retraction of the testicle, &c.

The discharge of urine seeming in quantity, at least, to resemble diabetes, I recommended the phosphate of iron, which was given in tolerably large doses, about a scruple three times a day, and persevered in for a long time. No effect, however, seemed to be exerted over the symptoms, which continued with almost unmitigated severity. I at last proposed venesection, to which he objected on the grounds of his weakness, and there being no inflammatory symptom about him. I did not press the measure, as I did not feel very confident in its utility.

Some time afterwards he renewed the conversation upon the subject of bleeding, and expressed himself willing to try what effect it might have. Accordingly, twelve ounces of blood were drawn from the arm. The urine, which had hitherto been discharged in the quantity of seven and eight pints per day, in three days had diminished to one quart. He rapidly recovered flesh and strength, and in ten days he was perfectly convalescent—cured, as it were, by magic.

Remarks.—The history of this case is extremely curious: the extraordinary way in which the symptoms seem to have been induced, their

obstinacy, and the little effect of remedies * over the excessive action of the kidney, but more particularly, the sudden influence which venesection, instituted without either hope or confidence, exerted over the morbid action of the urinary organs,—are circumstances worthy of reflection, and seem to me replete with instruction.

The only way in which it appears to me that the singular circumstances of this case can be accounted for, is, by supposing a peculiar state of the system resisting the action of medicine, and thus preventing its specific effects upon the particular organ. Blood-letting exerted some peculiar but unintelligible influence over the economy, by which this resistance was overcome, and immediately the medicine, previously exhibited, manifested its sanatory control, and the disease was subdued.

CASE VIII.

John Smith, aged 36, a sailor on board a packet. He complained much of what, in his own phra-

* He had been in the habit of using opium freely, on account of the pains and irritation, and from which he could not desist.

seology, he termed "inward fever." The symptoms were severe headach, thirst, constipation, dyspnœa, and a dry rough state of the skin. The tongue foul, and furred. The evacuations from the bowels were discoloured, being dark, and frequently a "grass-green." A dull or obtuse pain in the loins, much increased on pressure. He passed nine pints of urine daily. This urine had a milky appearance, somewhat like chalk and water mixed thinly together. The specific gravity 1·015. It coagulated by heat, breaking off into a short curd, and somewhat resembling sour milk. The pulse was hard and frequent: though his appetite was good, the digestive powers seemed to be much impaired. He wasted in flesh, and felt himself so greatly weakened, that he was unable to continue at his employment.

I directed him to lose blood, twice the first week, and once every week afterwards, diminishing the quantity (which was, in the first instance, twelve ounces,) at each time. Calomel* and opium were given in divided doses till the gums became a little turgid. The bowels were emptied by cathartic extract and infusion of senna. By a

* I am rather doubtful of the propriety of mercury in this chylous state of the urine, nor do I think a serous state favourable to its use.

perseverance in this plan for three weeks, the alvine evacuations assumed a more natural and healthy appearance, the bowels became more regular, the furred appearance of the tongue went off, the thirst abated, and the urine diminished to about five pints,* being a reduction of two quarts daily.

The calomel was now omitted, and the phosphate of iron given in five grain doses three times a day. As he still complained of the lumbago, ten leeches—five on each side of the spine—were applied, and repeated, a sinapism being occasionally interposed between each application. He was also desired to continue the cathartic extract and infusion of senna whenever the bowels became constipated.

He continued the phosphate of iron for about six weeks, with, however, some occasional intermissions, arising from oppression of the stomach, or some other accidental circumstances, which readily gave way to a bitter draught or two. At some periods he took as much as a drachm in the day.

In three weeks after commencing the phosphate, I found the quantity of urine reduced to

* The specific gravity, if taken at this time, has not been noted.

three pints, when it became rather high coloured, and all traces of chyle were lost. In a fortnight more afterwards the urine was very little more than a quart, and he was considered convalescent, but very much debilitated. He was now directed the powder of sarsaparilla with a bitter infusion, for which bark was afterwards substituted; after which he returned to his usual employment. He was under my observance for a month, when I lost sight of him, and have heard nothing more of him since.

Remarks.—The appearance of the disease, in this instance, I could attribute to nothing else than a substitution of gin for rum and brandy; unless, indeed, a too free indulgence in the latter. He had always used rum and brandy very freely, but his urine then was rather scanty and high-coloured. Some circumstances, however, caused a substitution of gin for his usual liquors, and very shortly after this substitution he experienced an inability of retaining his urine, the quantity being much increased, at the same time becoming more pale and watery,* till it had at last assumed the appearance already noted.

In the treatment of this case, I placed no

* When he used the rum and brandy, it almost resembled the brandy itself in colour, and was rather scantily voided.

restrictions whatever upon vegetable diet. The restrictions were placed upon the quantity, rather than the quality, of the food.

CASE XIV.

While residing at the Pigeon House, near Dublin, in charge of the Ordnance Medical Department at that station, I was called on very suddenly to visit the master of a small schooner, which was just on the point of sailing for Bristol. I found him in bed, highly feverish; his tongue foul, and very much furred; hot and dry skin; difficult and laborious respiration, with cough; pulse hard, full, and frequent; headach; insatiable thirst; and constipation.

I immediately bled him, prescribed some cathartic medicine, and promised to visit him regularly if he would remain. To this, at first, he was averse, but afterwards consented, when he reflected upon the severity of his indisposition. He took a lodging at Sandymount, where I continued to visit him till his recovery.*

* He appeared so miserable looking an object, that it was with great difficulty any one could be persuaded to take him in, as

On visiting the next day, I found that he was labouring under diabetes, discharging about twelve pints of urine in the twenty-four hours. The urine was very sweet to the taste, of a pale or straw-green colour, not coagulable by heat.* The alvine evacuations being discoloured, and the fever still continuing, I directed for him blue pill and small doses of Dover's powder, and repeated the blood-letting to the extent of fourteen ounces. Leeches were also applied to the epigastrium, where he complained of some degree of tenderness, which was extremely sensible upon the slightest pressure. The bowels were kept soluble by cathartic extract and infusion of senna. The skin was relaxed by the frequent use of the warm bath, and an occasional combination of the James's with the Dover's powder.

In a fortnight the urine was reduced to seven pints, but he would not consent to any farther depletion, although he evidently improved both in health and strength, being able to walk out, and even sit up the whole of the day. I now directed him to take the phosphate of iron, gradually increasing the dose, which was only five

each person applied to imagined he came merely to die in their house.

* The specific gravity in this case has not been noted.

grains at first, to a scruple, three times a day. Very soon after he commenced the phosphate, a sensible diminution in the quantity of urine began to take place, and this diminution continued to proceed daily. In three weeks it had diminished to nearly three pints and a half; but although it had still a saccharine taste, it was not near so sweet as it had been at first. At this period I recommended him some light bitter with tincture of rhubarb, which he took for a short time with great advantage, but finding himself so much better, he determined on going over to Bristol, before I felt perfectly confident or even satisfied of his convalescence. I gave him some general directions, and, at his own request, a history of his case, and he promised to acquaint me with his progress, but I never heard any thing more of him.

Remarks.—The disease in this instance arose, I suspect, from a long continued course of intemperance. I believe he was but seldom perfectly sober, although he was not absolutely incapable of the duties of his profession; yet, even by his own account, he drank to a very great excess. However, my information upon the general history of this case is extremely vague and uncertain.* The restrictions were

* He seemed very suspicious of my object, and was extremely cautious in his replies to my inquiries.

placed upon the quantity, rather than the quality, of the food.

CASE XV.

Catherine Pratt, aged 43, Henley Dispensary, December 3d, 1823.—Applied, labouring apparently under symptoms of indigestion; fever, hot and dry state of skin; insatiable thirst; tongue foul, but moist, the tip of a bright red colour; headach; respiration oppressed; slight cough, with occasional expectoration; pulse small, hard, and frequent. She also complains of flatulence, great languor and lassitude, and considerable general debility. The bowels generally constipated, sometimes nothing being passed for a whole week together; there was also great tenderness of the scrobiculus cordis, which was much increased by pressure. Twelve leeches were directed to the scrobiculus cordis, where the tenderness was most sensibly felt; and some pills of aloes, with myrrh, assafœtida, and soap, prescribed to be taken in repeated doses at proper intervals, while the bowels were rendered soluble by an infusion of senna, with sulphate of magnesia and tincture of jalap.

This woman had applied to me once before, in the early part of the summer, but I did not see any thing more of her till the present period. On the eighth, ten ounces of blood were taken from the arm, and she was desired to persevere in the use of her medicine. On the twelfth, she complained that the flatulence was very distressing, and therefore a little liquor carminativus * was added to the mixture.

15th.—Skin still continues hot and dry, and she complains of an obtuse pain in the loins. She states, however, that the urine is very well. ℞ *Calomel* gr. iij. *Pulv. Ant.* gr. xviij. *Opii* gr. iij. *Ext. Hyoscyami* gr. xij. *M. ft. pil.* no. xij. *St.* j. *ter in die.*

31st.—Did not attend again till this day, when, for the first time, I discovered the great quantity of urine passed by this patient. When questioned upon this subject, she always stated that it was very well; but since her attention had been turned to it, and she measured it, she says she could not have believed it possible that she passed so much, had she not satisfied herself by measuring it.† The quantity she found to amount to

* Dalby's, after the Formula in Paris's Pharmacologia.

† This shews the necessity of getting the patient to measure the quantity, when we have reason to suspect any disease of the

seven quarts and a pint in the twenty-four hours; and this she found to be the amount by several trials, whether she drank much or little. The urine was of a greenish-yellow colour, was not coagulable by heat or by nitric acid, was extremely sweet to the taste, and seemed to abound in saccharine matter; specific gravity 1·042.*

I directed twelve or fourteen ounces of blood to be drawn off from the arm, and the phosphate of iron to be taken in large doses—ten grains—with a grain of rhubarb, three times a day. The leeches were re-applied to the scrobiculus cordis, and a blister to follow; and particular attention to be at the same time paid to the state of the skin and bowels. The blood was thrown away before I had an opportunity of inspecting it. The gentleman, however, who performed the venesection, told me that the coagulum seemed soft,

urinary system. When patients are thirsty they must drink, and they think, of course, a plentiful flow of urine must follow, but they are seldom aware of its amount till they measure it.

* Dr. Henry states in his table before alluded to, that a wine pint of urine of specific gravity 1·042 contains 804·8 gr., or 1 oz. 5 dr. 1 scr. 4 grs. of solid extract. Hence we can readily compute the quantity of solid matter passed by this woman daily in the urine alone; for example: — 15 × 1 .. 5 .. 1 .. 4 = 25 oz. 1 dr., or upwards of two pounds troy! Can we wonder at the rapid emaciation which attends such cases?

or dissolved, and that the serum had a milky appearance. It was remarkable, that in the morning, before the bleeding was performed, this patient complained so much of faintness and weakness, that she was unable to remain at the Dispensary, and had actually gone home before the surgeon arrived to perform the operation. Afterwards, in the course of the day, I observed her walking firmly in the streets, without manifesting any signs of that debility which seemed to have harassed her so much in the morning.

January 2d, 1824.—She reports that the urine has been reduced to five quarts, being a reduction of five pints in four days; also feels much relieved. The sweetish taste of the urine still very sensible and strong. The plan of treatment was persevered in for another fortnight, when the quantity of urine was reduced to two quarts and (not quite) a pint; it was still, however, very sweetish to the taste, but the specific gravity had been reduced to about 1·032. At this period, she inquired the nature of her complaint, and, unfortunately, I told her the name of it, with the view of impressing upon her the necessity of an attentive and strict adherence to the directions given her. Unluckily, however, it had quite a different effect, for she became so much alarmed, that she looked upon her disease as incurable, and her

case as a hopeless one. She obtained a recommendation to a country infirmary, whither she went, and thus withdrew herself from under my care. At this infirmary she was placed under the care of a very respectable physician attached to the institution, and, as I was informed, was gradually recovering. However, even here she became dissatisfied, and returned to Henley, and was again admitted a patient at the Dispensary, on the 1st of September. The following are the symptoms as noted in my case-book.

The abdomen much enlarged, with evident fluctuation; anasarca of the feet and ancles so much increased at night, that she cannot keep on her shoes. Œdema of the right hand, with a severe pain through the whole arm, and which began about three weeks ago. Respiration oppressed, with a moist cough, particularly troublesome at night. The pulse full, hard, firm, and frequent — 90. Temperature a little increased. Thirst; tongue very red, but dotted with minute white spots; a disagreeable sweetish taste in the mouth; vertigo, and sometimes coma, very troublesome; night sweats, with great languor and general debility. Bowels constipated; evacuations hard, black, and scanty, and voided with great difficulty. Urine copious, saccharine, sometimes pale and limpid, sometimes of a

greenish straw colour, depositing a considerable quantity of cloudy mucus.* Specific gravity 1·038. Pain on pressure of the epigastrium, with a sense of fulness, and a feeling as if of constriction in the præcordia; palpitation; leucorrhœa; amenorrhœa since March last.

Six leeches were directed to the scrobiculus cordis, and a blister afterwards; calomel, antimonial powder, with compound galbanum pill and extract of colycynth, were given in small doses, at intervals, thrice a day. On the sixth, she was seized with diarrhœa, and confined to bed. The diarrhœa was checked by cretaceous mixture, but through confinement in the horizontal position, and the evacuations by the bowels and kidneys, the dropsical swellings soon subsided.

However, the pulse soon failed, the tongue assumed a fiery red appearance, the night sweats increased, and, notwithstanding every

* In examining the urine for mucus or pus, should there appear to be a considerable intermixture, if a female, we should inquire if they labour under leucorrhœa, from which source it often arises. In fact, we ought to find out whether it can arise from some morbid action of the parts in the neighbourhood, before we form our opinion. Leucorrhœa was the source in this instance.

effort to support her strength, she sunk rapidly, and died on the eleventh, at twelve o'clock at noon.

I solicited, and had actually obtained permission to examine the body; but, on going to perform the dissection with my friend Mr. James Brooks, we were refused permission till the sanction of a sister, who had not yet arrived, was previously obtained. When she came to Henley, no entreaties nor solicitations could induce her to swerve from the obstinacy of her refusal, nor to relax in the least from the determination which she had at first declared; consequently, I am deprived of the satisfaction, which I had promised myself, of detailing the morbid appearances discoverable on dissection, in this interesting case, to the profession.

Remarks.—This case is interesting, inasmuch as although a cure was not effected, still there are strong grounds for presuming that recovery might ultimately have taken place, or at least permanent relief have been obtained, had not this patient run obstinately headlong to her own destruction. It is to be regretted that, on her first application in the summer, I did not make sufficient inquiry so as to discover exactly the nature of her disease,—an oversight to which she

herself, in a great measure, contributed,* and which she did not afford me an opportunity of rectifying by calling again. There can be very little doubt but that this complaint was one of long standing, and that serious structural derangement of one, at least, if not of both kidneys, had succeeded; and yet she did not complain of those severe pains in the loins, which have been noted in some of the other cases of less severity, and, probably, of shorter duration. The plan of treatment, and the increased activity of the measures, when I discovered the nature of the disease, if we may judge from the effects, promised well; but as a fair trial was not given, nothing certain can be inferred.

* I make it a rule invariably to inquire into the state of every function, to ascertain whether it be healthy or disordered, but from misconception patients often deceive me, and frequently I cannot arrive at any correct conclusions till after repeated inquiries and *cross-examinations*. Such was the case both on the present occasion and at the Dispensary; although questioned as to the urine, she stated that "*it was all very well.*"

CASE XVI.

JAMES PLUMRIDGE, aged 24, a gardener; Henley Dispensary, November 17th, 1824.—Applied in consequence of a pain in the loins, which he considered as lumbago. As I was absent at the time of his application, the gentleman who officiated for me prescribed a combination of calomel and Dover's powder, to be taken in small doses at intervals, and also twenty-five drops of the spirits of turpentine, in a wine-glass of water, three times a day. On the 19th I first saw him, and directed a perseverance in the use of the medicine as above prescribed.

29th.—He stated that he had benefited but little from the treatment adopted: his skin was hot and dry; bowels irregular; evacuations dark coloured; thirst urgent; tongue foul; appetite good, but he seemed to be wasting in flesh. He complained very much of the pain in his loins.

He had been under medical treatment for some time previously to his application at the Dispensary. His attack, it appeared, began with very severe pulmonary symptoms, for which he had been bled, and derived considerable advantage from the practice instituted.

When asked as to the urine, he stated that it was very well; but when desired to estimate the quantity passed in twenty-four hours, he fixed it at something more than three quarts. By admeasurement it amounted to seven pints and a half. The urine was of a deep ale-colour, which, on standing, became still deeper; it did not deposit any sediment, but a dense whitish cloud fell to the bottom of the vessel. This proved to be mucus. It was neither saccharine, nor coagulable by heat, or the addition of nitric acid. Specific gravity 1·033. On treating the urine with nitric acid, urea precipitated in crystals almost immediately.*

Twelve ounces of blood were taken immediately from the arm; and antimonial powder, with a small proportion of calomel, prescribed in sufficient doses to relax the skin. Some aperient pills were also directed, for the purpose of moving the bowels when necessary.

December 6th.—He feels somewhat relieved, but the urine pretty nearly as at last. Twelve leeches were directed to be applied to the loins —six on each side of the spine—as he still complained of the pain; and a long narrow blister,

* This man was very much addicted to drinking.

extending from the atlas to the sacrum, a little below the last lumbar vertebra, was applied along the course of the spine, and he was desired to persevere in the use of the medicine.

24th.—The urine has diminished about two and a half pints, or three. The mucus cloud still very abundant. The specific gravity nearly as before. He was now directed to take the phosphate of soda, with uva ursi.

January 14th, 1825.—The above plan was continued till the present report. The urine has diminished, and the mucus cloudiness of the urine has, in a great measure, disappeared. The phosphate of soda, however, purges so much, that he was unwilling to continue it. In consequence of this effect, a scruple of gum kino, with a little opium, was added to each ounce of the phosphate of soda; but, even with this addition, it ran through the bowels.

18th.—The phosphate of iron was substituted for the alkaline one, and which he took in the usual doses. As his stomach seemed much weakened, either through the medicine or his own intemperance, cascarilla was given, as a grateful aromatic and bitter tonic. During the continuance of this plan of treatment, he derived very great advantage, the quantity as well as the

specific gravity of the urine gradually diminishing. Shortly after, however, he left Henley, and the phosphate was, consequently, discontinued for about three weeks, when it was again resumed.

February 28th.—Eight ounces of blood were drawn, in consequence of a degree of hardness in the pulse, and some other febrile manifestations. At this period, he was taking twelve grains of the phosphate of iron, with a scruple of the uva ursi, three times in the day. As he seemed very nervous, and rather debilitated, I likewise ordered him three grains of the sulphate of quina, and a little opium, thrice a day.

March 21st.—The venesection was repeated to the extent of ten ounces,* and the medicine continued. The urine was now reduced to nearly its natural quantity, and its specific gravity brought down to about 1·017. I found, however, that the quantity and specific gravity occasionally increased, and I have strong grounds for believing that the

* The blood drawn buffed and cupped, and exhibited strong marks of the inflammatory diathesis. The necessity for depletive measures originated solely in his intemperance, a circumstance which was rather unfortunate, as a remedial means became necessary, which his debilitated and shattered constitution could not well bear, and hence his recovery was not only prolonged but rendered much more difficult.

increase whenever it occurred, arose from excessive drinking, to which he was greatly addicted. Very shortly after this period, he obtained employment at a distance, and his mother, having reported him perfectly recovered, obtained his discharge from the Dispensary.

I could not obtain any of his urine at this period for final examination.

Remarks.—This is rather an unsatisfactory case, because I still remain in uncertainty as to the perfect convalescence of the patient, and I am fully satisfied of his imprudence in deviating from the rules prescribed to him, as necessary to insure his recovery. I have not, however, heard any thing unfavourable as yet. Notwithstanding the imperfections of this example, I conceive it so far instructive, as shewing the inconvenience which sometimes attends the active exhibition of phosphate of soda, and to which no management can perfectly reconcile the constitution. Perhaps, also, it is not quite so unsatisfactory as, on a first view, we might be disposed to regard it. I think it proves, unequivocally, the superior astringent powers which phosphate of iron exerts over the excessive action of the kidneys; because, notwithstanding the repeatedly renewed action of the remote causes of disease,—in this instance,

intemperance,—yet the medicine, even under such unfavourable circumstances, seemed to exert a controlling influence over the effect, and to check the diuresis, and the patient was at last enabled to resume his employment, which the severity of his disease had previously obliged him to relinquish.

CASE XVII.

Martha Wix, aged 40, a married woman, Henley Dispensary, April 4th, 1825.—Complains of very great languor and general debility; febrile heat; pulse (108) hard, small, and contracted; thirst; slight nausea; emaciation; countenance sharp-featured; appetite delicate, but otherwise good. Tongue foul; cephalea; respiration hurried, and, on the slightest exertion, considerable dyspnœa. Bowels constipated; evacuations somewhat discoloured, hard, and voided with difficulty. Pain of the epigastrium, much increased on pressure.

The urine was passed in great quantity, and this patient complained of a frequent desire to pass the water.

Eight leeches were applied to the epigastrium

where the pain was felt; and some pills, consisting of extract of colocynth with blue pill, were directed to be taken in ten grain doses on the alternate nights, and she was likewise ordered to preserve a soluble state of the bowels by infusion of senna.

As this woman lived about four or five miles from Henley, she was desired to be particular in noting the quantity of urine passed in the twenty-four hours, and to bring some of it with her, on her next visit, for examination.

8th.—Feels somewhat relieved, but the pain of the epigastrium still continues; bowels more soluble, and the evacuations somewhat more healthy in appearance. The quantity of urine varies at different times, but the average quantity is from twelve to fourteen pints; its colour deep amber, specific gravity 1·022.* It was neither

* The specific gravities, as stated in these cases, are, generally speaking, the average of several trials. Perhaps the specific gravity in this and some other instances may appear to exceed, in a very trifling degree, that which some authors have asserted to be the average specific gravity of healthy urine. If we put the quantity of urine out of the account, this will be the case. Allowing the natural quantity of urine to be two pints and a half, and as a pint, at 1·022, according to Dr. Henry's table, contains of solid matter seven drachms, it is evident that, in the healthy quantity, only seventeen drachms and a half of solid

saccharine nor serous. There was a considerable deposition of muco-purulent matter, but this, I believe, arose from leucorrhœa, to which I ascertained she was occasionally subject. Nitric acid caused an almost instantaneous crystallisation of urea.

She was directed to reapply the leeches to the epigastrium, and afterwards to put on a blister. The medicine was repeated.

15th.—The pain much abated, but has shifted to her side, as she expresses it, a little below the ribs. The urine about ten pints, sometimes eleven. The bowels improving. The leeches were now applied to the tender side; and she was desired to persevere, being cautioned to omit the pills when she felt any tenderness of the gums.

22d.—Still complains of the tenderness of her side; a slight turgescence of the gums, the eva-

matter would be discharged from the system daily. But here $12 \times 7 = 84$ drachms, or ten ounces and a half of solid matter, were daily passed with the urine by this patient. From this it is evident, that eight ounces more of solid matter than in the healthy state were passed. It cannot be surprising that patients emaciate under such circumstances. Hence, also, will appear the necessity of considering the quantity of urine in connexion with the specific gravity.

cuations nearly natural, the urine about nine pints; headach, fever, thirst, &c. still urgent.

The leeches were reapplied, and a blister put to the painful part the following evening. The mercurial was omitted, but the bowels were kept soluble by the infusion of senna.

May 4th.—The urine now about eight pints; specific gravity 1·020. Complains a great deal of flatulence and distension of stomach. She was now ordered a bitter infusion, with liquor potassæ and tincture of cascarilla, to be taken when she found the flatulence troublesome.

6th.—She finds the urine increased in quantity about a pint, but otherwise feels better. The specific gravity of the urine was not estimated, as no specimen was brought for examination. The plan, however, was persevered in, with the exception of omitting the alkaline liquor, till the 23d, when the urine was steadily at eight pints, and of an average specific gravity of 1·019. She now took the phosphate of iron, in doses of three grains, thrice a day. On the 30th, the phosphate was increased to five grains three times a day, and the urine was reduced to about six pints, or six pints and a half. From a degree of fever which continued about this woman, I was fearful the phosphate of iron would not agree with her,

and this proved to be the case. I therefore directed her to take ten grains of the pil. saponis c. opio, every night, or every other night, as occasion might require, at the same time keeping the bowels soluble by the infusion of senna with tincture of jalap.*

June 15th.—Her health very much improved, as she can now walk from her residence to Henley without much inconvenience. Her bowels constipated; but the cephalea, tenderness of the side and epigastrium, and febrile heat, have been completely subdued. The pulse is still a little hard, but is fuller and less contracted than on her first application. The urine reduced in quantity to about two pints and a half, sometimes three pints, in the twenty-four hours: the specific gravity about 1·017—1·0178. She now suffers again from flatulence, and a degree of oppression at the stomach. She, however, recovers flesh and strength rapidly, and feels her health greatly improved. She was directed some aperient pills, and to continue the pil. saponis c. opio, as before. She was likewise ordered a small quantity of the liquor potassæ with tincture of cascarilla, in dis-

* The tincture was added merely to prevent fermentation or decomposition.

tilled water, as an antacid. The phosphate was discontinued, from a supposition that it oppressed the stomach, and disagreed generally with her. I have not heard of her lately, and therefore presume that she feels so much better that she does not think it necessary to apply any more.*

Remarks.—This was a case in which the dyspeptic symptoms were severe and obstinate; but yet, when relieved at last, the diuresis, though somewhat reduced, still continued profuse. It had been a case of some standing, and I believe she had had professional assistance before application at the Dispensary. The urine had not become completely natural; and it is very possible, if she neglects her health, that she may relapse. From the susceptibility of the system to febrile action, and her being unwilling to submit to bleeding, in consequence of the languor and lassitude from which she suffered, I did not like to exhibit the phosphate of iron early in the disease, nor until the febrile and inflammatory symptoms had been sufficiently reduced by antiphlogistic measures.

* Since this sheet was sent to press I have seen this patient, and her progress has been extremely satisfactory. She is now convalescent.

CASE XVIII.

JANE LANE, aged 39, married, Henley Dispensary, May 4th, 1825.—Great languor and debility; feverish heat of skin; pulse hard, small, and frequent; respiration hurried, and oppressed with frequent sighing, and seemingly considerable nervous irritation; flatulence; bowels confined; tongue foul, and furred; cephalea; thirst; appetite fastidious, but otherwise good; urine abundant, from ten pints to a gallon and a half being passed daily. The urine was deep-coloured, and had a strong urinous smell, rendered still more sensible by the action of nitric acid. It was neither saccharine nor serous; but urea speedily precipitated, upon the urine being treated with nitric acid in the manner to be hereafter described. The specific gravity 1·029.

Small doses of calomel, about a quarter of a grain, in combination with the pil. galb. comp. and pil. aloës c. myrrha, were directed to be taken three times a day; and she was ordered a bitter alkaline* infusion, to be taken in divided doses.

* The alkaline infusion was directed because the urine was strongly acid.

A senna draught was also given, to be used according to circumstances.

11th.—The acidity of the urine has been much reduced, but little or no reduction of the quantity has been effected. The feverish state of the system still continuing, a saline mixture was substituted for the bitter alkaline infusion. On the 13th, some pills, containing antimonial powder and opium, were directed, to assist in relaxing the skin.

The above plan, with very little deviation, was persevered in till the 30th of May. The urine was now reduced to about a gallon, and its specific gravity brought down to 1·026. There was still a considerable degree of febrile irritation, although the skin felt softer and more relaxed; and as the bowels were irregular, and the evacuations frequently discoloured, I thought it possible that the constitutional irritation might be reduced by exciting a healthy action of the liver; wherefore calomel, antimonial powder, and opium, were given in divided doses, three times in the day, with directions to suspend the use of the medicine whenever the slightest tenderness was felt in the gums. Unfortunately, however, the directions were misunderstood, and on the 8th of June she was in a state of salivation. The tongue was foul,

and very much furred, with a good deal of fever in the system. The mercurial was now suspended, and aperients merely prescribed.*

Although the urine was not increased in quantity, yet flakes were separated by the application of heat. Its specific gravity very nearly as before. A mucous flaky deposit separates spontaneously from the urine, if allowed to stand.

On the 22d, the quantity of urine having increased to about ten pints, I determined, although the tongue still continued dry and furred, to exhibit the phosphate of iron, which was now prescribed according to the following formula:—
℞ *Phosphatis Ferri* ʒss. *Pulv. Doveri* ℈j. *Rhei* gr. xij. M. *ft. pulv.* no. x. *æquales; st.* j. *ter in die.*

27th.—The urine reduced to a gallon, or eight pints. The powders were continued; but as they seemed to increase the irritation of the system—more particularly the nervous system—a scruple of the pil. saponis c. opio was formed into six pills, and one directed to be taken three times a day, the bowels being kept soluble by an aperient mixture.

July 1st.—The urine has been reduced to very nearly half a gallon. Ordered to continue.

* On her first application, she conceived herself too weak to be bled; and experience having taught me that bleeding frequently not only increases, but even induces the salivating effects of mercury, I was now, therefore, unwilling to resort to it, though I thought it might prove otherwise beneficial.

6th.—Urine half a gallon and half a pint by admeasurement; specific gravity 1·0217. The phosphate of iron seemed to excite a little fever, and therefore the phosphate of zinc was prescribed, under the following formula:—℞ *Phosphatis Zinci* gr. xij. *Ipecacuanhæ* gr. iij. *Pulv. Ant.* gr. x. *Ext. Hyoscyami q. s. ut ft. pil. sex; st.* j. *alt. noctibus. Repet. pil. Sapon. cum Opio, et st. infus: Sennæ ad alvum promovendam.*

15th.—The urine reduced to something under a quart; but she complains of acid and bilious eructations. The specific gravity has been considerably reduced. That of the specimen brought to me for examination, I found to be 1·01798. She felt herself so completely relieved, that she had determined to apply this day for her discharge. In consequence, however, of the sudden derangement of her stomach, she was ordered a little rhubarb with an absorbent powder, as follows:—℞ *Pulv. Rhei* gr. x. *Pulv. Cretæ* gr. xij. *ft. pulv.* x.; *st.* j. *ter in die.*

The urine passed in the evening had the colour of blood-water, or the washings of meat. Its specific gravity was much higher than that of the morning, being 1·03043. It deposited a considerable portion of pink sediment, intermixed with some of the earthy salts. The urine effervesced with nitric and acetic acids, was strongly alkaline, reddening turmeric-paper, and dis-

charging the red colour given to litmus-paper by the acetic acid.*

18th.—The urine passed this morning was more clear and natural in its colour; but, by the addition of a few drops of the tincture of rhubarb, it assumed very nearly the colour of that passed on Friday evening. It deposited little or no sediment: the specific gravity was reduced to 1·02075.† The woman seems better, but still complains of flatulence, and some eructations. She was merely ordered a bitter infusion with tincture of ginger, and to attend to the state of her bowels.

25th.—The urine passed in its natural quantity, still alkaline: specific gravity 1·02071. The sabulous deposits have diminished in quantity. Bowels rather costive. She was directed a few

* The alkaline properties arose from the presence of ammonia, or, more probably, the subcarbonate, as the red colour of the turmeric was not permanent, but evanescent.

† This specimen was not alkaline: the specific gravity in each instance was taken after the deposition of the sediments, which subsided spontaneously. When the specific gravity is taken by the gravity-bottle, a portion should be filtered, and the gravity of the filtered compared with that of the unfiltered portion. Frequently a difference of from ·005—·015 will be detected, proving the mechanical suspension of a quantity of matter insoluble in the urine. A knowledge of these facts may prove of some importance.

aperient pills, to be taken occasionally; and twenty minims of muriatic acid were added to the bitter infusion.

I am obliged to conclude the history of this case thus abruptly, that the sheets may be put to press.

Remarks. — This case I think instructive. It is the only one in which I have tried the effects of the phosphate of zinc. This salt, even in very small doses, seems to have manifested considerable powers in reducing the quantity of the urine. The increased specific gravity noted on the reduction of the quantity of the urinary discharge, may be accounted for on the principle of the diminution of the watery portion. The sudden alkalescence of the urine I cannot readily account for; the absorbent powder used as an antacid was chalk, but the alkalinity of the urine arose from the presence of ammonia, not of lime. In this case there appears to me to exist a strong tendency to calculous disease; and, if the case be neglected, I have no doubt that either confirmed diabetes will supervene, or some calculous concretion form. I shall take an opportunity of stating in a note, as the sheet passes through the press, the future progress of this case.*

* This patient has been gradually improving in health, but I have not seen her lately.

I HAVE now submitted to the reader the facts upon which I have formed the opinions, and drawn the conclusions, expressed in the preceding treatise. How far they may be conclusive, must be left to the judgment of the reader. I am anxious that such of the profession as enjoy more extensive opportunities should report upon my views; for no theory or plan of treatment can be regarded as decisive, upon the experience and report of any one individual, however competent he may be to the task.

There are few, perhaps, after what has been stated, who will dispute the efficacy of the metallic phosphates in controlling the excessive action of the kidneys. While this action is purely the result of a functional disorder of these organs, I presume the principles of practice may be limited almost exclusively to the exhibition of the phosphates of iron or zinc; but if the structure has become diseased, as may be inferred from the secretion or formation of unnatural principles, then it will be necessary to combine a more active mode of treatment.

Although sugar did not exist in the urine in many of the cases detailed, yet a principle nearly allied to it in its elementary composition was generally found to predominate; and had these

cases been neglected, and left to run their natural course, I have no doubt that they would have ultimately terminated in the mellitic form of diabetes. We should, therefore, always attend to any excess of urea in the urine. "The relation," says Dr. Prout, "which exists between urea and sugar, seems to explain in a satisfactory manner the phenomena of diabetes, which may be considered as a depraved secretion of sugar. The weight of the atom of sugar is just half that of the weight of the atom of urea; the absolute quantity of hydrogen, in a given weight of both, is equal, while the absolute quantities of carbon and oxygen, in a given weight of sugar, are precisely twice those of urea." * We cannot, therefore, be surprised that diabetes should readily supervene in such a state of the urinary organs.

* Dr. Prout thus expresses the chemical constitution of these two bodies, and of the lithic acid:—

ELEMENTS.	UREA.			SUGAR.			LITHIC ACID.		
	No.	Per Atom.	Per Cent.	No.	Per Atom.	Per Cent.	1	Per Atom.	Per Cent.
Hydrogen..	2	2·5	6·66	1	1·25	6·66	1	1·25	2·85
Carbon....	1	7·5	19·99	1	7·50	39·99	2	15·00	34·28
Oxygen....	1	10·0	26·66	1	10·00	53·33	1	10·00	22·85
Azote	1	17·5	46·66				1	17·50	40·00
	5	37·5	100·00	3	18·75	100·00	5	43·75	100·00

With respect to the causes of diseases, it is often very difficult to ascertain exactly their nature; and to effect this in every instance would be utterly impossible. However, I think it will appear, from the clinical report of the cases, that neither indigestion, nor any other affection of the stomach, can be regarded as invariably the primary cause. Dr. Prout asserts that he has generally discovered, that when an excess of urea prevailed, the patients have been addicted to masturbation, and vices of this description. I was not prepared for such inquiries, and consequently have neglected to make them. I may observe, however, that some of the cases related occurred in women, and in children whose tender ages precluded the possibility of any such improper addictions. But I would not at all be understood *as opposing* this view of masturbation acting occasionally as a cause; on the contrary, I think it may frequently induce the disease, and the theory of its operation is not difficult to conceive. The irritation of the generative may readily spread to the urinary system, and the intimate association and connexion of these two systems favour such a view.

Such are the principal facts which I had to submit upon the history of this disease. As the subject may be yet considered in its infancy, I

wish this effort to be regarded rather as a practical inquiry, than as an elaborate or learned treatise.*

* Perhaps it may be objected to me, that, as an inquirer devoted to this subject, I have allowed the nature of the case to escape my penetration oftener than was consistent with that nicety of observation and distinction, to which my experience should have attained. So it is: but while I plead guilty to the charge, I am unwilling to let slip the advantages of such a plea —the reader will perceive, that I am not so much in love with my own views, as to become completely a bigot to them.

POSTSCRIPT

OF

DIRECTIONS

FOR

A PRACTICAL EXAMINATION OF THE URINE,

SO AS TO DETERMINE ITS

MORBID QUALITIES.

It occurred to me, that I should greatly add to the utility of this work, by offering to the reader a few concise practical rules for examining the urine in diabetes. To the practised chemist,* of course, this part will be useless; but it is not impossible that this little work may fall into the hands of some, who probably may regard these directions as by no means the least valuable part of the performance.

* It was my intention, at first, that these directions should have formed a section of the chapter on the diagnosis; but when I reflected that this work might probably fall into the hands of individuals whose scientific knowledge and address far exceeded my own, I thought it better to place them at the end of the volume, where they could neither interrupt nor annoy the philosophical reader.

Urinary disorders frequently escape observation, and are hence often confounded with other diseases, till an excessive flux of urine attracts the notice of the patient, who at length calls the attention of the practitioner to the circumstance, when, probably, the time for relief may have passed. It is while the disorder is rather functional that we can expect to effect much by medicine. When disorganisation, which is generally characterised by a derangement, or rather perversion, of function, has taken place, we shall find that the ordinary practice will prove inefficient, and, possibly, that the vigorous adoption of the most active measures will scarcely palliate even the secondary symptoms.

With respect to the quantity of urine, it is a very uncertain means of diagnosis, because it is liable to be affected by a great variety of accidental circumstances, and which, in many instances, produce merely temporary effects. In many such cases, the functions of the kidneys can scarcely be considered as affected; but when the sensible, mechanical, and chemical properties of the urine deviate from those of health, we may then safely presume that a functional disorder, at least, exists, which, if neglected, may speedily terminate in more serious disease.* If, under

* Dr. Prout thinks it possible that diabetes (by which he

such circumstances, a remarkably increased flow of urine be waited for, perhaps this symptom may usher in irreparable organic mischief, and thus a fatal disease may be established, even before its nature has been suspected. In the present observations, I shall confine myself, as much as possible, to those qualities of the urine which may be considered as more immediately connected with diabetes. Before, however, we proceed to the consideration of its morbid condition, it will be necessary to acquire a knowledge of its healthy composition.

No animal product has attracted more attention than the urine, and yet, perhaps, there is none, the composition and properties of which are *less generally* understood. Healthy urine, when first voided, is a transparent fluid, of a light amber colour, possessing an aromatic odour somewhat resembling that of violets. Its taste is bitter and disagreeable. As it cools, the aromatic odour leaves it, and is succeeded by one which is

means a saccharine state of the urine) may exist without an increased flux. As neither patients nor practitioners are much in the habit of tasting this excretion, it must be evident that a diagnosis founded on the quantity may lead to the most unhappy consequences. Many disorders of this fluid also depend on changes which even the most delicate sense of taste cannot detect.

known by the name of *urinous*. This, in the course of a few days, gives place to another, which has been compared to that of sour milk. This is still farther changed for a fetid alkaline odour.* The quantity voided in a given time varies in different individuals, and, even in the same individual, is affected by a variety of adventitious circumstances. The average quantity has been variously estimated by different authors: thus, Haller computed it at 49 oz. in the twenty-four hours; Rye makes it 40 in the same time; Dr. Bostock agrees with Rye. Dr. Prout thinks 32 oz. as about the general average. For my own part, I think Haller's estimation is above, while that of Dr. Prout is rather below, the general average.†

Such are the principal sensible properties of healthy urine; the mechanical and chemical properties depend upon circumstances, for the mode of developing which I must refer to the systematic works on chemistry. I shall here merely state

* These properties are to be understood as characterising regularly *cocted* urine; that which is *crude* or less elaborated, such as is passed shortly after drink or meals, does not possess them in so remarkable a degree.

† Dr. Prout, however, very justly and philosophically observes, that, under all the circumstances, each individual must, to a certain extent, be measured by his own standard.

the facts; but for the analysis or proof, I refer the reader as above. According to the analysis of Berzelius, a thousand parts of urine yielded—

Water	933·00
Urea	30·10
Sulphate of potash	3·71
——— soda	3·16
Phosphate of soda	2·94
Muriate of soda	4·45
Phosphate of ammonia	1·65
Muriate of ammonia	1·50
Lactate of ammonia, pure lactic acid, animal matter soluble in alcohol, urea inseparable	17·14
Earthy phosphates, with a trace of fluate of lime	1·00
Uric, or lithic acid	1·00
Mucus of the bladder	0·32
Silica	0·03
	1000·00*

From the saline ingredients thus dissolved in the urine, we naturally infer its superior specific gravity compared with that of distilled water. The specific gravity of distilled water, taken as a standard, is generally stated to be unity, and is thus expressed 1·000. The specific gravity of healthy urine, compared with the above standard,

* Thomson's Chemistry, vol .iv. p. 557. 1st. ed. Dr. Thomson took the statement from the Annals of Philosophy, vol. ii. p. 423.

has been variously estimated, by different authors, from 1·005 to 1·033. This great variation has probably arisen from a number of accidental circumstances, which, though not sensible, were yet sufficient to affect the results. Such may be a small increase or decrease of the watery portion, the circumstances of the animal having made use of food or drink a short time before the experiment, the temperature of the urine at the period of trial, &c., and also the season, whether summer or winter, in which the experimental comparison has been made.* Dr. Prout considers, that the mean specific gravity may be safely fixed at 1·010—1·015. This I look upon as a little too low.

The morbid conditions of the urine (independently of its quantity) may be inferred from its physical properties. The physical properties may be divided into sensible, mechanical, and chemical. The sensible characters are those which are obvious to the senses, without the aid or intervention of instruments or tests. These are,

* The reader will readily understand how the seasons will affect the specific gravity of the urine, if he reflects upon what has been observed with respect to the effects of the weather and its temperature directly upon the functions of the skin, and thus indirectly upon the quantity of the urine. The seasons act, by increasing or diminishing the watery portion of the urine.

the colour, the transparency, the smell, and the taste.

Colour of the Urine.—The colour of healthy urine is that of light amber, as already observed. It is also generally transparent, and especially after having stood, and deposited the mucous cloud, which is frequently suspended even in the most healthy urine. The colour and transparency of the urine are best examined in a test-tube,* of sufficient diameter. The urine assumes various colours, but the peculiarities connected with diabetes may be referred to the deep brown,† which, if the smell be at the same time urinous, denotes an excess of urea. Urine of a gelatinous or wheyish appearance, frequently contains serum, and coagulates on the application of heat or nitric acid. Mucus and pus produce a cloudiness or sub-opacity of the urine, which,

* Dr. Prout recommends a common phial, not less than one inch, nor more than two inches, in diameter, and from six to eight inches long. I believe such vessels are superior to what I have above recommended. It will be found advantageous, however, for the purpose of cleaning, to separate the necks and shoulders, by drawing a red-hot iron along the direction in which we wish the separation, and then applying cold water. In some peculiarities of colour—as the pink and yellow—Dr. Prout thinks an opaque shallow vessel the best.

† Deep ale colour.

however, becomes transparent on standing, and the pus or mucus, as the case may be, is found deposited in a thick flocculent mass at the bottom of the vessel. A pale straw-coloured, (or rather a yellowish-green tint,) transparent urine, denotes diabetes.

The Smell.—The odour, or smell, is sometimes highly urinous. This is often the case in fever and inflammation, when the quantity of urine is much reduced. Diuretics, especially those of a cooling or antiphlogistic nature, by increasing the watery portion of the urine, render both the colour and smell of this state much less sensible.* But when the urine is passed in the natural quantity, and, more especially, if it be superabundant, then an excess of urea may be inferred. In these cases, there often seems to be a morbid irritability of the bladder, exciting to a frequent discharge of the urine. A sweetish hay-like smell, such as is perceived in the urine of horses fed upon grass or new-made hay, denotes sugar in solution in the urine. If the quantity be abundant, as it generally is in such cases, by evaporation upon paper or linen, crystals of sugar may be obtained.

Taste.—But little can be inferred from the taste of so heterogeneous a compound as the

* Hence the advantage of saline diaphoretics.

urine has been stated to be. The taste is naturally intensely saline, but the sense is not sufficiently delicate to detect even the presence of unnatural substances, much less a slight excess of the natural products. The only substance which can be recognised by the taste is sugar; and when this is in sufficient quantity to give a sweetish taste to the urine, it is sensible to the most common perception.

Mechanical Properties.—These depend entirely upon the density of the urine, and arise from the different substances which it holds in solution. They are to be estimated by the specific gravity. As long as the soluble matters bear the natural or healthy relation to the watery portion, the specific gravity will not exceed 1·015.* But if the soluble matters should be in excess, then the specific gravity will exceed the standard.† In

* The reader will recollect, that, although the discharge of two pints of urine of specific gravity 1·015, in a given time, does not necessarily infer disease, yet ten pints of even a less specific gravity denotes a serious affection, and will induce general derangement and emaciation. Strictly speaking, the quantity is, perhaps, a mechanical property; but it is affected by such a variety of circumstances, that it hardly admits of philosophical adjustment.

† The specific gravity of a fluid affords data for estimating the ratio which the saline principles bear to a given quantity of the solution. For this purpose, Mr. Kinvan directs us to

diabetes and the urinary fluxes, which I have been considering, the specific gravity of the urine, notwithstanding its increased quantity, invariably exceeded the healthy standard, and in one case was even as high as 1·042.* A high specific gravity denotes a relative excess of solid matter; and, if the urine be very plentiful, it also denotes an absolute excess of the same principles.

subtract the representative of the specific gravity of distilled water from that of the solution (both expressed in whole numbers), and to multiply the remainder by 1·4; the product is the saline contents of a portion of the fluid expressed by the number assumed as the representative of the specific gravity of distilled water. Thus: let the specific gravity of the solution be expressed by the number 1·0273; then 1·0273 — 10,000 × by 1·4 = 382·2, which expresses the saline contents of 10,000 parts of a solution of the above specific gravity. Dr. Ure has simplified this formula: he desires us to multiply the decimal numbers of the specific gravity of the saline fluid by 140, and the product is the saline contents of 100 grains of the solution. Thus: ·0273 × 140 = 3·822, the saline contents of 100 grains. The uniformity of result from both these modes of operation is shewn thus: — 3·822 × $\overline{10 \times 10}$ = 382·2, the saline contents of 10,000 parts, as found by the first rule: and again, 382·2 ÷ $\overline{10 \times 10}$ = 3·822, the saline matter in 100 grains, as determined by Dr. Ure's method. The value of these facts need hardly be urged.

* Dr. Prout says, that he has found the specific gravity of diabetic urine higher than 1·050, but never so low as 1·020.—Page 61.

The nature of these principles vary in different cases; however, before we proceed to the consideration of this subject, it will be necessary to state the different methods of taking the specific gravity.

Specific gravity is merely another name for density, and is estimated by the weight of a given bulk of one body, compared with that of an equal bulk of another, at a medium temperature.* Distilled water, at 60 Fah., is generally taken as the standard of comparison, and its gravity, as already observed, is designated unity, or 1·000. The most delicate method of comparing the specific gravity of fluids, which is the only subject of consideration here, is by the gravity-bottle. The weight of this bottle (counterpoised), when filled with distilled water at 60 Fah., should be ascertained, and noted in grains. Then the weight of the same bottle, filled with the urine, should be next found. Divide the latter weight by the former, and the quotient will be the specific gravity.

Bottles which contain exactly a thousand grains, and hence called the "thousand-grain bottle," together with its counterpoise when filled with distilled water at 60 Fah., may be obtained at the

* The reader will find the subject of specific gravity amply treated, and clearly explained, in Paris's Medical Chemistry.

chemical and philosophical instrument makers. Such an apparatus simplifies the process very much, as we have only to fill this bottle with the urine, and place it in one scale, and the counterpoise in the other. As urine is always of greater specific gravity than water, the specific gravity will, in this instance, be positive; that is, to restore the equilibrium, weights must be placed in the scale containing the counterpoise, and the amount being added to the standard, gives the specific gravity. If, for instance, we find that 42 grains are necessary, 42 grains are to be added to the thousand, thus 1·042, which will be the specific gravity of such a fluid.*

Hydrometers, and what are termed specific gravity bubbles, are sold, for ascertaining the specific gravity of fluids. For the present object, they should be constructed with reference to distilled water as the standard. The portion of the hydrometer immersed in the fluid is the measure of the specific gravity, and its amount is

* If the specific gravity of the fluid to be examined were less than that of distilled water, then weights must be added to the scale containing the bottle. In such a case the gravity would be negative, and should be expressed in decimals. If the fluid were alcohol, about 815 grains would be required to produce an equilibrium, and the specific gravity would be expressed thus:— 0.815, or simply ·815.

ascertained by the marks on the stem. The bubbles are constructed of various known specific gravities, the amount of which is marked upon the bulb of the bubble. If the specific gravity of the bubble and of the fluid be equal, the bubble will remain at rest, neither rising nor sinking in whatever part of the fluid it is placed.*

The hydrometer, however, appears to be the most convenient instrument, and if the temperature of the urine be reduced to 60 Fah. at the time of the experiment, the result will be sufficiently accurate for all the purposes of practical medicine.

Quantity.—Perhaps the quantity is strictly classed among the mechanical properties. The quantity is ascertained by admeasurement. The quantity, of course, has also reference to the time, and the period for estimation has been fixed at twenty-four hours. It has been already stated, that the healthy quantity has been estimated at from 32 to 49 oz. Perhaps, if 40 oz. be taken as the average, it may be considered as the nearest to truth. A daily discharge of two pints of urine at a specific gravity 1·015, denotes neither a relative nor absolute excess of solid matter. But

* For the theory of these instruments, consult Paris's Medical Chemistry, or the works on Mechanical Philosophy.

if five pints of the same specific gravity be discharged in the same time, although no relative excess is indicated — the watery portion of the urine bearing the natural or healthy relation to the solid extract—yet there will be, in relation to the animal body, a discharge of solid matter absolutely in excess from the system; the carrying off of which in large quantity produces emaciation, and other symptoms of impaired health.

A discharge of watery urine, or such as is of low specific gravity, if the quantity be superabundant, generally denotes some imperfection or derangement of the assimilating functions; and it is not improbable, that even in those fluxes which we have been considering, the commencement may be characterised by an inferior specific gravity, or comparatively watery state of the urine. In short, the mechanical properties —the specific gravity and quantity—of the urine are objects of the highest importance to the practitioner in medicine, and any irregularity should immediately command attention.

Chemical Properties.—The sensible and mechanical properties are to be considered as affording merely general views of the deranged state of the urine: the specific nature of the disordered condition is to be elicited by means of another branch of science, namely, chemistry. A high specific

gravity, for instance, denotes a superabundance of solid matters in solution in the urine, but the nature of these principles is to be developed by chemical means only.*

The matters found dissolved or intermixed with the urine, may be classed under two general heads:—I. NATURAL PRINCIPLES. II. UNNATURAL PRINCIPLES.

I. *Natural Principles.*—The natural or healthy constituents, with their relative proportions, have been already enumerated. If any of these be in excess, (with the exception of water, and perhaps mucus,) the specific gravity will be increased. As it is my object to confine myself solely to those principles which attend, or more immediately characterise, a diabetic discharge of urine, the only natural principles, the excess of which can be discussed with propriety here, are *urea* and *mucus*.

Urea.—This principle, when in excess, is readily detected by its affording a precipitate with nitric acid. When nitric acid is dropped into a concentrated solution of urea, a number of

* There is, perhaps, but one actual exception. Sugar may be discovered by the taste, and occasionally by the smell; but the remotest estimate of the quantity cannot be formed from these qualities.

bright pearl-coloured crystals are deposited, consisting of urea and nitric acid. No other acid produces this singular effect.* If, then, a small quantity of the urine to be examined be placed in the fragment of an oil-flask, or in a watch-glass, and nearly an equal quantity of nitric acid be trickled, by means of a dropping tube, down the concavity of the glass, the nitric acid by its superior specific gravity will occupy the bottom of the vessel, while the urine will float upon its surface. If the urea be much in excess, an immediate crystallisation will take place. The time which elapses before crystallisation succeeds may be regarded as a sufficiently accurate measure, for practical purposes, of the excess. This time may vary from two or three minutes to as many hours.†

An excess of urea is commonly attended with diuresis, or increased flux of urine, and frequently with ardor urinæ, producing a species of incontinence of urine. This was the case with Martha Wix, Case XVII.

Mucus.—This principle forms a constituent of

* See Thomson's Chemistry, vol. iv. p. 429, 1st ed.

† If the urine be concentrated by evaporation, crystallisation will take place immediately, therefore the specimen for examination should not be allowed to evaporate.

healthy urine; but from disease, either of the bladder or kidneys, its quantity may be increased. An increase of mucus will give a cloudy appearance to the urine, and after standing, it is deposited in a flocculent form at the bottom of the urine. The subacetate of lead occasions a copious white precipitate, when dropped into fluids highly charged with mucus. Nitrate of silver also occasions a precipitate under the same circumstances. An increased secretion of mucus generally arises from irritation or some degree of inflammation, and, therefore, when observed, should be attended to. It may readily be confounded with another substance, pus; and, indeed, it sometimes approaches this latter so nearly in its characters, that distinctions, if they really do exist, are hardly appreciable.

II. *Unnatural Principles.*—The unnatural principles found in diabetic urine may be divided into two classes of products—animal and vegetable. The animal are chyle, albumen, pus, and blood. The two former have been regarded as constituting a species of the genus diabetes, which has, from the property which the urine possesses of coagulating by heat like the serum of the blood, been named diabetes serosus. Pus and blood, to which may be added bile, are accidental intermixtures depending upon peculiar morbid con-

ditions of the urinary organs and passages, no way connected with diabetes; but as these states frequently supervene, a knowledge of the circumstance may prove useful, and lead to a more perfect diagnosis.

Coagulable Urine.—The coagulability of the urine may depend upon the presence of either chyle or albumen, or indeed of both. The coagulation in these cases is effected by heat or by nitric acid. If urine which contains any remarkable quantity of coagulable matter, be heated in a watch-glass, or platinum dish, over a spirit lamp, when the temperature has been raised to 160 Fah., a coagulum, more or less dense according to the quantity of coagulable matter, forms.* The coagulation is also, in such cases, effected by nitric acid. Other re-agents are likewise capable of coagulating such urine, but their delicacy is hardly suited to practical use.

As the coagulability of the urine may depend upon the presence either of chyle or serum, it may be of some practical value to determine upon which of these principles the property chiefly

* I have lately been much in the habit of attending to the coagulation of the urine; and in the Clinical Report I have mentioned several means of ascertaining the precise point of Fah. at which coagulation commences; the more curious reader, therefore, I refer to that work.

depends. Chylous urine coagulates in a granular or curdy mass, something like the granular lumps which may be perceived in milk which has curdled from becoming sour. When it depends upon serum, it is more dense and firm in its consistence.* A chylous condition of the urine donotes an imperfect assimilation from a very impaired state of the digestive functions; whereas, a serous one† strongly marks the phlogistic diathesis, with a considerable tendency to inflammatory fever. These circumstances, if attended to, may be of service in regulating the activity of our means in the treatment of disease.

Pus.—Mucus and pus are not always readily distinguishable. Pus may proceed from an ulcer; mucus never does. Exulceration, however, is not essential to the formation of pus; for mucous surfaces in a state of irritative inflammation will secrete it. There does not seem to be any very great practical utility in distinguishing them; for an increased secretion of mucus,

* If the reader submit a little serum, in a Florence flask, to a temperature of 150 Fah., he will readily understand the proposed distinction.

† The specific gravity of serous urine is greater than that of chylous. Dr. Prout says, the most delicate tests of albumen are dilute acetic acid and prussiate of potass. The latter, I find, renders the $\frac{1}{10000}$th part of albumen evident in solution.

or the natural quantity assuming the sensible and obvious characters of pus, equally with pus, denote a diseased state of the part. Certainly, mucus cannot infer ulceration; whereas this state may attend pus. It was formerly supposed that pus always denoted ulceration, but experience has proved the fallacy of this opinion. There is one character, however, which when pus assumes may be regarded as an effect of ulceration. If the pus be intermixed with a degree of sanies, we may then infer an ulcerated surface; but, under ordinary circumstances, pus and diseased mucus merely infer inflammatory action, without enabling us to determine whether the ulcerative stage be present or not.* For distinguishing them, Dr. Young's method, founded on their optical properties, is perhaps the best and most easy of application. A portion of the suspected matter is to be placed between two small disks of plate glass, and held so that the light may pass through. If it be mucus, the light will pass unaltered; but if pus, the rays will be decomposed, and the prismatic colours rendered evident.

Bile.—Urine, containing bile in small quantity, has, when poured into a shallow vessel, a kind of

* If we can be certain that the discharge be mucus, we may safely decide against the presence of ulceration.

greenish cast. It will stain linen, calico, &c., yellow. If the urine be more highly charged, the colour will be deep brown. The most delicate test is muriatic acid, which strikes a green colour with urine containing bile, even in very small quantity.

Blood. — Blood is recognized by the deep colour, the speedy putrefaction of the urine which contains it, and such urine will coagulate on being heated, or by the addition of nitric acid. Mucus in excess, or in a morbid state, pus, bile, and blood,* are rather accidental occurrences, not necessarily connected with diabetes; still, however, it may be as well to be aware of the possibility of their presence, and the mode of detecting them. Pus and blood are to be regarded as unfavourable appearances, and the latter more especially, as denoting a formidable morbid condition of either the kidneys, bladder, or urethra.†

* Hæmaturia frequently arises from the presence of renal calculi, especially the oxalate of lime or mulberry species. For the mode of determining the source of the blood in urine, I refer the reader to Dr. Prout's Inquiry, &c. p. 296.

† It is scarcely necessary to caution the reader against mistaking the sanguineous appearance which the urine of menstruating females sometimes assumes. Indeed, in dysmenorrhœa, actual blood is frequently discharged, and becomes intermixed with the urine.

Vegetable Products.—The only unnatural principle of this class, found in the urine, is sugar. It forms no part of the constituents of healthy urine. Its quantity varies in different cases, and it is recorded, that 29 oz. have been separated from the daily urine of one patient. The qualities and appearance of the sugar separated from the urine in diabetes, differ in some degree from those of common sugar. The sugar of diabetic urine resembles that of grapes more nearly than any other. Another difference has been said to exist between this and common sugar, and which is, that the former is incapable of crystallisation. This, however, is not the case; for crystals of sugar are often deposited on the linen of diabetic patients, and have even attracted the notice of the patient, when the other symptoms of his disease excited no suspicion.* Dr. Henry, also, by exposing the solution to the air for a time, and occasionally removing the scum which formed, obtained beautiful white crystals, not inferior to those of vegetable sugar.† Chevreul, also, by slowly evaporating the alcoholic solution, obtained beautiful white crystals.

I know of no chemical re-agent, nor, indeed,

* See Prout on Calculous Affections, p. 65.

† Henry's Chemistry, vol. ii. p. 329, 8th ed.

of any chemical properties possessed by sugar, by which its presence may be immediately detected. If the quantity be sufficient, the sweetish taste will immediately indicate its presence, but when it is in smaller quantity, then its presence is not so easily detected. I found that thirty minims of a syrup formed by the solution of one pound and a half (troy) of sugar in one pint of water, gave a very sensibly sweet taste* to six hundred minims of spring water. In a thousand it was not perceptible.

One minim of the same syrup was mixed with 240 minims of spring-water, two minims of which were placed in a watch-glass on a white painted board, and put into the sun to evaporate. When evaporated to a syrup, it attracted dust, &c.; and by a further evaporation, the crystallisation† of

* The taste is not at all times equally sensible, and therefore cannot be depended on.

† The crystallisation is effected almost instantaneously by the addition of a drop or two of alcohol. This, however, cannot be added for this purpose in urine, because it also precipitates the sulphates which are dissolved in this fluid. However, I think, a practised experimenter may almost determine, from the appearance which saccharine fluids assume on the addition of alcohol,‡ whether sugar be present in solution or not.

‡ Provided no saline matters be present in solution.

the sugar became distinctly evident by means of a small botanical microscope. The taste of the crystals was not to be mistaken.

To render a drachm—60 minims by admeasurement—of healthy urine sensibly saccharine to the taste, it required ·7 of a minim of the same syrup; and an individual, not prepared to expect sugar, did not pronounce it sweet till nearly three minims had been added.

If urine, containing sugar, be mixed with alcohol, the sulphates which it holds in solution are precipitated. The solution may then be filtered, and evaporated to the consistence of a syrup. This syrup should then be again digested in half its weight of alcohol, filtered, and this alcoholic solution evaporated to dryness.* In the bottom of the watch-glass or platinum dish, in which the evaporation is most conveniently performed over a spirit lamp, a transparent crystal of sugar will be found in the bottom of the vessel. This crystal will be immediately recognised by its taste. I found, by experiment, that the sugar contained, by the intermixture of a single minim of syrup formed as above, mixed in an ounce of urine, was discoverable in a drachm of this fluid by this process.

* I now speak of a quantity of urine.

Sugar, in very minute quantity, may be detected by the following process:—

Let a portion of the suspected urine be evaporated to half its bulk; pour it off and digest with half a measure of alcohol, then filter the solution, and evaporate to dryness. The extract should then be distilled with four times its weight of nitric acid. If crystals form, they may be separated and examined apart; but if not, when the distilled mass has attained the consistence of syrup, it should be mixed with about three times its weight of boiling distilled water. This solution, when strained, will be found to redden litmus paper. The solution should be rendered neutral by the cautious addition of an alkali, either potass, soda, or ammonia. If the process have been carefully conducted, the solution will be perfectly clear and transparent; if not, it should be filtered. If to the clear solution a solution of muriate of lime be added, if the smallest particle of sugar pre-existed in the urine, the mixture becomes turbid from the precipitation of oxalate of lime. I have, by the above process, detected traces of sugar from an intermixture of two minims of syrup in four ounces of healthy urine, and using only one fluid drachm of the specimen.* The rationale of the operation

* Since the manuscript of this work was placed in the hands of the publishers, I have repeated these experiments under

is the following:—By evaporation, several of the urinary constituents are deposited, and from the

various modifications, and with more care and attention than had been previously observed. Consequently I find that the urinary phosphates, if predominant, or indeed even in the natural quantity, will cause a precipitation which may be mistaken for oxalate of lime. The nature of the precipitate, however, may be very soon decided, by adding a very slight excess of phosphoric acid, by which the insoluble phosphate of lime, should the precipitate be of this nature, will be converted into a soluble super-phospate, and the turbid liquor will immediately become transparent. Again, if a particle of the precipitate be separated, and urged by the flame of the blow-pipe, if it should be phosphate of lime, it will not be affected by the heat, unless some flux be present. It may, however, be rendered fusible and vitrified before the blow-pipe by admixture with the triple phosphate of ammonia and magnesia. But should the oxalate of lime form the precipitate, it may be recognised by the following characters. Before the blow-pipe it swells and blackens, and afterwards leaves a white ash, which exhibits alkaline characters; it reddens or turns to brown the yellow colour of moistened turmeric paper, and restores the blue colour to litmus paper, previously reddened by a weak acid, as the dilute acetic acid, and in fact exhibits all the distinguishing characters of caustic lime.

These sources of confusion may be avoided, by previously separating the phosphoric acid, which may be effected in the following manner:—

Neutralise the acidity of the urine by a solution of pure caustic potass, and precipitate the phosphates by a solution of nitrate of lead, or, what is preferable, a solution of sulphate of

decanted liquor the sulphates are precipitated by means of the alcohol. By evaporating to dry-

iron.* Let the precipitates then be separated by filtration, and the clear liquor may then be examined as in the former directions, and any precipitates which may occur may be afterwards submitted to the action of the blow-pipe, &c.

I have found the following process less operose, and sufficiently delicate for a first or hasty examination. After having precipitated the phosphates, drop a drop or two of the urine upon a long narrow slip of common window-glass, as used by Dr. Wollaston, and evaporate to dryness over the flame of a spirit lamp. To the dry residue add one or two minims of concentrated nitric acid, and boil it over the flame of the lamp. When reduced to the consistence of syrup, a few drops of boiling distilled water should be added. The solution should now be rendered neutral by a particle of potassium.† A drop of the solution of muriate of lime, will indicate the formation of any oxalic acid by a deposition of oxalate of lime, which may be recognised by the characters already detailed, and for the development of which the heat of the spirit lamp is quite sufficient. Dilute phosphoric acid also will dissolve the carbonate of lime with effervescence, whereas, it will not affect the oxalate. If, from the above experiments, we have reason to infer or sus-

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* The sulphate of iron is preferable, because the resulting soluble alkaline sulphates are precipitated by the alcohol.

† Potassium is preferable to potass, because it is so difficult, under ordinary circumstances, to obtain the solution of caustic potass free from carbonic acid, in which case, on the addition of the solution of muriate of lime, carbonate of lime will be formed, and will thus tend to confuse the result.

ness, sufficient heat should be used to drive off the alcohol,—as the action of nitric acid converts alcohol into oxalic acid,—we obtain the sugar in a solid form. By distilling this with nitric acid, we convert it into the oxalic acid. This, and any remaining nitric acid, are dissolved by the boiling distilled water; and by the addition of an alkali, are rendered soluble, alkaline oxalates and nitrates being formed. By the addition of the muriate of lime, a double decomposition takes place, an insoluble oxalate of lime and a soluble alkaline muriate resulting.

Sugar may be converted into malic acid by the action of chlorine; but, I believe, the above mode of determining its presence perhaps requires less chemical address than any other.* It is a matter of importance to determine, whether or not sugar exists in the urine; because, as this substance

pect the presence of sugar in the urine, we should then operate upon larger quantities, so as to place the question beyond all source of doubt. A glass retort of an ounce measure will be found a very convenient apparatus for the distillation of the syrupy extract in nitric acid, and thus sufficient quantities of the products may be obtained to exhibit their characters and verify their nature.

* By the methods which I have above mentioned, I have separated sugar from the infusions of a number of vegetables, into the composition of which it enters as a constituent principle.

forms no part of the composition of healthy urine, therefore its presence denotes a perversion of the natural function of the kidneys. We cannot well conceive a perversion of function, without some serious change in the structure of the organ which exercises it. The function of a part may be preternaturally excited, and its secretions increased without any important change in its mechanism. Of this we have daily proof, and that the organ soon resumes its healthy relations. But when its functions have been perverted, and that unnatural principles are not only secreted, but also formed in abundance, we have every reason to fear that serious morbid changes have been effected, which, if not speedily controlled, will ultimately lead to fatal consequences.

Such is a summary of the means of determining the nature of diabetic urine. Perhaps it may be imagined that the examination of the urine is not a matter of importance, nor likely to lead to any useful practical results. Indeed, it seems to be a prevalent error among the profession, that science cannot be rendered subservient to physiology, much less to the purposes of pathology. These opinions, however, arise from an unwillingness to apply our resources. Dr. Marcet, and more recently Dr. Prout, have fully proved the advantages which may be derived from the judicious

application of science to the purposes of our art; and I am willing to rank myself among the humble supporters of the assistance which science affords in the solution of some of the more abstruse and difficult problems in nosology. I may observe, too, that this work was in the hands of my publishers nearly a month before the second edition of Dr. Prout's work was even announced; and it is highly gratifying to me to find, that, though I have been anticipated in some degree, my opinions have been partly confirmed by this gentleman.*

* Had I seen Dr. Prout's work before this volume went to press, I probably should have attempted a different arrangement of the subject.

THE END.

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ERRATA.

Page 12, line 28, *for* unexceeds *read* exceeds.
—— 13 ——28, *for* Calcareous *read* Calculous.
—— 31 ——23, *after* connexions *dele* comma.
—— 31 ——24, *after* stomach *insert* a comma.
—— 32 ——26, *after* see *read* also.
—— 133 —— 7, *for* became *read* become.
—— 138 ——17, *for* was *read* were.