On temporary albuminuria : more particularly as occurring in the course of certain febrile or other acute diseases / [J. Warburton Begbie].

OBSERVATIONS

IN

CLINICAL MEDICINE.

I.

ON TEMPORARY ALBUMINURIA,

MORE PARTICULARLY AS OCCURRING IN THE COURSE OF CERTAIN FEBRILE OR OTHER ACUTE DISEASES.

(Read to the Medico-Chirurgical Society of Edinburgh, 5th May, 1852.)

"It appears to me most remarkable," writes Dr. Adams, in his learned translation of the works of the father of medicine, "that the important observations made by Hippocrates on the state of the urine in febrile diseases should have been lost sight of in an age when the chemical characters of the urine have been so much studied."[1] M. Littré has make a remark to the same effect, in his edition of 'Hippocrates,' and it will, I think, be acknowleged by all to be a just one. The observations on the urinary secretion contained in the aphorisms are such as to fill the attentive reader with wonder, as well at the amazing observation as at the vastness of the knowledge possessed by their immortal author. It has, indeed, been contended by some, that the fact of the occasional albuminous nature of the urine was known to Hippocrates,[2] and, if this notion be correct, then,

[1] 'Hippocrates.' Sydenham Society's edition. Vol. i, p. 98.

[2] On this point, see Dr. Adams' Observation on Aphorism 34, Section 7;' also Dr. Adams' translation of 'Paulus Ægineta,' vol. i, p. 552—(this page is erroneously printed 352).

more wonderful still, he had already associated it with a protracted disease of the kidney.

Whether known to Hippocrates or not, this connection of disease and symptom long lay neglected, and it is indeed only within our own days that Blackhall,[1] by showing the frequent association of coagulable urine with dropsies, and then the well-known researches of Drs. Bright, Christison, Gregory, and many others, allying albuminuria with alteration of the structure of the kidney, have added to our knowledge regarding it. At the present time, though *well-known*, there is perhaps no symptom the value of which is more frequently misunderstood than the existence of albumen in the urine. Unless the occasion of its presence can be referred to some such certain cause, as the admixture of pus or blood, &c., it is apt too generally to be linked with organic change in the kidney. That the difference of opinion which prevails as to the pathological importance to be attributed to the existence of albumen in the urine arises mainly from two sources, most will, I apprehend, be ready to admit. These are—either from an imperfect knowledge as to the causes of, or conditions under which, the coagulability of the urine occurs; or from an incorrect appreciation of the indications that coagulability, even when observed, affords. In illustration of the first of these, I need only here refer to the condition of the urine in a febrile disease, to which I shall afterwards have occasion in this communication more fully to direct attention—I mean scarlatina; and now speak more particularly of the condition of the urine in the dropsy which so frequently follows that disease. In such cases I have found the urine almost *always* to contain a considerable, in some a very large, amount of albumen; Becquerel[2] appears to have had the same experience; and Dr. Anthony Todd Thomson,[3] in whose posthumous work on skin diseases there occurs this passage:—"The urine is *always* found albuminous where dropsical symptoms appear." Opposed to this are the statements of Simon,[4] and Dr. Scott Alison,[5] and the observations

1 'Observations on the Nature and Cure of Dropsies.' London, 1813.
2 'Semeiotique des Urines,' p. 267.
3 'Diseases of the Skin,' edited by Dr. Parkes, p. 8.
4 Simon's 'Chemistry.' Sydenham Society's edition. Vol. ii, p. 313.
5 'London Journal of Medicine,' March, 1849.

of Phillip,[1] in Berlin,—the former speaking of the disease under the two heads of albuminous and non-albuminous. In illustration of the second reason which I have assigned as causing difference of opinion on this subject, I need only here remind the members of the Society of many cases which must have fallen under their own observation, in which they did experience difficulty in referring the occurrence of albumen in the urine to its proper cause, where perhaps they too rashly concluded its dependence on organic change, and only after further reflection and more careful examination, detected a much more simple cause, which had been previously overlooked, and which neglect had led them, in the first instance, unreasonably to magnify the importance of the disease. This is no supposititious case—such a one I have not unfrequently encountered—and the class of which it is the type will appear by examples in the sequel.

In the present communication I propose directing the attention of the Society to the condition of the urine in certain febrile or other acute diseases. Though the inquiry is important, the subject is too vast to permit me to discuss it wholly. I have, therefore, selected for present investigation one of the most striking characteristics of the urine in such diseases—its frequent coagulability. In a word, my object is not so much to deal with the aphorisms of Hippocrates on the state of the urine near and at the crisis of fevers, as it is to illustrate the observation of M. Martin Solon,[2] that at the resolution of diseases the urine is apt to become albuminous.

By *Temporary Albuminuria*, I mean the manifestation and continuance of albumen in the urine during a limited period, and unconnected with any serious organic change in the kidney. This albuminuria, as occurring in the course of certain febrile or other acute diseases, I shall at present consider under the three following heads—*Desquamative Albuminuria, Inflammatory Albuminuria*, and *Critical Albuminuria ;* and these I shall best illustrate by an immediate reference to the diseases in which they occur.

Under Desquamative Albuminuria, then, I shall speak

[1] Casper's 'Wochenschrift,' 1840, No. 35 ; and Simon's 'Chemistry,' Sydenham Society's edition, vol. ii, p. 280.

[2] 'De l'Albuminurie,' &c. Paris, 1838.

shortly of the urine in Scarlatina, Asiatic Cholera, and Erysipelas.

Under Inflammatory Albuminuria, of the urine in the Dropsy following Scarlatina.

And under Critical Albuminuria, of the urine in Pneumonia and certain cases of Typhus.

First, then, of Desquamative Albuminuria, and of the urine in Scarlatina. In speaking on this subject, we have to deal with a mass of conflicting evidence; for, unlike the condition of the urinary secretion in most febrile diseases, the characters presented by the urine in scarlatina have of late excited the attention of many accurate observers. Of continental authorities, I may quote the names of Martin Solon, of Simon, Romberg, and Phillip, with whose statements most of the members of the Society are probably familiar, and to which I need not allude more particularly than to say, that while some afford evidence of the frequent coagulability of the urine during the period of desquamation after this disease, others from very careful observations oppose it: thus Dr. Frerichs,[1] in his very excellent work, says it is not the rule to find the urine albuminous in simple scarlatina. In a short paper, published in the 'Monthly Journal of Medical Science' for January, 1849, I gave the results at which, after careful examination of the urine in many cases of scarlatina, I had at that time arrived. Particularly referring to twenty-one cases, because the experiments in regard to these were free from all conceivable sources of fallacy, and were possessed of this additional value, that they had been performed by me *coram publico*—in the Infirmary, in the presence of, and frequently aided by, my then fellow-clerks, more especially Drs. Littlejohn and Absolon. These experiments and others led me to entertain the belief, "that if careful examination of the urine were made, albumen in small amount would be found to exist in every case of scarlatina." The prevalence of the disease in this city and in many parts of Scotland, about and since the same period, afforded opportunity for the further investigation of the subject, which was not lost sight of. From Dr. Fleming and Dr. Chalmers, then house-surgeons of the Dundee and Perth Hospitals respectively, I

[1] 'Die Bright'sche Nierenkrankheit und deren Behandlung'—in a note at foot of p. 207.

early received communications corroborative of my own experience. In June, 1849, Dr. Patrick Newbigging communicated to this Society an interesting history of an epidemic of the disease, as observed in John Watson's Hospital, and from his own experience there in regard to the urine, expressed his concurrence in the belief I have just quoted.[1] I conclude this short historical account by referring to a most interesting paper, from which I have derived much instruction, giving an account of an epidemic, observed under very much the same circumstances as that by Dr. Newbigging, and also communicated to this Society by Mr. Benjamin Bell.[2] Mr. Bell's experience antagonises Dr. Newbigging's and my own; the urine, however, was not tested from day to day—a condition I had been led to regard and to express as a *sine quâ non*. Mr. Bell, I feel sure, will pardon me if I now state that, to a certain extent, the want of daily examination, in my opinion, invalidates his experiments. I am, however, willing to admit that, even had the diurnal testing been executed, the albumen might not have appeared—an opinion held in deference to Mr. Bell's, and to that entertained by others, as well as formed from my own more recent experience. In speaking a little more in detail in regard to the urine in scarlatina, let me direct attention more particularly to the following points :—

I. The period of the occurrence and duration of the albumen in the urine, and its amount.

II. The microscopic characters of the urine with which the albumen is invariably associated.

III. The pathological import which its existence denotes.

IV. Whether it possesses any diagnostic value.

I. As to the period of its occurrence, &c. It is just after the commencement of desquamation of the cuticle that the albumen first makes its appearance. In most of the cases I have seen, the third and fourth days after desquamation had set in were the most common. I have found it, however, on the first day of desquamation, and as late in its appearance as the eighth and ninth : this was the case in the urine of a patient I had occasion to attend lately. I had been examining the

[1] 'Monthly Journal of Medical Science,' September, 1849.

[2] Since published in 'Monthly Journal of Medical Science,' August, 1851.

urine from day to day, and finding no albumen on the eighth day after the desquamative process had commenced, I had begun to doubt the likelihood of its appearing, when on the morning of the ninth day I detected the albumen; it continued visible on the tenth, and passed entirely away on the following day. Here let me say a word as to the examination of the urine; in this, as indeed in all cases, both tests—*i.e.* the application of heat and the addition of nitric acid, *must* be employed; nor must the examination be made once or twice, and only on those days when the presence of the albumen is deemed most likely—it should be made every day, beginning before desquamation has commenced, and continued till that process is nearly completed. As a general rule, the duration of the albumen in the urine will be short, probably not longer than a few days; differences, however, exist in this respect; I have known it to disappear in thirty-six hours, and have found it to continue for ten days. There is one interesting fact in regard to its continuance—that after its disappearance it will not return, at least so I have always found; in other words, whenever the albumen was not detected after being first seen, its disappearance was a final one. The amount of albumen will generally be small, seldom more being present than to allow the urine to be called slightly coagulable—a feature of great importance in distinguishing the urine of the simple from that of the dropsical scarlatina.

II. The *microscopic character* of the urine, with which the albumen is invariably associated, is the presence of a considerable amount of epithelium, derived from the different parts of the urinary apparatus. Sometimes the entire epithelial lining of the small tubes of the kidney was present, though certainly not frequently. I do not remember to have ever seen in the urine of simple scarlatina the albuminous or fibrinous casts of the small tubes of the kidney, the appearance of which is so common in the urine of the dropsical affection. Besides epithelium, the urine generally contained amorphous urate of ammonia, sometimes crystalline uric acid; and occasionally, though very rarely, the urine, though examined very soon after micturition, contained crystals of the ammoniaco-magnesian phosphate. In all such there existed a greater than usual amount of epithelium and mucous sediment. It is not un-

common to find octohedral crystals of oxalate of lime in the urine at the same stage of the disease.

III. The pathological import which the existence of albumen in the urine denotes. This is a point on which difference of opinion must still be expected to exist, seeing not only how very different are the facts recorded in regard to the occurrence of albumen, but how varying is the estimation of the importance which is awarded to its presence. While many believe its manifestation to be accidental, and of no importance, there are others who conceive it, if at the time unaccompanied with dropsy, to be its certain prelude. Both of these opinions I have attempted to show are erroneous, and, at least as far as my own observations go, founded on incorrect data. What, then, is the cause of albumen in the urine in simple scarlatina, and what its pathological import? I conceive it to be as essential a symptom of the disease as is desquamation of the cuticle,—to be associated to a certain extent with that desquamation,—to be, in fact, the result of a desquamative process, which the mucous membranes in this disease, equally with the skin, are subject to. Granted, then, that this desquamation occurs when such a change is taking place in the epithelial membrane lining the minute tubes of the kidney, the office of the cells composing which is to eliminate from the blood the matters, solid or fluid, which, in the normal exercise of the renal function, compose the urine, it surely is not surprising that the albumen from the former should, to a slight amount, enter into the latter. Such I believe to be the cause of its occurrence; nor can I regard its presence as indicating any pathological condition further than the separation of epithelial cells and their passage in the current of the urine. No symptoms referable to any such condition occur, no febrile reaction, no lumbar pain, no non-elimination of urine, no suppression of its watery parts, not even any diminution in its quantity, and, with the exception alone of the presence of albumen, no marked alteration in any of its sensible qualities. I have said that this albuminous condition of the urine in scarlatina is associated with the cuticular desquamation, it is so in the time of its occurrence, and so it is also as regards its amount; for I have noticed the albumen in the urine to be greatest in amount, and to continue longest, in those cases in which the process

of desquamation had taken place to the greatest extent. In those cases in the urine of which no coagulability has taken place—for my more recent experience has shown me a few such—there has been no very marked desquamation, and no direct evidence of any epithelial separation, as shown by examination of the urine. We know that in many cases of scarlatina, especially in those where the eruption, though well-marked, has not been brilliant, extensive, or lasting, it is not uncommon for the desquamative process not to take place at all, or at most to a comparatively very slight extent. Such are the cases in which the coagulability of the urine will perhaps not occur. I say *perhaps*, for in some such I have, notwithstanding, found it. I am still, therefore, disposed to regard the temporary albuminuria of scarlatina as probably as frequent in its occurrence, and of somewhat of the same importance as a symptom, as the desquamation of the cuticle.

IV. Does the existence of albumen in the urine of scarlatina possess any diagnostic value? I shall best illustrate this point, by relating shortly the particulars of a case which came under my own observation at the time I was making these investigations.

A female servant, æt. 28, was admitted, early in December, 1848, into the Royal Infirmary, under the care of Dr. Paterson, with whom I then acted as clerk. Her chief complaint was of sore throat, which, however, was less severe than for some time before her admission, and was then not very characteristic, and of feebleness and incapability for exertion. She mentioned that she had lately undergone much fatigue and anxiety, having acted as nurse to a lady, who died while she was so employed. I need not detain the Society by relating all the particulars of the case, suffice it to say, that a few days after admission the cuticle, which had been dry, but the skin free from eruption, began to desquamate. The idea then occurred to me that, probably, this had been a case of scarlatina. I examined the urine; on the first and second occasions, and these on different days, detecting no albumen, but on the third found it slightly coagulable, and confess that, upon doing so, I felt less difficulty in deciding on the nature of the case. The albumen continued for three days, and no dropsy occurred. The interest of this case was increased by my being informed, on making careful inquiry, that the mistress of the patient, in whose house she resided, and on

whom, when ill, she attended, was supposed to have died of scarlatina, before, however, the eruption had been fullly developed, so that the servant had remained in ignorance of the cause of death. I conclude what I have to say in regard to simple scarlatina, by urging the importance, as well as interest, attending the existence of albumen in the urine of that disease. It is during that period when desquamation is taking place, not so much from the cuticle, I believe, as from the kidneys, that dropsy, from exposure to cold or other causes, is apt to be developed. Let regard then be had to the condition of the urinary secretion; till the stage of temporary albuminuria is gone by, the patient should be strictly confined, and no hygienic rule relaxed; but after that, even though the old cuticle is as yet only slowly separating, I am inclined to think the danger of a dropsical attack is passed; the renal function, never inactive, but only slightly involved, is again entirely healthy and efficient.

Second.—In regard to the occurrence of albumen in the urine in Cholera. The very frequent occurrence of albumen in the urine of persons suffering from this disease was, I believe, first noticed in the Cholera Hospital of Edinburgh, during the epidemic of 1848–49. At nearly the same time Dr. Parkes and others in London found the first urine passed in cholera to be coagulable. In the end of spring 1849 the disease became epidemic in Paris, and the same character of the urine speedily attracted attention—Messrs. Levy, Martin Solon, Rostan, and others, making observations in regard to it.[1] During the prevalence of cholera in Edinburgh, I had, thanks to Dr. William Robertson, the opportunity of examining the urine in nearly 100 cases.[2] On the general morbid characters of urine in cholera I shall not now enter, except in so far as these are connected with, or illustrate, its coagulability. One of the most invariable symptoms of Asiatic cholera is the entire, or almost entire, suppression of the urine; and one of the most favorable symptoms throughout the whole course of the disease is the return, or the decided increase, in quantity of that secretion. The mode of fatal termination in many cases of cholera had

[1] See Valleix, 'Guide du Médecin Praticien,' tome deuxième, p. 707.

[2] See 'Monthly Journal of Medical Science' for November, 1849 [and p. 65 of this volume].—Ed.

satisfactorily shown that the cause of death might reasonably be attributed to the existence of a poison in the blood, whose effects were produced in very much the same way as those of opium and other narcotics; death in such cases as those now referred to taking place by way of coma. All who have seen any number of cases of cholera are familiar with the circumstances now alluded to; and the painful experience of the almost certainly fatal issue of the cases which presented such symptoms cannot soon pass from the mind. Hopes of ultimate recovery given rise to by an unexpected rally from a state of prostrate collapse; by a wasting diarrhœa checked, and urgent vomiting controlled, by a returned pulse and genial warmth taking the place of a deadly coldness of the surface, were too often disappointed. Many such promising cases being cut off in the way already adverted to, it soon became manifest that the only certainly favorable symptom was the restoration of the urinary secretion. The urine, then, first passed in cholera is found to present the following characters:—To be dark in colour, muddy in appearance, to be deficient in specific gravity, to be generally acid in reaction—when treated with nitric acid, to manifest the presence of bile or biliary colouring matter—when tested by heat and nitric acid, to yield a precipitate of albumen; to be remarkably deficient in urea; and lastly, when viewed under the microscope, to contain a large amount of epithelium, derived from different parts of the urinary system, and generally one or other of the common crystalline deposits—most frequently uric acid. The morbid character most intimately connected with the mode of death adverted to is the extreme deficiency of urea, the retention of that substance being, as we know, a frequent source of mischief in other diseases; but the two characters which chiefly concern us in this investigation are the presence of albumen and the deposit of the epithelium. In several examples the albumen existed in such amount as to allow the urine to be called highly coagulable; but more generally the expressions coagulable, or slightly or faintly coagulable, more correctly described it. The albumen continued present in general for some days, usually decreasing in amount, but occasionally increasing for a day or two. This coagulability of the urine was associated invariably with the presence of a large amount of epithelium; as in the case of the

urine in simple scarlatina the epitheum was derived from the bladder, as well as from the kidney; it was, however, more common in the cholera urine to find the entire epithelial lining of the minute tubes. Attentive observation enabled me to note these further points; the amount of epithelium and the degree of coagulability of the urine always stood in exact ratio the one to the other. They generally appeared together, and again in company disappeared. I have found the epithelium present alone before the albumen appeared, but have never observed the opposite case. Again, the period of the disease at which the albumen and epithelium in the urine appear, is an interesting consideration in regard to their cause and pathological import. I have just referred to the favorable nature, as a symptom, of the return of the urinary secretion. It is indeed just as the period of the resolution of the disease is arrived at, just as convalescence begins, as bile returns to the stools, and as the general appearance of the patient commences to improve, that the first urine is passed; and these are the characters it presents. Now, I have called the albuminous urine of simple scarlatina a *desquamative* albuminuria, and for the same reasons I call the passage of albumen in the urine of this disease a *desquamative* albuminuria. The examination of both most emphatically indicates the progress of a desquamative change in the lining and secreting mucous membrane of the kidneys; and both diseases afford the evidence of desquamation taking place in other parts of the system. The desquamation of the cuticle in scarlatina is not more constant than that of the mucous membrane of the intestinal canal is in cholera. These peculiar features of the urine in cholera I have always found best marked in the severest cases of the disease. There remains one other point of still higher consideration, because beyond its mere interest there is a weight of value, namely, that by a just appreciation of these evidences furnished by the urinary secretion, means may and have been adopted whereby the condition of the patient may be improved, happily his restoration from otherwise certain death secured.

Third.—Albumen in the urine of erysipelas. I need not occupy the attention of the Society long with this example. I have found that after severe attacks of idiopathic erysipelatous inflammation, and most frequently when a large surface of the

skin has been affected, that the urine has, during the progress of convalescence, become albuminous. I do not regard temporary albuminuria as so invariable or frequent a symptom of erysipelas as I conceive it to be of scarlatina, at least I have not found it so. But since my attention was directed to this subject, I have found albumen in the urine during the early progress of convalescence from a large number of severe cases of the disease, more especially when these two symptoms had been present—severe gastric or intestinal irritation and derangement, and considerable desquamation of the cuticle. The quantity of the albumen present was never great; the period of its occurrence was at the resolution of the disease, as convalescence commenced, and during the progress of desquamation. It was, as in the other examples of albuminuria I have already referred to, invariably associated with epithelium, affording evidence of desquamation, but more closely resembling the urine of scarlatina in being less charged with this ingredient than that of cholera. The question arises, that seeing this temporary albuminuria is a symptom of certain of the exanthematous diseases, is the fact of the frequent occurrence of albumen in the urine of erysipelas, when its symptoms most nearly resemble those of that class of diseases, to be considered as at all proving that identity?

In the interesting paper[1] read to the Society at its last meeting, by Dr Alexander Wood, the relations of erysipelas with scarlatina were sought to be established by a reference to other but very important facts. The temporary albuminuria which occurs in the course of both adds, I think, another link to the chain of connection and relation.

In now taking leave of the subject of desquamative albuminuria, I have only to add, that the three examples now considered are not the only ones I could have adduced. There are others, of which variola and certain febrile affections of the skin are instances; but the three I have selected differ in no very marked degree from these and others, while they have served sufficiently to illustrate the temporary albuminuria dependent on desquamation. I have, it will further be observed, not claimed for the urine in these three diseases an entire similarity in their characters; it is sufficient for my purpose,

[1] Since published in 'Medical Times and Gazette,' July, 1852.

if you agree with me in thinking that they so nearly correspond in certain particulars, that, setting aside their differing characters, I am entitled to conclude that the *temporary albuminuria* common to the three arises from the same cause in each.

And now. *Secondly,* I have to consider the case of *Inflammatory Albuminuria,* which I propose to do very shortly, by reference to one example—*the dropsical disease following scarlatina.* Every one who has paid attention to the condition of the urine in this most interesting affection, must have noticed the great dissimilarity subsisting between its external and other characters and those of the urine in simple scarlatina; while in the latter the amount of urine passed, except during the continuance of febrile symptoms, is undiminished, one of the most certain forerunners, as it is always the most invariable accompaniment of dropsy, is the excessive reduction of the quantity of urine. This urine, when further examined, is found to contain a large amount of albumen; while, under the microscope, frequently blood, not unfrequently exudation corpuscles or compound granular cells, always much epithelium, and the fibrinous casts of the renal tubes are recognised. The symptoms which accompany these changes in the urine are generally well-marked, the most prominent, save the dropsy, being a very uneasy, often severe, lumbar pain and marked febrile excitement. But, independent of these general symptoms, it will, I think, be admitted, that the characters presented by this urine, while they differ from those of the urine in simple scarlatina, indicate also the existence of a much more serious change in the secreting mucous membrane of the kidney than a merely desquamative one. In order, however, to arrive at a correct opinion in regard to the pathological importance of the change undergone in the kidney during the dropsical disease, it is necessary to bear in mind both the symptoms presented by the patient and the hints afforded by the characters of the altered urine. These taken together give evidence of general febrile excitement, and of renal congestion, inflammation, and exudation. I have examined the urine in many such cases, and have found the albuminous condition much more lasting than in the simple cases—indeed observation and experience show now pretty plainly that the long-continued albuminuria of dropsical scarlatina may, and often does, lead imperceptibly—insidiously

it may be—to organic renal disease. In many instances I have found the albumen, though large in amount and associated with all the general and local inflammatory symptoms alluded to, speedily and entirely disappear. I have not seen many cases of the dropsy following scarlatina, which I had watched from the com mencement of the primary disease, but I have seen a few, and in all such the dropsical and aggravated symptoms appeared at the time the temporary albuminuria was going on, and were evidently the result of exposure to cold. This variety of albuminuria, then, which I have called inflammatory, may or may not be *temporary:* it is to be feared that not unfrequently neglected, or even unskilfully treated, the affection it accompanies lays the foundation of permanent renal disease. In most cases, however, it is fortunately otherwise, while in nearly all it may be looked upon as, under judicious management, a curable disorder.

Thirdly.—Critical albuminuria.—1. *Pneumonia.*—Becquerel,[1] Simon,[2] Andral,[3] Finger,[4] and others, have all noticed the not unfrequent occurrence of albumen in the urine of pneumonia. Several observers in this country, though perhaps on a less scale, have done the same; in particular, Dr. William Aitken[5] has recorded several cases of pneumonia in which albuminuria occurred. The peculiar appearance presented by the urine about the critical period in acute pneumonia is well-known. The urine, perhaps clear and transparent, perhaps even pale in colour, though in general not remarkable for any of these characters, becomes at that time almost suddenly dark and muddy, loaded with amorphous urates, which speedily subside in the form of a dense deposit. This characteristic is known to all attentive observers, but I do not think that it is so generally known that that urine, cleared as it is by the first application of heat from the solution of the urate of ammonia, is, by a continuance of the heat, and by the addition of nitric acid, caused to manifest the presence of albumen. Such, how-

[1] 'Semeiotique des Urines,' p. 327.

[2] 'Chemistry.' Sydenham Society's edition, vol. ii, p. 214.

[3] Quoted by Becquerel, 'Semeiotique des Urines,' p. 332.

[4] 'Präger Vierteljahreschrift,' 1847, No. 4; also 'Monthly Retrospect of Medical Sciences,' edited by Drs. Fleming and Gairdner, volume for 1848, p. 66.

[5] 'Edinburgh Medical and Surgical Journal,' No. 178.

ever, I have found to be the case in a large number of instances. It is undoubtedly, as Schönlein and others have pointed out, by the increased energy of the kidney that the mass, in many cases very large amount, of exudation poured into the substance of the lung is got rid of. That exudation is found in the urine in a very different form. The deposit being for the most part composed of amorphous urate of ammonia, of uric acid, and of a large number of very small molecules or granules, which are unaffected by heat, and unaltered by acetic acid, and which are, I think, to be recognised as the *débris* of the exudation—finally, of albumen, deposited by heat, or on the addition of nitric acid. These are the ingredients of the deposit found in the urine of pneumonia, this the manner in which the inflammatory exudation to a certain extent chemically tranformed, but to some degree having only undergone a breaking down, is as effete matter discharged from the system. In respect to the period of occurrence of the albumen, I have already mentioned that about the crisis of the disease is the time I have detected it.

By critical period in pneumonia is meant the time at which resolution begins, when the exudation, which had rendered a portion of the lung useless—impermeable to air—is being got rid of. The occurrence of the albumen in the urine I have, on a few occasions, noticed a day or two before the more general deposit appeared. This, from observation, I was led to regard as a very favorable symptom—it certainly was a very interesting one, because, just as certainly as the returning crepitation, and the less dull sound on percussion over a condensed lung, indicate the breaking up of the exudation and the return of the air to the previously closed vesicles, did the albumen in the urine advertise the approach of the more dense deposit, consisting of the amorphous urates, &c. The continuance of the albumen is very variable. I have never known it to disappear under five or six days. In chronic pneumonia, more especially when the disease has advanced slowly, and when, as is not unusual, a considerable portion of the lung is affected, and when, as is certain, cure is tedious, resolution slow, I have found the duration of the albumen longer than in acute pneumonia. In such instances I have known it to continue for weeks; it did so in one most interesting case, to which I shall

presently refer. As the duration of the albumen is variable so is its amount. It was always present unmistakably, allowing no doubt of its existence; often it was present in considerable amount, not unfrequently in very large. Such are the facts I have observed in regard to the existence of albuminuria in pneumonia, or rather in the convalescence from it. In regard to the frequency of its occurrence, I may mention that in almost all the cases of pneumonia[1] admitted into the Royal Infirmary under the care of the senior physician during a period of nine months, and which I carefully examined, the appearances were such as I have detailed; and that the casual examination of many other cases in wards under the care of other physicians served to strengthen my belief in the almost uniform occurrence of the facts now noted.

I shall here give the particulars of one case—that before alluded to.

In August, 1848, a hale man, aged upwards of sixty, was admitted into the infirmary with acute pneumonia affecting the inferior lobes of both lungs. The disease ran its course with marked severity, but at the end of fourteen days from his entrance to hospital the patient was convalescent. As I was in the habit of doing, in the case of every patient at that time, I examined this man's urine,[2] and found it highly coagulable; still it was passed in normal amount and maintained a good specific gravity, while under the microscope it was found to contain a large deposit of amorphous urates, and a considerable amount of the granular matter I have already described. In this case the opinion first formed (after the discovery of the albumen) was that he laboured under Bright's disease, and that the acute affection which caused his entrance into hospital was an example of one of those intercurrent inflammations which, whether affecting the pericardium, pleuræ, or lungs, we know to be common in that disease. The general symptoms of the patient, however, in particular his appearance and marked convalescence, together with his freedom from dropsy, and the

[1] Of at least eleven cases I have preserved notes, and these in connection with some other features of interest in the urine of pneumonia I shall hereafter lay before the Society.

[2] The first examination had not been made till the fourteenth day of the disease.

characters presented by his urine, appeared to me to militate against the idea of his suffering from renal disease. Accordingly, I kept him under careful observation for some time longer, both while he remained in the hospital and after his dismissal from it; and examining his urine from day to day, perceived its characters to undergo those modifications I have described; and, finally, found it to present those of a perfectly healthy secretion. Had this examination not been continued, or this cause of temporary albuminuria been unknown or unregarded, the probability is, that incorrectly appreciating the evidence afforded by examination of the urine, and particularly the detection of albumen, instead of considering the coagulability as evidence of the progress of a healthy action, we should unreasonably have concluded it to be that of the existence of a permanent organic change. To this albuminuria, then, I have given the title of *critical albuminuria*,—because my data being correct, and my conclusions justifiable, it is to be regarded as an evidence of a critical action, and commencement of a change undergone by a diseased part before its return to a healthy state. But I can further illustrate this subject by a reference to changes which occur in some cases of typhus fever. I have have found albuminuria by no means an uncommon attendant on the convalescence of typhus; not, however, nearly so invariable in its occurrence as in scarlatina, or even so common as in pneumonia; so frequent, however, as to lead me to examine all cases in which it occurred, and that with very great care. The result has been, that no one of any such cases has, either at the time or during a considerable period of observation afterwards, afforded the evidence of any organic change in the kidneys to account for the albumen in the urine.

The albuminuria in the case of typhus appears to me of special interest, as occurring much more frequently, if not entirely, in certain cases of typhus. It is in those cases in which we know, or have reason to suspect, that the deposits, generally called typhus deposits, have taken place in internal organs, that we find albumen in the urine. Two or three observations of a somewhat different nature have led me to this conclusion; for example, I have found the urine albuminous in cases of abdominal typhus—that is, in those cases in which we

generally find severe diarrhœa as a symptom during life, and deposit in the intestinal glands as the most prominent lesion after death. In several cases of this kind, which proved fatal, I have found albumen in the urine for days before death; and in others, which happily recovered, I have as frequently noticed its occurrence. In both these instances the albumen appeared, for the most part, at an advanced period of the disease, at least after the particular symptoms had continued for some time; while in the former the albuminuria continued up to death; in the latter, in some it disappeared as convalescence was fairly established; and in others it lasted for a longer period. The amount of albumen in these cases, and the other characters with which the coagulability was associated, were exactly as I have described them in the example of pneumonia; and finding the albuminuria to bear a relation to the deposits in internal organs in typhus, I have been led to regard the kidneys as the emunctories by which the morbid matter so deposited is to a certain extent at least removed from the system—and so doing, to regard the temporary albuminuria of typhus as a critical albuminuria. It is, I think, no objection to this view that deposits, such as those referred to, remain in organs for a lengthened period; for, firstly, I do not think we can pretend to limit the period of their removal or disappearance; and I am inclined to believe that, when they do so disappear, the urine will very probably contain the ingredients I have noticed; and, secondly, the calcareous masses found in the spleen, and other organs, accepted as the earthy remains of the deposits spoken of, certainly attest the removal by some channel or other of the animal matter, of which, in their original condition, these deposits were partly composed. This is an interesting subject, and invites further inquiry.

And now, in conclusion, I have thus brought under the attention of the Society some of the various causes, as I have observed them, of temporary albuminuria, more particularly as occurring in the course of certain febrile or other acute diseases. Let me again state that I am far from supposing that in this consideration I have included all its various causes, or the diseases in which it may occur. There exist several others, as puerperal fever, phthisis, &c.; these, however, I have not hitherto been able to observe in numbers sufficient to justify

any deductions, though from what I have seen I feel inclined to attribute the albuminuria in these, and some others, to a blood change. Temporary albuminuria occurring in the course of certain diseases has in this paper been considered under three heads—Desquamative, Inflammatory, and Critical—and to one or other of these three I have referred the coagulable urine of scarlatina, cholera, and erysipelas, of dropsical scarlatina, and of pneumonia and certain cases of typhus fever ; it remains for the Society to consider whether or not these divisions are authorised.[1] The study of the morbid qualities of the urine is one of confessedly great interest and importance, and so also is the pathology of the kidney ; both of these have individually received great attention—not, however, sufficiently in respect of the relation to, and dependence of, the one upon the other. It is in this direction that our labours must now advance ; and doing so, we cannot fail to arrive at facts equally instructive as important.

[1] For an account of an interesting discussion which followed the reading of this paper before the Medico-Chirurgical Society, in which Dr. Christison, Dr. Andrew Wood, and Dr. W. Gairdner took part, see the 'Monthly Journal' for July, 1852, p. 92 ; also the 'Medical Times and Gazette,' June 19th, 1852, p. 623.