On dropsy connected with disease of the kidneys-morbus brightii-and on some other diseases of those organs, associated with albuminous and purulent urine, illustrated by numerous drawings from the microscope / by W. R. Basham.

ON DROPSY,

CONNECTED WITH

DISEASE OF THE KIDNEYS,

ETC. ETC.

ON DROPSY

CONNECTED WITH

DISEASE OF THE KIDNEYS (MORBUS BRIGHTII),

AND ON

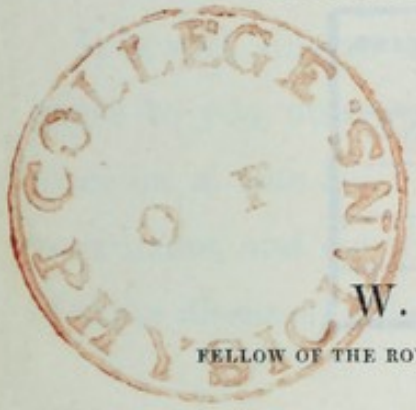
SOME OTHER DISEASES OF THOSE ORGANS,

ASSOCIATED WITH

ALBUMINOUS AND PURULENT URINE.

ILLUSTRATED BY

NUMEROUS DRAWINGS FROM THE MICROSCOPE.



BY

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TO

RICHARD BRIGHT, M.D. F.R.S.,

ETC. ETC.

DEAR SIR,

The pathology of the disease which you were the first to describe, and which is inseparably associated with your name, has engaged the attention of many inquirers. The disease has been examined from various points of view, and much has been done to elucidate its causes, its complications, and its progress. The subject, however, is not exhausted; and in the following pages I have endeavoured to remove some of the obscurity which still surrounds several points connected with this disease.

It is with sincere and grateful respect that I dedicate these pages to you, animated with the hope that they may assist to place on a true basis the pathology of the disease which bears your name, and contribute to our knowledge of the foretokens of these diseases of the kidney.

I am,

Dear Sir,

Very faithfully yours,

W. R. BASHAM.

17, *Chester Street, Grosvenor Place,*

Aug. 21, 1858.

PREFACE.

THE epithelial cell displays characters not less significant in disease than in health. Physiologically, either as protective to the various tubes or ducts which it lines, or, in the form of gland-cells, performing, in the inner recesses of some organs, as the kidneys, a mysterious and hitherto unexplained part in the office of excretion, it is constantly being renewed by a power inherent in the organism, and so long as the renewal is uninterrupted and complete, that process goes on undisturbed, and the equilibrium of health is preserved. Pathologically, whenever, from local or general causes, the regularity of the circulation is disturbed, and conditions of hyperæmia or blood stasis follow, the epithelial structures are the first to feel the disturbing influence, and the cells are thrown off with a rapidity incompatible with complete or efficient renewal, and are produced in an abortive or atrophic form; or when the higher degrees of inflammatory congestion prevail, these atrophic epithelial cells give place to others specially characteristic of the more intense forms of diseased action.

The epithelial cell consists of a cell-wall, within which is contained a fluid called mucosin—glairy, viscous, and transparent. A fine granular material is sometimes dispersed

through this fluid. In the centre of the cell is a single nucleus, clear and well defined; with a high magnifying power, within this is seen another smaller body, the nucleolus. In studying the metamorphosis of these cells in disease, the essential points for attention are the defined appearance of the cell-wall, the absence or otherwise of granular matter within the cell, and the number of the nuclear bodies. Atrophic cells generally exhibit many nuclear granules, and as these nuclei are highly refractive and formed of fat-grains, the term fatty degeneration has been applied to abortive cells presenting these appearances.

Mucous membranes exhibit remarkable peculiarities in reference to these modifications or alterations of the epithelial cells, when thrown off under the influence of various morbid or disturbing causes; but our knowledge of these modifications of development has not hitherto been applied, beyond certain limits, to the elucidation of the nature or progress of disease. In affections of the air-passages, a pituitary, a mucous, a purulent, or a blood-stained excretion are, severally, evidence of disease, differing in intensity and kind. If the excretion from the mucous membrane in simple catarrh, in bronchitis, or in pneumonia, be microscopically examined, various modifications of cell-structure will be apparent, which are distinctly characteristic of these diseases. In catarrh the healthy epithelial cell is shed in abundance, but accompanied by other cells which appear to be atrophic, or abortive cells of the same class. They are usually more granular than the standard epithelial cell, and in place of a single nucleus several distinct nuclei appear collected together within the cell-wall. (See Plate V, figs. 5 and 6.) These have been variously named by different observers. It is the cytoid corpuscle of Henle, and bears a close resemblance to the lymph or colourless blood-corpuscle, except that it is much larger when occurring in catarrhal excretion. Associated

with these in the severer forms of catarrh, in those approaching to the limits of inflammatory action, may be seen the compound inflammation-corpuscle of Gluge. This is a large ovoid or spherical cell, containing numerous resplendent nuclear granules. When the cell-wall is ruptured or dissolved, these nuclear granules remain clustered together in a grape-like mass; hence they are called botryoidal, or, by some writers, mulberry bodies. The mucus or fluid accompanying catarrhal exudation also exhibits many isolated resplendent granules, which are considered as free nuclei. These microscopic objects occur in a clear, viscid fluid—called mucus or mucosin—which appears for the most part to be derived from the rupture or breaking up of the cells whose nuclei are distributed through it. In bronchitis the excretion from the mucous surface is the product of a more energetic disturbing cause. The epithelial cell has altogether disappeared. The field of the microscope presents numerous cells, spherical in shape—uniform in appearance and size—smaller in diameter than the epithelial cell—somewhat granular on the surface of the cell-wall—and displaying within a trefoiled or reniform nucleus; these are the exudation- or pus-corpuscle. The fluid which accompanies them is less viscid and tenacious than the catarrhal fluid, and has moreover a faint alkaline reaction. The more purulent the secretion the less viscous is the accompanying fluid, and, practically, it is well known that in severe bronchitis, as the attack subsides, the sputa become more viscid, and ultimately return to conditions not unlike those observed in simple catarrh. In the early stage of pneumonia, the excreta consist of epithelium in small quantity, mixed with exudation- and compound inflammation-corpuscles in hourly increasing proportions, the whole mixed with a fine granular material, stained more or less with hæmatin, and with which not unfrequently a few isolated blood-

corpuscles are mixed: this is the true croupous exudation. As the disease advances these characters are lost, and these cells give place to an abundant formation of pus-corpuscles; and the sputum then acquires many of the qualities characteristic of bronchitis. From these data we are justified in concluding that the respiratory mucous surface, under the influence of disease, gives off products differing according to the nature, intensity, or duration of the disturbing cause. We have less need for the aid which these facts offer, and are less dependent on microscopic examination in diseases of the respiratory organs and passages, because the successful manner in which the stethoscope has been applied to the investigation of the morbid phenomena of this region, leaves a minute acquaintance with the microscopic character of the excreta unnecessary. But from other mucous surfaces similar products are cast off according to the nature and intensity of the disease. The present work is an effort to apply these facts to the investigation of diseases of the kidney; and to ascertain if the products thrown off from the tubuli uriniferi during the progress of disease possess any similar specific characters, from which correct deductions might be drawn as to the nature, degree, duration, or stage of the renal disorder.

The figures in the following illustrations have not been drawn to scale; they have been copied from the object glass with as much accuracy as possible. It may be thought that some of the illustrations have such general similarity, that a repetition of them was unnecessary; but the object of the author has been to present a faithful representation of the cells and casts at different periods of the disorder, irrespective of any change of character which might have taken place in them. The cases have been selected as typical cases of their class. The microscope employed has been either one of Powell's, or one made

by Pillischer, with a quarter-inch focal power. The author has with design limited himself to the use of very simple instruments and this focal power, because such instruments are within the reach of every practitioner, and may be used by those who are little skilled in microscopic observation. In the employment of the microscope for clinical purposes, the use of the most simple and least complicated instruments should be encouraged; for with these, observations may be made quickly, and without loss of time, and every practitioner, with moderate attention, may verify for himself with some degree of certainty the advance or decline of the renal disorder which his patient suffers.

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ON DROPSY,

CONNECTED WITH

DISEASE OF THE KIDNEYS.

CHAPTER I.

INTRODUCTION.

The microscope as an instrument of investigation should be to diseases of the kidneys, what the stethoscope is to diseases of the lungs. The ear detects, by the aid of the one, the alterations of the sounds of respiration induced by disease; the eye, assisted by the other, sees in the urine materials and products thrown off from the kidneys, which, when carefully studied, become safe and reliable exponents both of the nature of the disease, and of its advance or decline.

The object of the following observations is chiefly to illustrate the aid which the microscope affords in the diagnosis and prognosis of renal disease. While I have aimed at making the student familiar with the general character and symptoms of, as well as the principles of treatment in, these diseases, I have been desirous to ascertain if a more extended signification, than has hitherto been accorded, might not be given to the tube-casts and cells, and other deposits found in the urine, in renal dropsy: whether, in fact, in the specific cell-character of these deposits might not be found a more certain guide in prognosis than can be furnished by any other property of the urine, or by any other symptom exhibited by the patient. From an albuminous state

of the urine, coupled with other symptoms, certain morbid conditions of the kidneys are inferred; from certain deposits found associated with the albuminous urine a greater degree of certainty and accuracy have been given to diagnosis. These deposits undergo marked alteration and change as the renal disease advances, and it has appeared to me an inquiry of deep practical importance, whether a careful study and record of these modifications of the urinary deposits might not reveal the different stages of these diseases, and become a safe guide in prognosis as well as add another element of certainty to the detection of special forms of renal disorder.

Every one familiar with cases of renal dropsy will readily admit how difficult it is to form a satisfactory, definite, or correct opinion of the rate of progress, the advance or recession of the organic changes in the kidney. He must confess that he is guided in his prognosis by the subsidence of the dropsy, or the diminution of the amount of albumen in the urine; but these symptoms, favorable as they may appear, are by no means conclusive of any radical improvement in the condition of the kidney. In the course of a few weeks the dropsy returns, again abates—returns—and the patient dies.

In diseases of the lungs a physical exploration of the chest enables the physician to estimate with an accuracy proportioned to his experience, the progress of the pulmonary disorder, and I believe the microscope can be made to yield equally reliable evidence in diseases of the kidney. It has appeared to me that if the urinary deposit in diseases of the kidney were constantly examined during the whole progress of the disorder, and drawings of the appearance of the tube-casts and their contents carefully made, and compared with each other at different periods of the case; and moreover if drawings were also made of the microscopic appearances of the contents of the tubes in the various forms of renal degeneration after death, we might hope to arrive at data sufficiently determinate to afford us a safe guide for estimating the rate of the progress of the disease, the nature of the organic changes, and the prospect of relief through the agency of appropriate reme-

dies. The diagnosis of these diseases is sufficiently clear; the development and early stage of the disorder are well marked and easily recognised; but even at this stage, data are yet required to enable the physician to decide with any accuracy upon the probability of a cure, permanent or temporary.

When the malady assumes the chronic form, the dropsy, the albuminous urine, the tube-casts, merely testify to the nature and seat of the disease; they but imperfectly furnish the means of estimating the stage of the disease or the probable power of remedial agencies to suspend or interfere with the progress of the disorder. It has been thought that the increase or diminution of the amount of albumen in the urine would mark the rate of progress of degeneration. It has been thought that an estimation of the amount of solids daily excreted by the kidneys, as suggested by Dr. Christison, would be a test of the progressive waste of the tissues, and inferentially of the advance or recession of the disease; but no satisfactory conclusions have as yet been obtained from these methods of investigation. It has not yet been established that the amount of albumen excreted with the urine ever bears any definite relation to the progress of the disease. The albumen in the urine neither augments nor decreases in any certain ratio as the disease advances or recedes. Certainly it gradually diminishes and altogether disappears in curable cases; but it varies much in the more fatal cases. The object of the examination of the urine should be to determine, if possible, the stage at which the disease has arrived. I believe that neither the estimation of the amount of albumen nor the weight of the solid constituents of the urine daily excreted will supply the requisite data on which reliance can be placed for deciding with any degree of certainty the stage at which the renal disorder has arrived, or the rate of progress at which it is advancing. Upon this subject Dr. Owen Rees ('Analysis of the Blood and Urine,' pp. 157, 158) justly remarks, "It is an important point in the investigation of the degeneration of the kidney, accompanied by excretion of albumen by the kidney, whether the proportion of this principle found in the urine bore any relation whatever

to the stage of degeneration to which the kidney had advanced. This relation, however, is wanting, and we yet need a guide, for determining, in many cases at least, at what stage the disease may have arrived when examining our patient."

I freely confess to great scepticism of the practical value (its relation to treatment) of minute attention to the specific gravity of the urine, from which some authors have sought to deduce the amount of solids daily excreted by the kidneys. Independent of circumstances which combine to make me doubt the efficiency of the ordinary method in use, by urinometer, for determining with anything like accuracy the specific gravity of the urine, I am inclined to advance one step farther in heterodoxy, and express my opinion that the specific gravity of the urine, however accurately obtained, must fail to afford any very certain or satisfactory information in relation to the progress of renal disease. There is no animal fluid subject to such hourly variation in regard to its density as the urine; so that unless all the urine of the twenty-four hours be collected no truthful result could be obtained. But even when this is done, no practical inference of any importance is obtained; for the specific gravity of the urine both in health and disease, will vary one day with another, influenced by a variety of extraneous circumstances: the temperature, the density of the atmosphere, its hygrometric condition, the quality of the food, the quantity of fluid drunk, the activity or torpidity of the alvine functions, the amount and nature of the exercise of the body generally;—these will severally influence the density of the urine. It appears almost certain that this great variation in the specific gravity of the urine is imperatively needed, that the blood may be maintained at a definite and fixed density. Physiologically, it is easily conceived what irregularity and disturbance of function would everywhere ensue if the blood were continuously undergoing variations in its degree of concentration, which must occur under the varying circumstances just enumerated, if the kidneys were not, according to the vital requirements, perpetually engaged in regulating and maintaining the necessary equilibrium in the density of the circulating

fluid. It is only thus that the endless variability in the specific gravity of the urine can be explained, or that we can account for the excess of saline constituents and urea at one period, and their absolute decrease with a positive augmentation of water excreted at another. If these variations be thus infinite in health, how much more irregular and ill defined may they not be in disease. An estimation, therefore, of the specific gravity of the urine leads to no practical result; the information it conveys has no absolute value, for from the density of the urine, as an isolated fact, no inference or conclusion in relation to prognosis or treatment can be drawn. It is not intended by these observations to declare that the density of the urine should not be taken into the account, when we are recording *all* the qualities of the urine, physical, chemical, and morphological, with the view of describing the conditions of this fluid significant of disease. It is only asserted that the specific gravity of the urine as an individual property affords of itself no trustworthy information either in relation to the progress of the disease or the success of the treatment. I do not forget that a pale lemon-coloured albuminous urine of low specific gravity indicates a stage of disease very different from what is inferred from urine deep-coloured, albuminous, and of high specific gravity. But these opposite states of concentration teach less than the microscopic appearances accompanying these different densities; and it is from these microscopic appearances that in reality we obtain the information we seek.

The instrument ordinarily employed for taking the specific gravity of the urine—the urinometer—affords but the rudest approximation to the true specific gravity; where the object is only to ascertain if the urine be of *high* or *low* specific gravity, a watery urine, or a fluid highly charged with organic urinary products, this little instrument affords sufficient information: but if the true specific gravity be required with the intention of drawing conclusions from any daily alteration in the amount of solids dissolved in the urine, as for instance in a case of diabetes, when the object is to ascertain the increase or decrease in the amount of sugar present, then no reliance whatever can be

placed on this instrument for any minute differences of specific weight. An accurate balance, and the thousand-grain bottle can alone be relied on. The urinometer has its index scale secured in the tube of the upper limb of the instrument with sealing-wax. This often softens, the index gets slightly displaced, and the instrument is useless. I have known such an instrument in use, and the displacement not discovered till repeated discrepancies between its results and those obtained by the balance led to a detection of the error. These instruments should never be washed in warm water; the finger should never be applied over the red spot where the index is secured; and they should be carefully kept in a cool place in the summer time. I have reason to think that the displacement of the index just mentioned was occasioned by the instrument being kept usually on a window-sill daily heated by the sun.

Lehmann has shown that the formulæ given for calculating the solid constituents of the urine from the specific gravity of this fluid are inapplicable and erroneous. "It was supposed that the residue of the urine might readily be determined from its specific gravity, and for this purpose F. Simon, Becquerel, and G. Bird have attempted to establish formulæ from which, when the specific gravity was given, the solid residue of the urine might be determined. The complete inapplicability of such formulæ, which I have shown by my own experiments, has recently been most completely demonstrated in a large number of investigations made by Chambert on the urine of healthy persons. These experiments prove that there does not even exist any definite proportion between the quantity of salts in the urine and its density, and much less that any such connection exists between the organic matters and the density of the fluid." (Lehmann's 'Physiological Chemistry,' vol. ii, p. 436. Sydenham Soc. edition.)

If then from the specific gravity of the urine no correct estimate of the amount of the solid constituents can be obtained; if, moreover, the amount of solid constituents be a quantity infinitely variable, and dependent on many extraneous conditions unconnected with the disease, we have left but two

other conditions of the urine from which information may be derived, expressive of the progress of renal degeneration. These are the proportion of albumen present, and the special character of the tubular or organic deposit thrown off from the kidneys.

The weight of albumen contained in any single specimen of urine would convey very incorrect data on which to calculate the quantity passed in the twenty-four hours. An estimate of the quantity passed in the twenty-four hours can only be obtained by collecting all the urine passed in that interval. The ordinary method is to collect and measure the whole, and by taking a part, the amount of albumen contained in that part represents the proportion contained in the whole. Such a process is totally inapplicable in private or general practice. It is next to impossible to collect all the urine of the twenty-four hours; what is passed during the action of the bowels cannot be collected: indeed, it is only in hospital practice that such observations can be attempted. For practical purposes of every-day use a correct and minute estimate of the amount of albumen passed is out of the question, a rude approximation is all that can be obtained, and is all that is necessary for practical purposes, and this can be obtained readily by noting the space the coagulated albumen occupies in the tube after being allowed to rest; and the phraseology recommended by Dr. Christison expressive of the proportions observed by the eye, may with advantage be employed.

Dr. Christison's degrees of coagulability:

I. Gelatinous by heat.
II. Very strongly coagulable by heat—nearly the whole tube.
III. Strongly coagulable—half the tube.
IV. Moderately coagulable—one quarter of the tube.
V. Slightly coagulable—one eighth.
VI. Feebly coagulable—less than one eighth.
VII. Hazy by heat—no visible flakes.

Thus, neither from the specific gravity, nor from the amount of solid constituents, nor from the proportion of albumen present in the urine, can any definite information be collected calculated to decide the stage at which the disease has arrived, or the progress it is making.

If then from these several sources no satisfactory conclusions can be drawn, and no reliable evidence obtained that will mark the several phases of the disorder, we must turn to the microscope and inquire if the tube-casts or the cell-structure accompanying them, which appear in albuminous urine, from time to time, suffer any transformation or change sufficiently characteristic to become significant of different periods of morbus Brightii.

A comparison of the appearance of the sediment in the early stage of the disease, during or immediately after the period of hyperæmia of the organ, with what is found at the latter period of the same case after it has become protracted into a chronic disease, will convince the observer that material changes in the character of the sediment have taken place; and if it can be shown that during the intermediate period between these extremes the casts and their contents undergo a definite process of change, the inference must be that these gradual transformations will represent periods or stages, progressive or retrogressive, of the disease. A microscopic examination of the deposits in the urine would thus hold out a promise of becoming a steady guide to determine the stage at which the disease had arrived: our prognosis would then become more certain, and our treatment, adapted specially to a known period of the disease, would be directed with a fairer prospect of success. For several years past the urine of all the patients under my care in the Westminster Hospital suffering from renal dropsy, or any form, indeed, of renal disease, has been submitted almost daily to microscopic examination, and drawings made of the most characteristic appearances, and preserved in the case-books, so that a comparison of the morbid deposits of any period of the disease might be readily made, as well as with those occurring in other cases running either a similar or a

varying course. The relation, if any, which exists between the various characters of these deposits, and different stages and different forms of the disease, may thus be easily ascertained.

The epithelial cells thrown off from the renal tubes, as well as the casts accompanying them, suffer very material and obvious alteration as the disease of the kidney advances. These consist in palpable deviations from the standard structure of healthy epithelium. It is not necessary to give any detail of the minute anatomy of the kidney; it is presumed that the reader is familiar with Mr. Bowman's researches into the structure of the kidney ('Phil. Trans.'), and every pathologist recognises the aid which those researches afford him in studying the diseases of these organs. The epithelium lining the channels through which the urine flows differs in appearance in different parts. In the convoluted tubes it performs the office of gland-cells, and according to Mr. Bowman these cells probably secrete the urine. The individual cells are spherical, sometimes appearing oval in shape, and by apposition become somewhat of a hexagonal appearance; they have a single nucleus, and appear slightly granular. The epithelial cells lining the straight tubes are larger in appearance, less granular, contain a single nucleus, and their office probably is rather protective than glandular. They are the last to exhibit any character of degeneration, and in some forms of disease of the kidney, while the cells at the base of the cones are extensively decayed, those at the apex still exhibit all the characteristics of healthy epithelium. The epithelial cells of the uriniferous tubes never appear in the urine but under the influence of disease. The epithelium of the calyces, pelves of the kidneys, and ureters, is simply protective. These cells are more or less ovoid when isolated, they frequently are seen in groups of two or three, they then appear somewhat pyriform, they are much larger than those of the straight tubes, and they approach in character to the tesselated or pavement variety. They never appear in the urine under the ordinary circumstances of health. But in urine highly charged with uric acid, as in an attack of what is called

gravel, the epithelium of these passages is shed sometimes in abundance. From the irritation of a calculus within the calyces, or imbedded in the pelvis or infundibula of the kidney, or from any cause exciting pyelitis, these cells soon give place to exudation- and inflammation-corpuscles, and eventually to pus-cells. The epithelium of the bladder and urethra, and of the vagina in the female, is essentially protective, and consists of several layers of cells which exhibit the appearance of plates or scales with overlapping edges, and hence it is called the scaly or squamous epithelium. Individual cells, or a few cohering, forming a kind of scaly plate, are constantly seen in healthy urine—particularly in that of the female, the clusters of cells being derived principally from the vagina. In albuminous, and more particularly in purulent urine, this scaly epithelium is often present in abundance. The faint cloud which is often seen in healthy urine, and which hangs suspended in the fluid rather than is precipitated, is composed of urethral and vesical epithelium, with mucus-corpuscles more or less abundant, according to the quality of the urine. These latter corpuscles are formed in small proportion by all mucous surfaces, even in a state which cannot be considered otherwise than healthy.

In certain disorders of the urinary passages the urine contains a palpable sediment. In gonorrhœa, leucorrhœa, in stricture in the male, the urine will be cloudy from the presence of either pus, mucus, or, as they are sometimes called, exudation-corpuscles. In these cases the urine may exhibit faint traces of albumen, becoming very faintly hazy by heat and nitric acid; this will depend on the presence of pus in small quantity. In vaginal, but more particularly in uterine leucorrhœa, the urine may be cloudy, faintly albuminous, may contain an abundant sediment —which is flaky, and exhibits vaginal and vesical epithelium, with exudation- and pus-corpuscles, held together by a tenacious mucus, presenting a slightly granular character. In the gonorrhœa of the male, as well as in stricture of the urethra, the urine may be cloudy from the purulent secretion, and the microscope will exhibit fields or groups of pus- or exudation-cells held together by a granular material, together with masses

of squamous epithelium. It is not supposed that these appearances could ever give rise to suspicion of renal disease, or be mistaken for products derived from the kidneys. They may, however, coexist with renal disease, and to the inexperienced might become the source of some confusion and doubt.

CHAPTER II.

THE MICROSCOPIC OBJECTS IN ALBUMINOUS URINE.

The earliest record of the tube-casts in albuminous urine appeared in the year 1843. Figures of them occur in several German works about that period; but the diagnostic value of the different varieties of these tube-casts and their cell-contents was not then understood. Dr. George Johnson has done much towards placing these tube casts in their proper position in relation to some forms of kidney disease; but I am desirous of showing that a still higher diagnostic value belongs to them than they have hitherto been supposed to possess, and I think if attention be paid to certain special characters belonging to them, at different periods of the disease, that inferences of great practical value may be drawn from the progressive changes the cells undergo. The following lectures and cases are so arranged that the characters of the simpler and earliest forms of deposit are first described, proceeding thence to the more advanced stages of renal degeneration, and comparing the appearances presented as the disease advances. But I would here guard the reader and practitioner from the error of supposing that one single examination suffices to determine the stage of the disorder; in some cases this may be sufficient. It is, however, rather by comparing the character of the deposit of one period with another, and by carefully noting the altered appearance of the casts and cells, and the direction of whatever change is taking place, by which a correct estimate is formed of the advance of the disease.

The figures which illustrate the following lectures will be familiar to all readers of the more recent works on the pathology of the kidney. It is not presumed that any novelty attaches to

them. What the author seeks is to illustrate the several stages of renal degeneration, by pourtraying the appearance of the renal cells and casts at intervals during the progress of the disorder, believing that by this mode of illustration the student in this branch of clinical observation will be relieved from the embarrassment which has hitherto beset him when he seeks to know what meaning or inference he is to draw from the several varieties of casts and cells which he meets with in the urine. The figures hitherto published to illustrate the deposit in Bright's disease are grouped together in one plate, and, with the exception of Dr. George Johnson's and Dr. Gairdner's works, no reference whatever is made to the stage of the disease at which the several varieties may be expected to appear. I venture to hope that the following illustrations may not be without their value, both to the student and the practitioner.

The sediment found in albuminous urine consists principally of certain cylindrical forms moulded in the uriniferous tubes of the kidney; these present different characters according to the stage of the disease, or the intensity of the morbid process. They may be either coarsely granular, finely granular, or partly granular and transparent, or completely hyaline. Associated with these casts are various cell-structures—the blood-cell, the epithelial cell, healthy or abortive; the compound granule-cell; and the various modifications which cell-growth undergoes during the presence of acute or chronic disease. When hæmorrhage takes place into the uriniferous tubes from rupture of the Malpighian capillaries, the coagulum formed is washed away and appears in the urine as a cylindrical cast of a granular appearance, entangling a number of blood-cells within its mould. These casts are usually stained of a red colour by the hæmatin of the effused blood. As the hæmorrhagic state subsides epithelial cells appear in the cast, mixed with blood-corpuscles; these latter become less numerous and ultimately disappear. The casts gradually lose their fibrinous, or, properly speaking, their coarsely granular appearance, and the epithelial cells then seem imbedded or rather held together by a fine granular exudation. In favorable cases the casts become daily more transparent and

the epithelial cells less abundant. In other cases various modifications of cell-development take place; resplendent granules, free nuclei, accompany the cast; compound granule-cells, abortive epithelial cells, disintegrated granule-cells, in the shape of grape-like clusters of nuclei, and other evidence of cell-transformation, make their appearance and supply information of the nature and direction of the renal disease.

The following objects are from time to time met with in albuminous urine:

Fibrinous casts, containing blood-discs (blood-casts). (Pl. 1, fig. 1.)

Granular casts, containing epithelial cells and blood-discs. (Pl. 1, fig. 2.)

Finely granular casts, containing epithelial cells, either natural or undergoing transformation. (Pl. 2, fig. 2.)

Finely granular casts, containing compound granule-cells and free nuclei, and occasionally pus-cells. (Pl. 1, fig. 4, and Pl. 4, fig. 2.)

Pus-casts,—casts composed exclusively of pus-cells are very rare.

Hyaline casts, containing epithelial cells, either natural or in a state of change. (Pl. 1, fig. 12.)

Hyaline casts, containing resplendent granules, free nuclei, and here and there an epithelial cell. (Pl. 3, fig. 4.)

Hyaline casts, containing compound granule-cells, free nuclei, and disintegrated cells. (Pl. 5, figs. 4, 5.)

Hyaline casts, containing large fat-granules, and grape-like clusters of nuclei, having an oily appearance. (Pl. 6, figs. 2, 4.)

Hyaline casts, without admixture or structure of any kind.

Epithelial cells, isolated or in groups, from the uriniferous tubes, the pelvis of the kidney, ureters, bladder, urethra, or vagina.

Amorphous flakes of a granular material, stained of an orange-red by the hæmatin, sometimes entangling blood-discs, more frequently without. (Pl. 1, figs. 7, 8.)

Blood-corpuscles, always single, never in rouleaux.

Pus-cells, isolated or massed together in groups.

Compound granule-cells, isolated resplendent granules (free nuclei.)

Botryoidal clusters of granules, or nuclei (disintegrated compound cells), and diffuse granular matter.

Crystals of uric acid, rhomboidal or lozenge-shaped, occasionally columnar, sometimes amorphous (grit).

Crystals of oxalate of lime (octohedra).

Crystals of the triple phosphate.

Vibriones.

Spermatozoa.

Metamorphosis of cell-structure in albuminous urine, and its pathological signification.

But little attention has hitherto been paid to the *progressive* alteration of cell-structure which accompanies the casts in albuminous urine. With the exception of the so-called epithelial casts, and the fatty and oily and waxy casts, but little notice has been given to the various modification of cells which are thrown off as exudations from the uriniferous tubes; and no effort has been made to extract any information, as the disease advances, from those transformations of the cells which are present to the eye in morbid urine. Those who adopt Dr. George Johnson's nomenclature have hitherto been content to interpret the presence of cells in the casts as significant of an acute or chronic process of desquamation, or of fatty degeneration, but no special value has hitherto been accorded to the transformation and change which the cells themselves exhibit during the lifetime of the patient.

Dr. George Johnson communicated to the Medical and Chirurgical Society a paper on the Pathology of Bright's Disease of the Kidney, which was published in the 'Transactions' of 1846, in which he successfully showed that in one form of that disease, the epithelial cells of the kidney underwent a fatty degeneration, and that "the disease was primarily and essentially an exaggeration of the fatty matter which exists naturally in small quantities in the epithelial cells of the healthy organ." He

pointed out also the diagnostic value of a microscopic examination of the urine, and that the presence of renal disease might be inferred from the character of the epithelial cells seen in the sediment of albuminous urine.

These researches have done good service to the cause of renal pathology, and they have been the means of directing the investigations of others into the proper paths of observation. I desire to amplify these views, to travel onward by this road,—to extend to a wider sphere this plan of research; and if my conclusions are not always in accordance with his, I nevertheless acknowledge the benefit I have derived from his observations; his facts remain uncontradicted, interpret them as we may.

In the various forms of morbus Brightii the cell-structure of the kidney undergoes different kinds and degrees of transformation and change. I have reason to think that this transformation is not always a simple accumulation of oil or fat within the cell-wall. That in many cases it amounts to what has been termed a fatty degeneration is not denied. But what I seek to show is, that the disease is not simply an arbitrary accumulation of oil or fat within the cell.

Modified by circumstances which will be more fully developed hereafter, the cell-structure of the renal tubes appears to depart from the standard or healthy type in very different degrees, and in this respect to exhibit a remarkable analogy to what is observed in other organs having epithelial structures.

When mucous surfaces or canals are the seat of diseased action, not only is the standard or healthy epithelium shed, but it is accompanied by cells in various stages of development, which may severally be regarded as examples of imperfect or abortive formation; and this tendency to degenerate is proportioned to the deterioration of the vital energies of the organism. These conditions are seen exemplified in catarrhal and inflammatory exudations of the air-passages. On this subject Lebert's 'Physiologie Pathologique' may be consulted with advantage. The epithelium of the kidneys under the influence of disease exhibits very analogous conditions.

This metamorphosis of the epithelium of the tubes I believe

to be pregnant with most valuable information if rightly interpreted, and presents a prospect of estimating, with some degree of accuracy, the rapidity, force, and direction of the morbid process going forward in the kidney. I think attention to the character and modification of the cell, of equal, if not more importance than the granular or hyaline appearance of the cast.

The first departure from the healthy type of the epithelial cell is its becoming more granular, the single nucleus being either obscured or accompanied by other nuclear granules. This change is very apparent in all catarrhal affections of mucous surfaces, and may be most readily seen in the ordinary mucous discharge of bronchial or nasal catarrh. Compound granule-cells may make their appearance, but they are few in proportion to the healthy epithelial cells.

Some observers are disposed to consider that these granule-cells arise from the fatty degeneration of pus-cells; but a careful examination of the mucous fluid in the mildest forms of catarrh where no pus-cells have pre-existed, will, I think, prove that one of the earliest manifestations of a hyperæmic condition of a mucous surface, accompanied by a casting off of epithelial cells, is the metamorphosis of some cells and their departure from the normal type, and their tendency to become abortive, or what appears to constitute a fatty degeneration.

This transformation of the epithelial cell into the granule-cell has been observed by Reinhardt (Wedl's 'Pathological Histology,' Syd. Soc. edit., p. 292) in various conditions of the pulmonary mucous surface. Wedl does not consider Reinhardt's proposition, that granule-masses are abortive, or degenerated, or altered epithelial cells, is of universal application; but he admits that a perfectly analogous condition occurs in the kidney in 'morbus Brightii,' and he recognises the fatty degeneration of the epithelial cells as a well-known morbid phenomenon in this disease, although he does not consider it a universally established fact.

Without seeking to decide this point, I feel convinced that a careful examination of the alteration in development which

the epithelial cells in albuminous urine *progressively* exhibit, will be found to afford valuable assistance in the prognosis of renal disease. It must, however, be recollected, that it is not the presence of one or two granule-cells among healthy cells that would justify the opinion of an unfavorable progress. It is the constant and continuous increase of cells becoming more and more degenerate and compound, with a proportionate decrease of true epithelium, which is the index of advancing disease.

The pathological import of these granule-cells has, by different observers, been variously estimated. By some they have been considered the product of an inflammatory process, and Gluge has designated them as compound inflammation cells. I do not express any more decided opinion on this point than that, so far as the renal structures are involved, their presence is usually preceded by a state of inflammatory congestion, and that proportioned to their number, and the nuclear or fatty metamorphosis of the epithelial cells, does the degenerative process advance in the kidneys; so that an examination of the sediment in albuminous urine at certain intervals will exhibit this transformation, either advancing or receding, and an estimate may accordingly be made with some degree of certainty of the state of the kidney during life. A reference to the following cases will illustrate this opinion. In Hancock's and Welch's and Staunton's cases (Plate IV), the epithelial cells throughout preserve their standard type; a few granule-cells make their appearance as in all catarrhal exudations, but they are always accompanied by healthy epithelium. In Osborn's and Eden's cases, the proportion of compound cells daily increased till all true epithelium vanished; and the casts contained little else but compound granule-cells, free nuclei, and disintegrated compound cells. The abortive condition of all the cells was without difficulty recognised. In both classes of cases numerous highly resplendent granules, isolated and scattered through the casts, are constantly met with; they are removable by ether and are certainly fat-molecules: they are the free nuclei either of unformed or disintegrated cells. They

are of little importance, compared with the groups or grape-like clusters of granules, hence called botryoidal, but which occasionally assume a crescentic shape, and but for this appearance they might be viewed as simple aggregations of fat-granules brought together by molecular attraction; these are severally groups of nuclei without any cell-wall.

The pathological import of these clusters of nuclei without any visible cell-membrane has, I believe, in relation to the kidney, never been satisfactorily made out. It has appeared to me, as I shall endeavour to prove in the sequel, that these several forms of granule-cell, compound fat-cell, molecular fat-cell, fat aggregate globules, or by whatever other name they may be described, represent a deteriorated or atrophic state of cell-development, which eventually becomes so powerless that the cell-membrane disappears, nothing remaining but a heap of nuclear molecules, which, accumulating in the tubes and Malpighian bodies of the kidney, eventually constitutes a true fatty degeneration of the kidney. These grape-like and crescentic clusters of granules in the urine are significant of a subacute process, and imply an atrophic or degraded state of cell-growth, and when they become daily more numerous are very unfavorable indications.

The large compound granule-cells, possessing the characteristics of Gluge's compound inflammation globule, so far as the urinary sediment exhibits them, I believe, never make their appearance but as the sequel to a state of hyperæmia. These cells represent a stage succeeding to one of inflammatory engorgement, and may at all times be considered as indicative of a low, chronic, or subacute state of inflammation. They are always numerous in acute morbus Brightii, or that form of renal disease which produces the large pale-white kidney. But they also are, in the acute form of the disease, almost always associated with cells which present a distinctly granular appearance, and within which no nucleus, but only a diffuse fine molecular, or finely granular material, is contained. On rupture of the cell-wall the finely granular contents are diffused over the field.

It has appeared to me that the finely granular material mixed with free nuclei, which appears to constitute the contents of the tubes, and even of the Malpighian bodies in the large white anæmic kidney of acute morbus Brightii, is derived partly from the disintegration of these granular cells, and partly from a diffuse inflammatory exudation, which in these large kidneys is interstitial as well as intratubular. For these reasons, I am reluctantly led to doubt the appropriateness of the term desquamative, or non-desquamative, as applied to some forms of morbus Brightii by Dr. G. Johnson. I have arrived at this opinion, by devoting much attention to the microscopic character of the sediment in many cases of renal dropsy, making drawings, almost daily, of the casts and cells, and watching and recording whatever changes might present themselves, whether in favorable or unfavorable cases; and in the latter, whenever possible, comparing the cell-structure and contents of the tube, with the cells and casts present in the urine during life.

Dr. George Johnson considers that the appearance of granular epithelium, either aggregated together by granular matter in the form of casts, or of cells isolated from each other, is proof of a desquamative process taking place in the kidneys, "the result of a salutary effort to eliminate from the blood some abnormal products, the retention of which would be attended with injurious consequences,"—and, he thinks, "the escape of this noxious matter from the blood is favoured by this free shedding of the epithelial cells."

It must not be forgotten that this free shedding of epithelium, is common to all free epithelial mucous surfaces, which are the seat of inflammatory engorgement or irritation, and the term desquamative bronchitis, or desquamative catarrh, would be as appropriate as desquamative nephritis. From every mucous surface, which is the seat of inflammatory irritation, or hyperæmia, the normal epithelium is abundantly shed, and in the catarrhal exudations of any mucous membrane, the ordinary epithelium may be seen in great abundance, ultimately giving place to cells of various stages of development, regulated by the intensity and duration of the inflammatory process. This

shedding of epithelium is the more free in the ordinary mucous canals, because the cells are arranged in a succession of layers, whereas, in the tubuli uriniferi, a single layer only occurs, placed in direct apposition to the basement membrane. A microscopic examination, whether of the urine in the early stage of Bright's disease, or of the catarrhal exudations from any mucous surface, will demonstrate that a shedding or throwing off of the epithelium of the canal, is among the earliest manifestations of the morbid process.

A careful attention to the earliest symptoms of the several forms of morbus Brightii, will establish the fact that every case has its origin in a period, if not of inflammatory congestion, at least of hyperæmia, or passive congestion, or stasis.

It is this state of hyperæmia which first embarrasses the renal function; some of the constituents of the blood either transude, or direct rupture of the Malpighian capillaries takes place, and blood-corpuscles appear in the urine, not always, however, proportionately to the amount of inflammatory engorgement. In some cases the presence of blood can only be detected by the microscope; in others it is palpable to the unaided eye. This hyperæmic stage is followed by a greater or less exudation of epithelial cells, and with modifications of cell-structure, varying with the intensity of the disturbing cause. In curable and tractable cases the amount of epithelial exudation is trifling, and only lasts for a short period. In some varieties of the disease but little epithelium is thrown off, and what appears in the urine consists of abortive or compound cells, clusters of nuclei, and hyaline casts. In other forms, the epithelial exudation continues for a longer period, and is apparent in some modified form almost to the last hour of life.

For these reasons, I am led to doubt the correctness of the term desquamative and non-desquamative nephritis. I would prefer that of acute and chronic albuminous nephritis, did I not think that a tribute of justice and respect is due to our distinguished countryman who first discovered, recorded, and illustrated this form of disease; and, in common with the most celebrated of the Continental pathologists, I prefer speaking of

the disease as the morbus Brightii, in its acute or chronic form.

That variety or stage of the disease to which Dr. George Johnson applies the term non-desquamative, comprises not the least frequent form of Bright's disease; and he admits the relation which non-desquamative disease sometimes bears to acute desquamative nephritis, the former being the sequel to the latter (p. 373).

I am inclined to think that in all these cases which are classed as examples of non-desquamative disease, the examination of the urine was made at a time when the primary stage had passed away, and when the transparent hyaline casts, without any or but few epithelial cells, were visible; and which appearance I believe emphatically marks the temporary or permanent decline of the disorder. (See 'Hancock's and Welch's Cases,' Pl. IV.) In Dr. George Johnson's Case, XXII, p. 352, the dropsy was of a fortnight's duration, the urine contained small waxy casts, with *scarcely any* epithelium, and few if any blood-corpuscles.

The presence of *some* epithelium and *some* blood-corpuscles, from my point of view, leads me to the conclusion that during the antecedent period the urine had contained both epithelium and blood—evidence of engorgement and inflammatory irritation. But if even from the first outset of the disease the epithelium had been scanty, although the casts became granular, and blood-discs became visible, the interpretation I should give would be, that the absence or small amount of the epithelium was to be accepted rather as a most favorable indication of probable recovery, than a justification for calling the disorder one of non-desquamative nephritis.

The correctness of Dr. George Johnson's observations are not —cannot be impugned; they may, almost daily, be verified. There is a period in favorable cases where little or no epithelium is visible; and where transparent, hyaline, or waxy casts are alone seen. It is only with the conclusion drawn from the absence or scantiness of epithelium at this stage that I venture to disagree. Dr. George Johnson has been so able a pioneer in

this branch of pathological research, he has so well indicated the way in which these forms of disease may be most successfully investigated, that I regret to differ from him in so small a matter as the fitness or appropriateness of his nomenclature.

CHAPTER III.

OF THE NATURE AND ORIGIN OF THE TUBE-CASTS.

The blood-cast—the fibrinous or coarsely granular epithelial cast.

The tube-casts seen in the sediment of albuminous urine, and containing various forms of cells, present to the eye very different degrees of clearness or transparency. This appearance may vary from something very coarsely granular to complete transparency; and many degrees of gradation are met with intermediate between these extremes. The most coarsely granular of these casts contain only blood-corpuscles, and is oftentimes stained of a yellowish-red. It is considered as fibrine, coagulated and moulded in the renal tubes, and is the product of hæmorrhage from rupture of the Malpighian capillaries. These are always found in hæmaturia after scarlet fever, and in the early hæmorrhagic stage of acute morbus Brightii. The casts next in order are sometimes called the fibrinous or granular epithelial cast. These present a coarsely granular appearance, and contain epithelial cells, held together or imbedded in the granular exudations. By some these have been viewed as formed by coagulated fibrine. But it must not be supposed that these fibrinous cylinders are formed out of coagulated fibrine, as the blood-casts appear to be; for the word coagulated implies the separation of the fibrine from the other constituents of the blood, by a process analogous to what takes place in hæmorrhage or in the coagulation of the blood out of the body. Wedl ('Pathological Histology,' p. 257) says, whether these deserve the name of fibrinous cylinders is perhaps very proble-

matical, since the coagulation of fibrine into molecules, or a molecular form of fibrine has not been demonstrated.

These fibrinous and coarsely granular epithelial casts found in the urinary sediment in acute morbus Brightii are considered by Continental writers as true croupous exudations. Scherer has described these urinary cylinders as similar to false membranes, and having many characters in common with the fibrinous exudations of croup. That this is the correct interpretation of their origin, is, I think, confirmed by the presence of flakes of amorphous fibrine, very granular, and stained with hæmatin, which are seen also in the sputa of the early stage of pneumonia, as well as in croup. And moreover, within these coarsely granular epithelial casts, as the disease advances, pus-cells are frequently seen associated with granular cells, proportioned to the intensity of the disturbing cause. Analogous conditions are seen in the croupous inflammation of other epithelial surfaces.

In plastic or fibrinous bronchitis, an exudation forms in the smaller bronchial tubes, strictly analogous to these fibrinous or granular epithelial casts of the renal tubes. The microscopical appearance of this bronchial exudation is that of a coarsely granular material, containing epithelial cells, granular cells, and exudation, or even pus-corpuscles; and it is in every respect similar in character, and I think in origin, with the fibrinous and coarsely granular epithelial casts now under consideration.

The finely granular, semi-transparent cast.

But in albuminous urine casts are often seen, not so coarsely granular perhaps,—finely granular, in fact, and approaching towards transparency—which cannot be considered as the product of a croupous form of inflammation. It is worthy of notice that these finely granular casts are usually accompanied by few epithelial cells; but these cells are more granular than the standard epithelium of health, and with them are seen non-nuclear and highly granular cells, the earliest and perhaps the simplest departure from the healthy spheroidal epithelial cells.

As the disease continues, the cells undergo manifest change; these non-nucleated granular cells increase, and are accompanied by cells containing many nuclei, having something of the character of the compound inflammation-corpuscle of Gluge.

Dr. Gairdner, with whose views I have to express my perfect accordance, and whose opinion on many points I seek only to confirm, in his excellent treatise on the Pathological Anatomy of the Kidney ('On the Pathology of the Kidney,' p. 42), has referred to the imperfect development of the epithelial cells, and to the analogy of the changes with those which occur in diseased mucous membranes in general; and he remarks that Henle was the first to show that the essential phenomenon in all mucous catarrhs and inflammations, was the increased formation of epithelial cells in various stages of growth, accompanied by an increased quantity of viscid mucous secretion.

Atrophic or degenerated cells undergo disintegration readily and with rapidity. It is well known how speedily the cell-membrane of the compound inflammation-corpuscles of Gluge disappears, leaving groups of molecules, the grape-like (botryoidal) clusters of granules, so frequently seen in the tube-casts of albuminous urine in acute morbus Brightii. In a similar manner the granular non-nucleated cells disintegrate, and the fine granular viscid contents of the cell, diffused through the renal tubes, is moulded to their shape, and appears in the urine, with a few isolated epithelial or other cells.

I therefore think that this finely granular semi-transparent cast is derived from the disintegration of atrophic epithelial and granule cells, and that it is formed in a manner similar to the viscid mucous secretion in catarrhal affections of other mucous membranes. Practically it is difficult to separate this form of cast from the hyaline or transparent cast next to be considered, as they both appear to be derived from a similar source, and to merge one into the other, and to have many characters in common with catarrhal secretions in general.

Of the hyaline, waxy, or transparent casts; and of the oily or fatty casts.

These several names are applied to certain transparent, clear, cylindrical-looking forms, which frequently appear in the sediment of albuminous urine. They are more abundant and more frequent in the chronic forms of morbus Brightii than in the acute. They are present in the urine of the mildest and most tractable cases equally with the severest and most fatal. Their significance has been variously estimated; their true import will, I think, be found to depend on the cell-structure with which they are associated.

Dr. George Johnson considers them to be moulded in tubes which have been entirely deprived of epithelium by the desquamative process; yet he says their appearance in acute nephritis is by no means uncommon, but that they occur in much less proportion than the granular epithelial casts; he does not profess to determine their nature. They are sometimes, though rarely, perfectly clear and homogeneous, and unaccompanied by cell or structure of any kind. Minute spherical discs, somewhat resplendent, and which may be mistaken for free fat-granules, are occasionally present. They appear to be the nuclei of unformed or of disintegrated epithelial cells. (Pl. IV, fig. 12.) These hyaline cylinders now and then contain traces of granular matter, and occasionally one or more perfect or abortive epithelial cells. (Pl. IV, figs. 4, 9.) These are the finely granular casts described in the preceding section. Frequently a compound granular cell may be brought away with the cylinder; and, lastly, more or less fatty material may become associated with these transparent tubes, for the oily and fatty casts are nothing more than these transparent cylinders loaded with those products.

If we compare the material thrown off from mucous surfaces generally, when under the influence of acute or chronic inflammation, with these exudates from the tubes of the kidney, a very strong resemblance, if not identity of character, in these morbid

processes will be apparent. Free exudation of epithelium is an essential phenomenon in all inflammatory states of mucous surfaces, as has already been stated. If we examine the excretory products of any kind of catarrh, of the Schneiderian membrane, of the pharynx, larynx, bronchial tubes, stomach, intestines, or bladder, epithelial cells in various stages of development, from the perfect standard cell to the abortive denucleated one, with compound granule cells (Gluge), resplendent molecules and granular matter are seen held together by a thin but viscid tenacious fluid, clear and glairy, or in parts finely granular, which appear to constitute the fluid portions of these mucous excretions. From the larger mucous canals this viscous secretion appears spread out or smeared over the surface, and is detached in films or flakes, the diameter of the canal being too large to permit it to be moulded to its cylindrical shape.

The tubuli of the kidneys are essentially mucous canals, and under the influence of inflammatory irritation give out products strictly analogous to those which are formed from other mucous surfaces. If the glairy, greyish, viscid mucus in mild but chronic bronchial catarrh be examined under the microscope, the observer must be struck with the resemblance which the appearance presents, to the casts, whether granular or transparent, thrown off from the tubuli of the kidneys. (Pl. IV, figs. 5, 6.) Perhaps the most satisfactory comparison is that made between the bronchial expectoration of those suffering from albuminuria, and the tube-casts found in the urine of the same patient. In these several examples there may be seen the epithelium accompanied by cells of varying degrees of development, held together by a glairy, viscid mucus which in some is slightly granular, in others coarsely granular, and different only from the exudation from the tubuli of the kidney, in that the masses are filmy or flaky instead of cylindrical or tubular. A manifest difference, however, between the two must not be overlooked: in bronchial or catarrhal mucus the film-like masses readily cohere and become miscible, as it were, one with the other; the tubular exudate from the kidney preserves its individuality, and has no disposition to intermingle, cohere, or mat together. The

action of the urine, with which these casts are mixed so soon as formed, may explain this difference: this saline, acid fluid acting on the mucus and destroying its ordinary miscibility, and perhaps rendering it more granular.

It may be objected to this view that the formation of mucus takes place only in the follicles of the mucous membrane; and that as no such structure exists in the kidney, that this exudate from the tubes can have no identity with the viscid material thrown off from other mucous surfaces. But it is a matter of great doubt whether these mucous follicles are the only source of mucous secretion. In health, in canals which require lubrication for the more ready performance of the function of transmission, the mucous follicles doubtless contribute to such a condition, and readily pour forth a watery fluid on the application of the accustomed stimulus. But catarrhal mucus is totally unlike healthy or follicular mucus. The latter is perfectly clear and watery, and contains a few natural healthy epithelial cells. The former is more or less viscid, tenacious, and granular, and contains epithelial cells in various stages of development. There is reason, then, for supposing that the viscid glairy fluid formed by all mucous epithelial surfaces which are the seat of catarrhal inflammation or irritation, is produced by the disintegration of the numerous cells which are abundantly formed and shed, and as rapidly broken up. It is quite certain, and may be verified at any moment by the examination with the microscope of any catarrhal fluid, that wherever this kind of excretion is formed, epithelial cells in various degrees of development or transformation, with abundance of free nuclei, and some granular matter, constitute the essential parts. The relation of the viscid fluid to these cells may be a matter of discussion—whether the fluid is essential to the formation of these cells, or whether it arises from the disintegration or breaking-up of them. Lehmann considers that this viscid mucus is derived from the disintegration of epithelial cells, and this latter view is supported by the authority of Scherer and Virchow. (Lehmann's 'Physiological Chemistry,' Sydenham Soc. Ed., vol. i, p. 377.)

Between the nucleus and the cell-wall of all cells is contained a viscid hyaline fluid, which, on the breaking up of the cell, becomes dispersed and exhibits the characteristic tenacity of mucous secretion. The well-known action of alkalies on cell-structure will exhibit this property of the contents of the cell. A drop of liquor potassæ converts pus-cells, or exudation-corpuscles, into a ropy, viscid mass, which under the microscope is seen as a glairy fluid, with many resplendent molecules, which are the nuclei of the disintegrated cells: and if the experiment be skilfully conducted, the appearance in the field of the microscope very much resembles ordinary pituitary mucus from the Schneiderian membrane.

The significance of these hyaline or transparent casts will depend on the cell-structure which accompanies them, and on the relation, as to time, which other kinds of casts bear towards them. If they appear in the urine very shortly after the period of hæmaturia they may be accepted as indicative of a state somewhat analogous to a catarrh of the renal tubes (see Plate IV), and the case in all probability will prove remediable and tractable. In such cases here and there an epithelial cell is seen, and perhaps a compound granule-cell, but these are not numerous, and they do not increase. In other cases these glairy moulds of the tubes contain numerous abortive cells, in almost daily increasing numbers, compound granule-cells are always present, clusters of granules (botryoidal and crescentic) and free nuclei are also seen. These appearances are significant of a chronic subacute process, which, slow as it may progress, is but too often irremediable. In a third variety of these hyaline casts, few or no epithelial cells are seen. The appearances are characteristic of broken-up cell-structures, clusters of granules having more and more the appearance of fat-granules, many acquiring a large size and becoming even oily from the high refractive power they exhibit. In the most advanced cases the cast seems made up of these fatty and oily materials, and hence has acquired the name of the fatty or oily cast. These indicate the highest state of fatty degeneration.

There is yet one other variety of hyaline or transparent

cast, which has been called, from the absence of all structure visible in it, the waxy cast—certainly from no resemblance which it has to wax,—and which, from the difference in the diameter of them, may be formed either in the smaller convoluted tubes, or in the larger straight tubes of Bellini, the origin and nature of which has not yet been determined.

Lehmann (' Physiological Chemistry,' vol. ii, p. 397), however, speaking of the tube-like, or cylindrical bodies, occurring in the urine, and concurring in the view that the granular cylinders are true croupous exudations, appearing in all the inflammatory renal affections which are usually included in the acute form of Bright's disease, mentions these transparent casts as a third form, which occur in the shape of hollow cylinders with walls, which are so perfectly hyaline that they cannot be detected by the microscope, unless by modifying the light. "They generally," he says, "occur, only scattered in the chronic form of Bright's disease, in fully developed fatty degeneration of the kidneys." An epithelial cell, or the rudiment of it, may often be observed in this species of cylinder, and Lehmann considers these transparent casts as the *membrana propria* of the urinary ducts. I cannot coincide with this view, for in the examination of the kidneys after death, in which these hyaline casts have been found in the urine during life, the membrana propria of the tubes has to my eye been present, although denuded of epithelium. It has appeared covered with granular, fatty, or oily matter. If the membrana propria of the tubes were shed, it would be difficult to make out any vestige of tubular structure; which I have never known to be the case, even in the densest and most atrophied kidneys. These very transparent casts have not, to my eye, the appearance of hollow tubes. I have always supposed them composed of some viscid material; and examining them, first without any reagent, and afterwards with the addition of dilute acetic acid, I have more than once seen them become faintly granular. I have rarely met with them perfectly hyaline, that is, entirely free from any morphological element. The purest and most transparent will contain one or two isolated, replendent granules, which may be viewed as the

free nuclei of the cells whose contents form the transparent cast.

Attention to the microscopic character of these casts will at any time enable the practitioner to estimate the nature and intensity of the disease, its advance or decline, its form, and its probable termination. The blood casts represent the period of active hyperæmia and hæmorrhage, the coarsely granular epithelial cast, with its compound inflammation corpuscles, and accompanied by amorphous granular flakes, stained with hæmatin, the period of inflammatory exudation; the finely granular, semi-transparent casts, with scattered epithelial and granule-cells, the subsidence of that stage. Transparent casts, with compound cells, with isolated, resplendent molecules, and grape-like clusters of granules, represent a stage of chronic, sub-acute disease of grave import; and if these casts become more and more loaded with large and gradually increasing fat-granules, and even oily drops, the progress of fatal fatty degeneration is clearly marked.

In thus treating of the subject of the degeneration of cell-development in the kidneys in morbus Brightii, it must not be supposed that these deteriorating conditions are limited to those organs. It is in them—from the nature of the materials passing out with the urine—that we are enabled during life to decide on the nature and character of the morbid process going forward in those organs. But there is reason to believe that the nutrition of most of the textures and organs of the body proportionately fails; and although not so apparent, because not manifested in a manner capable of being determined or demonstrated during life, nevertheless that the tissues of every organ become more or less degenerate and inefficient for the purposes of life. It is certain that the cells of the liver are invariably loaded with fat in all fatal cases of morbus Brightii. And in every case which I have examined, the heart-fibre has exhibited the microscopic character of atrophic and granular, fatty, degeneration. It is worthy of remark, how frequent are the maculæ albidæ on the exocardial surface of the heart in cases of Bright's disease. They seldom amount to more than a milky

opalescence of the serous surface, and the frequency of atheromatous deposits in the coats of the arteries, particularly in the aorta, must be familiar to every pathologist.

It may not be out of place, here to notice the supposed relation between pericarditis and morbus Brightii. The connection is, I believe, accidental and not essential. Inflammation of serous surfaces is so common a complication, both in acute and chronic morbus Brightii, that it is not surprising, that occasionally the pericardium should be the seat of an inflammatory exudation. But the occurrence is by no means so frequent as to constitute a rule—unless the maculæ albidæ are accepted as evidence of pericardial or exocardial inflammation —certainly, the cases of pericarditis complicated with morbus Brightii, are in my experience very small, and those which I have met with should be viewed, certainly, as exceptional cases. The milk-spots on the surface of the heart, give rise to no symptoms during life; their pathology is still a matter of discussion,—one form of them, that in which the serous surface appears thickened and elevated, and which can be peeled off, partakes of the character of a chronic inflammatory deposit; but the other form, that presents but a lactescence or milky opacity of the serous membrane, which is neither thickened nor elevated, is not so clearly of an inflammatory origin.

The progressive transformation of the epithelial structures in unfavorable cases of renal dropsy is therefore to be accepted as evidence of a diffused and general degeneration and decay, as well as of a local and special disease of the kidneys. It is by keeping this fact constantly in view that we may hope to establish a definite principle of treatment; not directed exclusively to the kidneys, as the apparent failing organs; but to the constitution generally: aiming at the restoration of the blood to a condition favorable to a more healthy cell-development, with the hope that those functions which a retrogressive cell-formation has impeded, will speedily be re-established so soon as the vital fluid has returned to a standard condition of health.

To attain this desirable object, the hydræmic or watery

state of the blood must be first reduced; and even while that is attempted, the impoverished state of this fluid must be replenished and enriched by the influence of ferruginous preparations. In some cases it is surprising to witness the rapid improvement which these preparations of iron effect, not only in the general symptoms and condition of the patient, but in the character of the cells and casts appearing in the urine; a proof that a deteriorated cell-growth quickly disappears when the nutritive properties of the blood have been restored. But while a just confidence is reposed in the remedial agency of chalybeate medicines, those will little avail if the system be not supported by a nutritious and generous diet, co-operating with a moderate but essentially necessary amount of stimulants.

These principles of treatment have reference to the chronic rather than to the acute form of the disease. But even in the latter, so soon as the symptoms of febrile disturbance have subsided they may, with advantage, be applied.

I believe much harm is done in cases of renal dropsy by keeping the patient for too long a time under the depressing influence of antimonials. These are of the highest importance in the very early stage, while blood-casts are present in the urine. Even while fibrinous casts are present, if there be any indications of increased temperature of the surface, accelerated pulse, or any well-marked sign of local inflammation, they should not be discontinued. But the faintest sign of the subsidence of these symptoms would justify a modification of remedies, and mark the necessity for an improved diet, and a moderate allowance of wine.

The employment of wine must be governed by those rules which guide us in other forms of disease. If increased heat or thirst follow it has been commenced too early. The quantity ordered will depend much on the age and previous habits of the patient. Port wine appears to be the wine best suited for these cases, and should be taken with or after the principal meals, and should not exceed two glasses—unless in very exceptional cases—in the twenty-four hours. Whether confined to bed or

not the patient, should be clothed from head to foot in flannel; and in the event of recovery, should, both in summer and winter, wear some form of woollen under clothing next the skin.

The following are the several forms of diseased kidney, connected with dropsy and albuminous urine, which I have had an opportunity of studying microscopically, as well as of examining the urinary sediment during life. They belong to the pathological series, which is entitled to the generic name of morbus Brightii, from the distinguished physician who first described them. I do not venture to assert that they represent different stages of *one disease*. Although the first, second, and third forms, with great probability stand in that relation to each other; the first two representing the acute, and the third the chronic stage. I would rather say that the whole group may be viewed as examples of the direction which degeneration of structure takes when the impaired or weakened vital force is specially manifested in the kidneys; and though considerable variation in external aspect, volume, and weight are apparent, yet, nevertheless, each exhibits a similar tendency to cell-deterioration, differing more in degree, than in form.

The various forms of diseased kidney of which examples are given in the following pages.

I. The red, chocolate, or plum-coloured kidney, somewhat increased in weight, the cortical surface studded with deep coloured arborescent vascularity; the same evidence of congestion pervading the whole organ. It represents the stage of inflammatory engorgement. The Malpighian bodies are seen filled with extravasated blood; or these, as well as the convoluted tubes, are distended with a fine molecular exudation or deposit, deeply stained with hæmatin.

II. The large, pale, white or yellowish-white kidney, more or less lobulated, and much increased both in volume and weight. The capsule non-adherent, and the cortical surface smooth and marked with a few star-like spots of vascularity. The cones are

usually of a pale flesh tint; they appear small from the great apparent extent of the cortical part; they sometimes appear buried in, or almost obliterated by, the great amount of deposit. The Malpighian bodies and convoluted tubes, as well as the interstitial parts, appear choked and distended to the utmost by a fine molecular exudation in which free nuclei and fat-granules, and disintegrated cells may be seen. There are intermediate conditions between these two forms, the difference consisting only in colour, amount of exudation, and the rapidity with which the disease runs its course.

III. The kidney is increased in volume and weight, is of a reddish or yellowish-brown colour; the cortical surface is either finely or coarsely granular; and the capsule being slightly adherent, when removed the well-known granulations of Dr. Bright become apparent.

These granulations the microscope shows are the Malpighian bodies, and contiguous tubes stuffed with a fine molecular product or exudation, in which free nuclei and fat-granules are mixed.

IV. The kidney is but little augmented in volume and weight. The capsule is less tenaciously adherent, and when removed the cortical surface presents a granulated surface not unlike salmon-roe. The colour is a yellowish-fawn, sometimes a reddish-yellow. The contents of the convoluted tubes and Malpighian bodies appear similar to the last form, except that the free nuclei are more numerous, the fat-granules more abundant, and there is a greater proportion of broken-up cell-structure.

V. The kidney differs from the last only in the cortical surface being tuberculated rather than granular. The increase of weight is variable. The colour is sometimes a greyish or dirty-yellow, or a sombre-fawn. A star-like distribution of vessels is seen on the surface, and a section shows some injected vessels running perpendicular to the surface and in the direction of the base of the cones. These appear of a red flesh-tint, and appear striated from vascular injection. The tubular structure of the cones seems frayed out at the base. The section of the cortical

part exhibits a white appearance in the intervals of the vascular striæ. The Malpighian bodies and convoluted tubes appear to contain granular matter and fat-grains, the latter predominating.

VI. The kidneys are variable in regard to increase of size and weight, generally of a soft flabby consistence. The capsule is easily detached, and the cortical surface is smooth, shining, and of a pale waxy whiteness, with a few arborescent vessels on the surface. The cortical part is slightly striated, the intervals of the striæ having a glistening appearance of a spermaceti brightness, rendered more shining and resplendent under water. The Malpighian bodies and convoluted tubes are everywhere filled with highly resplendent aggregations of fat-granules, sometimes even presenting an oily appearance; and the cell-structure is throughout more or less fatty or degenerated. This is the fatty or waxy kidney of some pathologists.

VII. The kidney is diminished in volume and weight, shrunken and atrophied, often irregular in shape; in substance dense and firm; the capsule adherent; the cortex studded with nodular eminences varying in number and size. The colour of the kidney is red or a brownish-red. The cortical layer is reduced to a minimum of thickness so that the base of the cones seems lost in the external circumference. The cones are striated, and of a deeper colour than the rest, and appear to be the only part of the organ remaining. Microscopically examined the cortical part seems reduced to a fibrous structure, in which an original tubular arrangement is with difficulty traced. In the nodular eminences a few convoluted tubes may be teazed out, and their canal appears filled with a dense granular material; the epithelial cells are everywhere detached and undergoing disintegration.

This atrophied state of the kidney has been compared by Henle to cirrhosis of the liver. But in this latter form of atrophy there appears to be a new formation of connective tissue with a shrinking or absorption of the hepatic cells and parenchyma; while in the shrunken and atrophied kidney I have never been able to satisfy myself of the presence of any new formation, but only of the obliteration and condensation of

the tubular structure. At very advanced periods of life the kidney is often seen thus atrophied, particularly as to its cortical substance.

This last form, although always associated with albuminous urine, does not give rise to dropsical symptoms beyond slight œdema of the ankles, and sometimes not even to this. It is most commonly fatal by uræmic poisoning, coma, or convulsions. It is frequently met with in the gouty habit of body, and has been appropriately termed the gouty kidney by Dr. Todd.

I am not prepared to say that these comprise all the forms of diseased kidney associated with albuminous urine, or that may have been described under the name of morbus Brightii; they are, however, the principal and most common forms, and they are those which I have had the opportunity of studying, and of examining the urine during life. I have made no mention of the cysts which are sometimes seen in great numbers in the granular kidney. I have known them so numerous as not to be counted, varying in size from a millet-seed to that of a pea, or even larger. They do not seem to have any direct connection with the fundamental disease, as, although sometimes present, they are not a constant accompaniment of granular kidney: I avoid the controversy respecting their origin. We have no means of detecting their presence during life, and we have, at present, no cause to believe that they give rise to any symptoms. They are often seen in the kidneys of people advanced in life, who, there was no reason to believe suffered from any renal disorder.

CHAPTER IV.

RELATION OF SCARLET FEVER TO RENAL DROPSY.

In considering the several forms of renal disease connected with dropsy and albuminous urine, and in tracing the character of the cell degeneration which marks their progress, it will be most convenient to commence with the simplest form, that in which the inflammatory origin of the disease is the most manifest, and in which, in fatal cases, the cell transformation is most apparent and most readily demonstrated. The early stage of these cases is marked by the presence of blood in the urine, either visible to the unaided eye or recognised by the microscope. It cannot be doubted that the dropsy which follows scarlet fever exhibits all the characteristics of an inflammatory origin. It is ushered in by a secondary febrile attack, with evidence of renal engorgement. In unfavorable and fatal cases a rapid destruction of epithelial cell-structure is apparent, accompanied by the exudation of an inflammatory product, which accumulates in the uriniferous tubes and Malpighian bodies, increases the size and weight of the organs, and developes all the conditions recognised as characteristic of the sub-acute form of morbus Brightii.

The examination of the urinary sediment from time to time in these cases will furnish information of the nature of the process going forward in the kidneys; and, from the evidence which the microscope supplies, a favorable or unfavorable opinion may be formed with great precision and certainty.

Careful attention to the material thrown off from the kidneys will, I think, satisfactorily prove that the foretoken of danger is the appearance of degraded or atrophic cells, rather than the desquamation of epithelial structures in the form of granular epithelial casts. For so long as the epithelial cells remain unchanged, a favorable termination may be expected. When these cases of dropsy after scarlet fever prove fatal from the third to the fourth week after the commencement of the secondary fever, the kidneys invariably present appearances identical with what is seen in that form of morbus Brightii recognised as the sub-acute; and from this point of view the inflammatory origin of one form of renal degeneration is established; as well as that scarlet fever, at certain periods of life, and in certain habits of body, must be classed as one of the most efficient and active causes of renal degeneration.

The exception to this will be found in those cases of scarlet fever where death occurs either during or immediately after the eruptive period; that is to say, within ten days from the commencement of the eruptive period. In such cases the kidneys are gorged with blood; they are of a purplish red or deep madder-brown red, and give out blood in abundance when a section is made. The uriniferous tubes in these cases are found filled with sanguineous, fibrinous coagula loaded with blood-corpuscles, and of a deep red colour. But this congestive condition, in the majority of cases, rapidly passes away, dropsical symptoms supervene, and, if the patient dies from the third to the fourth week from the period of the secondary fever, the kidneys uniformly present evidence of increase of size and weight,—they are pale and faintly granular, and of being the seat of a morbid process which is very similar in character with what is found in the acute form of morbus Brightii. The late Dr. Miller ('The Pathology of the Kidney in Scarlatina') describes the appearance of the kidneys in the fatal cases which came under his observation during the epidemic of scarlet fever in 1848. One or two are characteristic of the hyperæmic period, but the rest exhibit the kidneys as of a pale colour as

regards the cortex, yellowish or yellowish white, and presenting the appearances usually noticed in acute albuminuria.

Hæmaturia after scarlet fever.

Hæmaturia after scarlet fever is no uncommon occurrence; it is always associated with more or less of general dropsy, with a pasty, spanæmic appearance of the surface of the body. In the great majority of cases, it is a morbid condition, perfectly manageable, quickly yielding to judicious treatment, and only in exceptional cases either leading to, or associated with, permanent and organic mischief of the kidneys.

A question of much pathological interest arises out of the study of these cases—namely, whether the congested or impeded state of the circulation in the kidneys is mainly dependent on arrested cutaneous function during the desquamation of the cuticle; or is it evidence of the imperfect elimination of the febrile poison during the eruptive stage, and therefore a sequel to the completion thereof through these emunctories—the kidneys? From whichever point of view we study these symptoms, the condition of the kidneys is that of inflammatory congestion, and the impeded renal function demands the same remedial measures.

Of the many cases of hæmaturia and dropsy after scarlet fever that come under treatment, some have had the exanthematous fever most favorably, and its characteristic stages have been well marked, but during convalescence the patient has been incautiously exposed, and the proper precautions, with respect to clothing at that period, have been neglected. In these there is some show of probability that arrested cutaneous function may suffice to explain the sequelæ of dropsy and bloody urine. But, in the vast majority of cases, this secondary condition must be accepted as evidence of the imperfect elimination of the febrile poison during the antecedent exanthematous stage, arising either from the greater intensity of the poison, or the incompleteness of the processes by which it is released from, or decomposed in the system.

The amount and duration of the hæmaturia, as a secondary affection after scarlet fever, is very variable. In some cases the renal hæmorrhage is abundant, and gives to the urine, for some consecutive days, a marked blood-red appearance; in others the presence of blood is scarcely recognised, except by a certain dusky appearance, as if a few grains of soot had been added to the urine. Nevertheless, whether the hæmorrhage be trifling or abundant, there is always, at the commencement of this supplemental stage, evidence of more or less febrile disturbance, clearly expressing the inflammatory nature of this secondary process. Anasarca of greater or less degree of the whole surface of the body, sometimes with, more often without, serous accumulations in the abdominal cavity, accompanies the hæmaturia. The pale, pasty, spanæmic aspect of the patient, with a puffy, œdematous state of the face, is also very expressive of this disorder.

Case I.—Such are the chief characteristics of the hæmaturia and dropsy, caused by the secondary renal affection following scarlet fever; and the case of John D—, ten years of age, admitted into Burdett ward, in August, 1855, illustrates, in a marked manner, these preliminary remarks. This child had scarlet fever the first week in August, and, from the mother's description, the eruptive stage was passed favorably, there being, however, troublesome sore-throat, with external swelling of the neck. By the 14th of August, however, he appears to have been quite well. A few days after, however, his face and eyelids were noticed to be swollen in the morning; and, on admission, the following symptoms were recorded: The whole surface of the body was anasarcous, more evident in the face and hands and wrists, feet and ankles, than on the trunk; the abdomen was distended, dull on percussion at the flanks, and afforded evidence of fluid by succussion. The temperature of the skin was higher than natural; the pulse was small and frequent; the tongue pale and furred. The respiratory movements were not impeded, and the heart's sounds were natural. The urine which was passed soon after admission was of a dark blood-red colour, and highly albuminous. The sediment,

which was very abundant, consisted exclusively of large-sized fibrinous blood-casts (Pl. I, fig. 1); there were also many free blood-corpuscles. The little patient complained much of thirst, and urgent aching pain across the loins. The lumbar spaces were painful on making deep pressure. He was ordered to be cupped from the loins and to take the compound jalap powder; and a diaphoretic draught was given every four hours, and its action promoted by the child being clothed in flannel. The little fellow bore the cupping without flinching or crying. The purgative powder acted briskly and with advantage. Two days afterwards the swelling of the abdomen was greatly reduced, and the general anasarca had decreased. There was less heat of skin; the pulse was fuller and slower; there was abatement of the thirst; the tongue was clean, and there was a desire for food. But the urine was still charged with blood, and the microscopic appearance as on admission. The pain across the loins was not diminished. Brisk purging with the cream of tartar and jalap was continued, and by the end of the week a very manifest improvement was apparent. The urine began to augment in quantity so soon as the action of the purgative ceased; but blood was still present, although in diminished amount. He was dry cupped on the loins with considerable and immediate relief, the lumbar pain subsided, and the urine became clear and more natural in appearance. Its specific gravity was 1·016. By the tenth day from admission the dropsy of the surface had nearly disappeared. The abdomen was natural and free from any indication of fluid, and the only vestige of the anasarca was some slight puffiness of the eyelids in the morning. Drawings of the sediment were made from time to time; but no material alteration took place, till the hæmaturia subsided—when the casts appeared coarsely granular, entangling spheroidal epithelial cells and a few isolated blood discs. (Pl. I, fig. 2.) These epithelial casts continued present so long as any dropsical symptoms remained. One or two isolated granule-cells (fig. 2) were seen on one occasion only. In these cases of dropsy after scarlet fever the microscope at first reveals a state of simple renal hæmorrhage, the casts being

the blood coagulated within the renal tubes and washed therefrom by the urinary current. Within certain limits, experience justifies the opinion that the more abundant the hæmorrhage, the greater is the security from subsequent renal disorganization. As the hæmorrhage subsides, an exudation of epithelium takes place, held together in the form of casts by a coarsely granular material, which is doubtless an inflammatory product, as it is frequently accompanied by inflammatory corpuscles—granule-cells and amorphous fibrinous flakes. In this case, however, the evidence of the severer form of inflammatory action was wanting, for the granular epithelial casts contained only spheroidal epithelial cells, exhibiting no departure from the standard of healthy cells. The casts became daily less granular, and ultimately perfectly hyaline or transparent, with here and there an epithelial cell, either within the cast or isolated and scattered over the field of the glass.

By the fourteenth day very evident improvement had been effected: all traces of dropsy had disappeared; the appetite was good; the quantity of urine was natural, but it was still albuminous. There is, however, in these cases an impoverished state of the blood which tells so forcibly of the morbid agencies, which, from the primary exanthematous fever to the secondary febrile state with renal hæmorrhage, so continuously deteriorate this fluid in its most important constituent of red corpuscles, that the propriety—nay, the necessity for the administration of chalybeate remedies must ever be apparent. The citrate of iron was at first given; but the urine continuing albuminous, and the microscope occasionally revealing isolated blood-discs and granular cysts, it was changed for the tincture of the sesqui-chloride. It was remarked how rapidly the child improved in appearance; how soon, after taking this most valuable of all the preparations of iron, his face, and the surface of the body generally, indicated a return to the characteristics of a healthy circulation. Before he left the hospital we had the satisfaction of finding the urine quite free from albumen, and that, beyond a few isolated and scattered epithelial cells, the microscope detected no morbid conditions in this fluid. Valuable as the

preparations of iron are in the treatment of these cases, judgment is required in selecting the proper period to administer them. Our best guide is, the presence or absence of febrile disturbance; so long as the patient suffers thirst, anorexia, and has a quick pulse and hot skin, febrifuge and antimonial medicines, with local depletion, are obviously indicated; but, with the subsidence of these symptoms, ferruginous preparations should be given without loss of time. I believe the sesquichloride of iron, in these cases, to be the most efficacious and the best adapted for this class of disorders. This case has illustrated the chief features of the hæmaturia and dropsy after scarlet fever,—they may be summed up as follows: Secondary febrile disturbance; anasarca of the surface of the body; ascites; extreme pallor, or even waxlike aspect of the skin; scanty, albuminous urine; and renal hæmorrhage. The urinary deposits were very characteristic. At the first examination fibrinous casts (Pl. I, fig. 1), entangling numerous blood-discs; amorphous flakes, which, like the casts, were coloured by the hæmatin; free blood-corpuscles, with a few epithelial cells. As the hæmorrhagic state of the urine subsided, the casts presented the appearance of tubes somewhat granular, containing the epithelial cells of the tubes—several isolated, large and oval; some few spheroidal (Pl. I, fig. 2); and here and there appeared a compound granule-cell. At a later period the tube-casts became almost transparent, and contained only here and there an epithelial cell, the urine had become free from albumen, and the patient was pronounced convalescent.

The principles of treatment applicable to such and similar cases may be comprehended in a few words. To lessen the febrile disturbance, to promote the action of the skin, to alleviate the local congestion of the kidneys, and while the hyperæmic condition of these organs continued, to husband their powers of excretion, and by active purgatives to cleanse the system of the accumulated fluid which the embarrassed kidneys were unable to excrete. When these results had been favorably accomplished, the indications were to supply the functions of assimilation with a constituent all important to the impoverished

blood, and which, co-operating with animal food and a well regulated diet, soon brought the little patient to a satisfactory convalescence.

In this case little alteration of cell-structure was visible. A few compound granule-cells ever present when epithelial surfaces have been the seat of inflammatory action, were the only forms detected. No free nuclei or clustered nuclei, or other indications of breaking up of cells, were noticed.

RELATION OF SCARLET FEVER TO RENAL DEGENERATION.

Hæmaturia after scarlet fever—General dropsy—Pulmonary and cerebral complications—Convulsions—Death.

The secondary diseases of scarlet fever, the renal congestion, the dropsy, the albuminous and bloody urine, and the oftentimes fatal termination, are to be traced to the imperfect elimination of the original febrile poison. On the kidneys the force of this secondary effort seems concentrated. In mild cases, a state of simple congestion, with temporary embarrassment to the renal function, is alone evident; the dropsy is but trifling; the urine soon recovers its natural character, and convalescence speedily follows. But in the severer forms, either from the intensity of the febrile poison or the weak or scrofulous habit of body which it attacks, the hyperæmia of the kidneys becomes an inflammatory engorgement, and destructive processes follow, terminating in exudation and fatal degeneration of the renal structures. The state of the kidney after death leaves no doubt on my mind that the consequences of this renal inflammation are identical with what we witness in the acute form of morbus Brightii. The symptoms during life—the general dropsy, the albuminous urine, the sediment, at first consisting of blood-casts, then, fibrinous and epithelial, then presenting disintegrated, abortive, and fatty cells; after death, the pale, smooth, or finely granular, bloodless kidney, increased in weight from exudation both interstitial and tubular—afford

convincing evidence of the analogy, not to say identity, of the morbid process active here and that observed in the acute form of morbus Brightii. Moreover, the complications of this secondary state are analogous. The cerebral and pulmonary conditions are not different; convulsions, coma, and death significant of uræmic poisoning occur in both. Pulmonary œdema is as frequently fatal in the one as in the other.

Case II.—Richard L—, æt. 7, was admitted on February 10th, 1854. More than a month had elapsed since the child had suffered scarlet fever. He had been treated as an out-patient for a few days preceding admission. His convalescence after the primary fever did not progress favorably. The mother, however, could give no very intelligible account, except that he suddenly began to swell all over about a week since.

The child was the subject of general anasarca. The face was pallid, pasty, and sodden. The scrotum was distended with fluid and the prepuce œdematous; there was serous effusion of moderate extent into the cavity of the abdomen. The chest was moderately resonant; moist mucous murmurs were heard in all the large tubes. The respirations were frequent and short, 24; there were fits of dyspnœa, and troublesome cough. The skin was of a febrile temperature; the pulse was 96. The heart's sounds were natural. The tongue was furred and dry, and there was much thirst. The urine was scanty, smoky in appearance, sp. gr. 1·020, and highly albuminous. The mother stated that for several days in the previous week the water was of a blood-red colour. Examined by the microscope, blood-casts of large size, with many free blood-corpuscles and some isolated epithelial cells, were visible. (Pl. I, fig. 3.) The compound jalap powder was given daily as a purgative. Warm baths and diaphoretic salines were ordered. The free purging and the febrifuge medicine reduced the febrile symptoms, and on the 13th, the skin had become cool, the tongue cleaner and moist, and there was less thirst. The face continued puffy, but there was considerable diminution in the general anasarca. By the 20th, ten days after admission, the urine had increased in

quantity, was clear, of a bright amber colour. But the specific gravity had varied from day to day, according to the activity of the purgatives. The apparent amount of albumen was not reduced. The urinary deposit examined on the 12th day after admission was seen to consist of granular casts, containing epithelial cells; many compound granule-cells, some granular casts, containing free nuclei. On the addition of nitric acid, the albumen, coagulated by heat, became altered in colour, first assuming a bluish green and subsequently passing into a greenish black. The effect of nitric acid on the albuminous coagula results probably from the oxydising agency of the nitric acid on the colouring matter of the urine; it has not yet, however, been satisfactorily explained; it occurs most frequently in the acute form of morbus Brightii, and, so far as my experience teaches me, it is a condition of very unfavorable significance. The pulse continuing good, and the appetite improving, the bowels acting freely with the cream of tartar purgative, the patient was placed on the potassio-tartrate of iron.

On the 3d of March, three weeks after admission, the general aspect had improved, the face, however, continuing œdematous in the morning, but subsiding as the day advanced; the quantity of urine passed in the twenty-four hours had notably increased, but without any proportionate diminution in the general dropsy, which, although much less than the week previous, still manifested itself as anasarca of the entire surface. The specific gravity of the urine was 1·015-16, and the quantity of albumen seemed on the increase, as its coagulation by heat rendered the contents of the tube nearly solid. The urinary deposit examined under the microscope revealed alterations in the appearance of the tube-casts, which I have since learnt to view as significant of the most unfavorable results. The casts were still granular, and contained epithelial cells, presenting the usual appearance of the tubes during the early period, but many and by far the greater number of the casts were less granular, more transparent, contained here and there epithelial cells, some compound cells, and many free nuclei. Scarcely a cast was free from those larger aggregations of

nuclei, to which the term glomerulus has been applied; whether they be abortive cells, or of the nature of the compound inflammation-globules of Gluge, when they appear in any abundance in any form of cast found in albuminous urine, and are accompanied by grape-like clusters of nuclei without a cell-wall (Pl. I, figs. 4 and 5), as well as by many others which are isolated and free, and appear imbedded in the granular tube-casts, they imply a very tumultuous action and a very intractable form of renal disease.

On this 3d day of March the child was sitting up in bed, having taken his dinner with an apparently improved appetite, when convulsions suddenly came on; they were of the type of those intermittent movements so frequently seen produced by dental or intestinal irritation. These convulsive movements continued for several hours, with only slight intermissions; the pupils were dilated; the breathing was laboured and quick; the pulse 110—120; deglutition was impeded. Purgative enemata were administered; cold was applied to the head. The convulsions continued in paroxysms during the night; in the intervals the patient remained comatose. The child died at 2 p.m. on the morning of the 5th, forty-eight hours after the commencement of the convulsions.

The kidneys were large for the age, and weighed six and a half and six and three quarters ounces. They were pale, flabby, and of a whitish-yellow colour. The capsule was easily removed, and the surface was smooth, with a few arborescent veins. The cortical portion on a section was much increased in thickness, and the cones, which were of a pale salmon tint, seemed imbedded in it. A portion of the cortex was microscopically examined, and the Malpighian bodies seemed filled with a dense granular or molecular deposit, in which could be seen many free nuclei. The epithelial cells were in many places detached from the basement membrane, and the tube was filled with granular exudation; some compound cells and clusters of nuclei were also noticed. (Pl. I, fig. 6.)

The lungs were œdematous. Some fluid was in the abdomen. The brain had a sodden appearance. The ventricles con-

tained serous fluid, but no other morbid condition was observed.

We could obtain no information which could be considered satisfactory of the earlier stages of this child's illness, beyond the fact of its having had scarlet fever. Whether the eruptive period was distinguished by any untoward symptom, or whether desquamation of the cuticle followed, could not be ascertained, as the mother had not paid attention to these matters.

That the secondary affection was characterised by symptoms of unusual severity, the state of the child on admission very plainly testified, and the attention of the student in clinical medicine is particularly directed—first, to the degree and character of the febrile disturbance; secondly, to the renal and pulmonary complication; thirdly, to the cerebral conditions and sequel. The febrile symptoms were of a low type, yet there were many expressive of irritative action, such as usually accompany local or regional inflammation; nevertheless, the brown, dry tongue, the extent of dropsy, the pallor and wax-like aspect, forbade depletory measures. But the state of the urine, the physical signs within the chest, each told of states of stasis and hyperæmia in these regions—formidable obstructions to the purification of the blood by respiration on the one hand, and of its depuration by urinary excretion on the other. What principle of treatment should guide us in such complex states?

The therapeutical principle which I would enunciate is, to endeavour to act upon and bring into activity those functions and emunctories which are not, or are only in a moderate degree, implicated in the morbid disturbance; and by their agency relieve, if possible, the oppressed and impeded organs. Thus, though the surface of the body is anasarcous, we must endeavour to promote its exhaling power. Antimonial diaphoretics are adapted for this purpose. As the intestinal mucous surface gives no sign of sharing in the congested condition of the lungs or kidneys, we must excite its secretions to activity, and by purging the system of the accumulated fluid, vicariously, for a time, relieve the kidneys of their office. The

intimate sympathy between the kidneys and skin, and between the latter and the bronchial mucous membrane, entitles us to expect the most beneficial results from vigorously promoting the cutaneous function. Unhappily, in these cases, the general anasarca of the surface is a formidable obstacle to cutaneous exhalation. External heat affords the most efficient aid. Warm baths afford oftentimes great temporary relief to the bronchial congestion and dyspnœa; the breathing becomes less oppressed, and the secretion from the bronchial tubes more free. But the hot-air bath is certainly the most efficacious; it is not followed by that exhaustion which a succession of warm-water baths invariably induce; and to my observation the amount of relief felt by the patient is much greater. To aid these external appliances, ammoniacal salines may be given internally with advantage. Active purging yields the best results. It is, however, of importance to select appropriate means to obtain the greatest amount of relief, for it is not every purgative of the Pharmacopœia which answers this purpose equally well. That purgative which acts most directly as a hydrogogue is the best adapted, but which, at the same time, is not followed by any disproportioned exhaustion, or by any torpid reaction. The combination of jalap and cream of tartar is most admirably suited to these ends. It acts quickly, without depressing the system, is not followed by inactivity, and induces copious watery dejections. This patient was much benefited by these purgative remedies: the febrile state was lessened, the tongue became moist, and doubtless, from the amount of fluid drawn away by the cathartic, may be explained the great variation in the specific gravity of the urine. There was manifest abatement of the dropsical condition, and the breathing was easier and the expectoration more copious. Continuing this plan of treatment, the improvement became sufficiently pronounced to justify the administration of chalybeates. At the same time, the state of the urine, revealed by the microscope, together with the appearance of that peculiar pigmentary condition observed in combination with the albumen, suggested a very unfavorable prognosis. The casts of the tubes were partly

transparent, partly granular; many disintegrated cells were imbedded in them. A few epithelial corpuscles were visible within the tubes, some were filled with fat-granules, and the tubes contained many scattered free nuclei, highly refractive, and completely removed by ether. These microscopic conditions indicate an advancing stage of degeneration, and if spread through both kidneys, must be quickly followed by an imperfect elimination of the chief urinary constituents.

It would be out of place here to enter into an investigation of the nature of the pigments that are occasionally met with in the urine, cyanurin, melanurin, &c. Experience tells me that the development of this pigmentary condition, in combination with albumen in the urine, is of the gravest import. It is always associated with the most advanced stage of renal degeneration, and in every instance in which I have seen it, it has been quickly followed by fatal results. Lehmann, in his 'Physiological Chemistry' (vol. ii, p. 428), says, as far as his experience goes, it is only when uræmic symptoms have manifested themselves, that this peculiarity of the urine is generally observable, and this entirely coincides with my own; or, I should rather say, that uræmic symptoms always follow or are associated with this change in the colour by nitric acid. We should not then be unprepared for the development of unfavorable symptoms whenever this peculiarity of the urine is observed; so that notwithstanding the apparent improvement in the child's condition, even to the diminution of the dropsy of the surface, I expressed my fears at the time that this hopeful state would be but temporary. And surely nothing can exhibit the value and importance of frequent examination of the urine in such cases more forcibly than the fact here obtained, and the unfavorable inference deduced, from the alteration in the cell-structure and this pigmentary phenomenon. In all other respects there was an apparent amendment, and if we had based the prognosis only on the general aspect of the patient, we might fairly have inferred that all was going on well. It is not of less importance in hospital practice than in private, nor is it less necessary amongst the poor than amongst the rich, to be

explicit and candid in the expression of our fears or hopes to those anxiously interested in the welfare of the patient. It is as much the office of the physician to allay anxiety where that can be done with prudence, as it is his more distressing but not less imperative duty to disclose his worst apprehensions, especially when he sees expectations of amendment cherished, which experience teaches him will be but temporary, and which must soon give way to less equivocal signs of approaching danger.

In the present instance, I believe the warning given to the mother was unheeded; the amendment was so palpable to her, that she would not believe but that our unfavorable opinion was mere conjecture. An important point may be learnt here —namely, the suddenness and abruptness with which the symptoms of uræmic poisoning oftentimes commence. In some cases, particularly in adults, the indications are progressive; but here, all other things being promising, convulsions suddenly supervene; they intermit, but coma characterises their remission, and the patient dies forty hours after the first indication of the urinous poison acting on the nervous centre. It may very properly be asked—can nothing be done in this critical state of things? Are there no remedies available for such a crisis? With such a state of kidney degeneration as the latter examinations of the urine revealed, I believe nothing will avert the fatal termination. These cases of convulsion are not always immediately fatal; in the intervals consciousness may return, and advantage of that interval may be taken to administer medicinal aid. Where remissions of the convulsions occur of several hours' duration, a fairer prospect of relief is present than where the patient remains comatose. In either case, however, an effort should be made to excite the bowels to active exertion. Enemata, containing, according to the age of the patient, a quarter, a half, or even a drop of croton oil, should be administered; and where the ability to swallow is unimpaired, benefit may be expected from the chlorine mixture, the agency of which, according to the opinion of Frerichs, depends on its decomposing the carbonate of ammonia into which the urea

in the blood is converted, and which carbonate that author conceives to be the poisonous agent in these cases of fatal uræmic poisoning. Proofs of this doctrine are, I think, required; but whether the hypothesis be true or false, clinical experience pronounces in favour of this chlorine mixture in cases where symptoms of uræmic poisoning are developed.

The cell-structures, as well as the tube-casts, underwent the successive changes which have been observed in acute morbus Brightii, and I have no hesitation in placing scarlet fever in certain constitutions as one of the most active causes of this form of renal disease.

Hæmaturia after scarlet fever—anasarca—convulsions—fibrinous casts during the hæmorrhagic period—epithelial casts later, few in number—recovery.

Blood in the urine, general dropsy, and convulsions, are a formidable series of symptoms to combat against; but convulsions concurrent with hæmaturia and dropsy, though of the gravest import, are not necessarily fatal, and the following case teaches that complete, even rapid recovery may take place if the kidneys be not implicated beyond the stage of hyperæmia:

Case III.—William Grice, æt. 13, a potter's boy, was admitted March 31st, 1856. The surface of the body was everywhere anasarcous, the face œdematous, the respirations were not more frequent than natural, there was neither cough nor dyspnœa, the tongue was clean and pale, and there was no febrile heat of skin, pulse natural, the urine was scanty and of a dark sooty appearance. It was stated that ten days since he had sore throat and a mild attack of scarlet fever; he was ill in bed for a week, when the skin began to peel off his wrists and hands. He went abroad that day, and at night felt chilly, as if he had caught cold. In the morning his face was swollen, and subsequently his arms, wrists, and legs began to swell. His water was like blood. The

boy complained of aching across his loins. On admission the skin was freely desquamating from the palms of the hands and soles of the feet. The urine was highly albuminous. He was cupped from the loins; had cream of tartar purgatives and diaphoretic salines. The urinary deposit exhibited under the microscope many blood-discs, much fibrinous debris stained with hæmatin, and many fibrinous casts containing blood-discs, and some free glandular epithelium, natural in appearance. (Pl. I, fig. 7.) The day after admission he was seized with convulsions. Mr. Wallis, the clinical assistant, described them as epileptiform in character, consisting of intermitting clonic movements, with some foaming at the mouth and snapping of the jaws; the pupils were dilated, and there was considerable turgescence of the face. There was rotation of the head on its axis. There was complete unconsciousness throughout. The spasmodic movements gradually subsided, and the boy fell into a calm and natural sleep of some hours' duration, on awaking from which he had no recollection of anything that had occurred. The tongue was not bitten. The urine became much augmented in quantity, clearer, and less albuminous. Four days after admission the anasarcous state of the surface had greatly subsided, yet the urine still presented a sooty, dingy appearance, but was plentiful in quantity. On the eighth day from admission the dropsy had disappeared, the urine, however, continuing albuminous, and exhibiting under the microscope a few isolated blood-corpuscles. Suddenly the hæmaturia returned. The urine became of a bright red, and fibrinous blood-casts, mixed with granular epithelial casts, were again present. (Fig. 9.) Amorphous fibrinous flakes, stained with hæmatin, were also seen. As the hæmorrhage subsided, epithelial cells, isolated or in groups, became apparent, as well as the granular epithelial casts. One or two compound granule-cells were seen, but there was no evidence of disintegrated cell-structure, no grape-like clusters of nuclei, nor anything to imply any tendency to cell-disorganization. He was now placed on the tincture of the sesquichloride of iron. In four days the urine regained its natural colour, it was slightly albuminous, and contained casts becoming daily less granular,

with a decreasing number of epithelial cells. I was at first disposed to view the second attack of hæmaturia with apprehension; but experience teaches me that within certain limits the renal hæmorrhage is a salutary rather than a hazardous process. It is the natural and spontaneous relief to that state of inflammatory engorgement, which, if unrelieved, terminates in the production and exudation of materials, fatty, fibrinous, and albuminous, which constitute the essentials of morbus Brightii. The deposits from the urine, as this hæmorrhagic condition subsided, gave assurance that nothing beyond the hæmaturia had occurred. There were no indications of any altered condition of the epithelium, and little more than the fibrinous debris, mixed here and there with a few epithelial cells, were noticed up to the period of his convalescence.

This case exhibits the reliance which may be placed on the character of the urinary deposits, as a guide for arriving at a correct opinion of the nature and probable termination of the renal disorder.

If the absence from the urine of all indication of any morbid change in the appearance of the epithelium, notwithstanding the continual presence of albumen and the elements of hæmorrhage, be taken into consideration, and compared with the changes which those cells exhibited in the fatal case of R. L., represented in Pl. I, figs. 4, 5, and again in that of Hadway (Pl. II, fig. 2), it is but a reasonable inference, that so long as the epithelium undergoes no morbid change, and is unaccompanied by compound cells, (Gluge's,) or other evidence of fatty or granular exudation, the safety of the patient may be held secure; but such alterations in the character of the deposit, following rapidly in succession the proofs of inflammatory engorgement, which an early examination of the urine has supplied, must be accepted as significant of imminent, and, perhaps, I may say, certain danger.

The microscopic examination of the urine, therefore, justified a favorable prognosis; for at no period did the instrument reveal any disorganizing process going forward in the epithelial structures—nothing was seen but normal cells entangled in the

fibrinous coagula, blood-discs, and amorphous fibrinous flakes. In this respect how different from the character of the deposit in the fatal cases to which reference has been made. We may thus reasonably conclude, that where the urine affords no evidence of any destructive disintegration going forward, a safe and speedy convalescence may be expected. Yet it must not be forgotten, that so long as the urine continues albuminous, or exhibits any trace of the hæmorrhagic state, active treatment should not be neglected nor measures of precaution laid aside. There seems to be a special efficacy possessed by the tincture of the sesquichloride of iron in such cases of renal hæmorrhage; and it appears materially to aid nutrition in rapidly restoring to the circulation the proportion of red corpuscles, the destruction and loss of which is so apparent in these forms of disease; and it appears to me also to exercise, either directly or indirectly, some beneficial influence in the formation of healthier cell-structure. It is possible that whatever restores to the blood any property or quality in which it is deficient, imparts to the organism a renewed power in the development of cells. There is no greater or more striking effect seen than the gradual disappearance of abortive or disintegrated cells in the urinary deposit, as the patient slowly comes under the influence of these preparations of iron.

Hæmaturia after scarlet fever—anasarca—convalescence.

I have already alluded to a point of much pathological interest arising out of the investigation of these cases of hæmaturia and renal disturbance: whether this sequel simply arises from the arrest of the cutaneous function during the period of the desquamation of the cuticle, or whether it may not be traced to the imperfect elimination of the febrile poison at the exanthematous period, and referable therefore to a state of the blood imperfectly purified.

Case IV.—The case of Ralph W—, æt. 11, bears materially on these points, for he was in the hospital throughout both stages of the fever; indeed the fever showed itself while the patient was in

the surgeons' wards, and he was passed into Burdett ward on the first appearance of the febrile symptoms. He was admitted November 13th. He complained the night before of feeling ill, and early in the morning of the 13th he was seized with violent retching, vomiting, and purging. The tongue was of a bright red and moist, and the papillæ being much enlarged. He vomited frequently during the day, and complained of pinching pain in the abdomen. The pulse was small and weak. The case was thought to be one of simple gastric disturbance, and he had effervescing medicine and some aromatic mixture.

On the 15th, two days after the first symptoms, there was sore-throat, the fauces and tonsils having the brilliant scarlet redness characteristic of the scarlet fever, and the tongue had acquired the well-known strawberry aspect. In the course of the day a bright efflorescent rash appeared on the face and throat, extending thence to the trunk, and during the following days occupying the whole body and extremities. The irritable state of the stomach and bowels ceased with the appearance of the eruption. He was placed on the chlorate of potash mixture.

On the third day of the eruption the colour had become dusky, and there was no diminution of the sore-throat; on the contrary, there was a disposition to ulceration, with the formation of a dirty, tenacious, viscid secretion. The throat was cleansed frequently by means of a sponge saturated in the chlorine mixture.

On the 21st of November the eruption had entirely disappeared, and the throat presented a favorable appearance, but there was no appearance of desquamation of the cuticle.

On the 23d, the eighth day of the fever, slight cuticular exfoliation appeared on the arms, but no further appearance of desquamation was observable. His convalescence progressed very slowly. The appetite continued indifferent; the tongue had become pale; the aspect of the patient was dull; the bowels acted regularly, and the urine was abundant and natural. The patient during this period was placed on bark and nitric acid, and the diet was improved; but there was no inclina-

tion for food; the little fellow was lethargic and dull, and indifferent to everything about him, and had no inclination to get up. There was no cough; the respiratory sounds were natural, and, with the exception of the signs of a tardy convalescence and defective appetite, there were no symptoms of consequence.

On the 7th of December, twenty-two days after the first appearance of the scarlet rash, the surface of the body became generally anasarcous; there was some heat of skin and acceleration of pulse; the tongue was pale and moist; the face was œdematous, as well as the trunk and extremities, but there was no ascites. He complained of aching pain across the loins, and the urine was scanty and highly charged with blood. The breathing was somewhat oppressed and short; there was frequent cough, without expectoration; the respiratory sounds were very faint throughout the chest, and in the large tubes there was some trifling sibilus. He was cupped to four ounces from the loins. Ordered the compound jalap powder, one scruple, and the diaphoretic mixture; to be clothed in flannel, and a hot-air bath administered. The urine was microscopically examined, and fibrinous casts entangling blood-discs were abundantly visible, together with free blood-corpuscles. (Pl. I, fig. 10.) The treatment made little impression on these symptoms for the first six days; throughout this period the hæmaturia continued and the anasarca increased, so that both upper and lower extremities became extensively œdematous. He had warm baths and brisk purgatives, with the compound jalap powder.

On the 20th December the urine became more abundant, had lost the red, sanguineous character, and had acquired the smoky tinge observable in the milder forms of scarlatinal dropsy; it was moderately albuminous. The microscope exhibited tubular casts; more transparent, and containing a few blood-discs, with glandular epithelial cells, and one or two compound granule-cells. (Fig. 11.) The tincture of the sesquichloride of iron was now given. The anasarca gradually disappeared; the urine became clear and natural, and when examined, on the 4th of January, was free from all appearances but a few very transparent casts, with here and there an epithelial cell and

isolated nuclei. (Fig. 12.) The patient rapidly improved, soon lost the flabby, sodden aspect of dropsy, and was discharged convalescent.

This case teaches us, that no precaution taken during the period immediately subsequent to the exanthematous fever can avert the morbid sequelæ in certain instances. The child never left the ward from the first day of the attack. The temperature of the ward is uniform, never descending below 60°. The type of the fever was that of scarlatina anginosa. The ushering in of the disorder was more than usually severe, the vomiting and purging of the days preceding the eruption being disproportionately frequent. The eruption exhibited in its course nothing irregular; it perhaps may be said to have receded too early. The sore-throat was not more severe than in analogous cases. The irritable state of the stomach and bowels departed so soon as the eruption came out. On the whole, however, it was very evident that the type of the fever was of the severest form, excepting only that dreadful form, the scarlatina maligna; and, moreover, that the exanthematous period had not adequately eliminated the febrile virus. This became apparent at the period of desquamation, which, in ordinary cases, proceeds *pari passu* with convalescence; but a trifling exfoliation of cuticle took place, and the progress of recovery lingered, as though some morbid material still lurked in the system; nor can we doubt that it was so, for secondary febrile symptoms manifested themselves, accompanied by hæmaturia and general dropsy: congestion of the respiratory organs, expressed by cough and dyspnœa, were also amongst the disturbances indicative of some widely-acting morbid influence. The hæmaturia was severe, and continued unaffected by the measures employed for the lessening of the local and internal congestions. Cupping, active purging, diaphoretics, and warm baths were administered, but the hæmaturia continued unabated for seven or eight days, and then, apparently having accomplished the complete depuration of the system, it subsided, leaving no other morbid condition to be combated but the impoverished blood and the accompanying debility.

It is interesting to observe how rapid is the restoration to health, how speedily ferruginous preparations seem to enrich the blood with red corpuscles, so soon as this cleansing process of the secondary fever has become complete. The hæmaturia in these cases, when severe, would seem to threaten the organic integrity of the renal organs; but, if careful microscopic examination be made from time to time, and the character of the casts carefully noted, these will be seen as fibrinous moulds of the larger tubes, containing blood-discs and scattered epithelial cells. As anasarca diminishes, epithelium becomes less abundant, and gradually disappears as convalescence progresses; the albumen, at the same time, daily diminishes, till, at length, all vestiges of it are lost, and the urine exhibits all the qualities of the healthy excretion. It is when the desquamation of the renal epithelium does not diminish, the urine continuing albuminous for weeks after the secondary attack, the specific gravity of this fluid becoming low, the urinary constituents reduced to a minimum, the casts becoming more and more transparent and fatty, the epithelium becoming more abortive, with scattered or grouped nuclei; it is under such circumstances as these that an unfavorable prognosis must be formed, and fears entertained that permanent granular degeneration of the kidneys has commenced.

PLATE I.

JOHN DAVY.

Fig. 1.—Blood-casts; amorphous fibrine stained with hæmatin; blood-corpuscles.

„ 2.—Granular casts containing epithelial cells, healthy; two compound granule-cells; scales of epithelium from pelvis; one cast very transparent.

R. L——.

„ 3.—Blood-casts; spherical epithelial cells.

„ 4.—Granular casts containing epithelial cells; many compound granule-cells; granular casts containing only free nuclei; several grape-like clusters of nuclei; abortive or disintegrated cells.

„ 5.—The same; the casts containing many clustered collections of resplendent granules of aggregated nuclei, as well as compound granule-cells; one granular cast containing free nuclei.

„ 6.—Malpighian bodies and convoluted tubes from the cortical part of the kidney. Both appear to be stuffed with a fine granular exudation. The basement membrane is everywhere denuded of epithelium, and the torn extremities of the tubes exhibit the granular matter and abortive cells freely escaping.

W. GRICE.

„ 7.—Fibrinous blood-casts; fibrinous flakes stained with hæmatin; scattered blood-discs and epithelial cells, healthy.

„ 8.—Granular casts containing normal epithelium in a few blood-discs; fibrinous flakes stained with hæmatin.

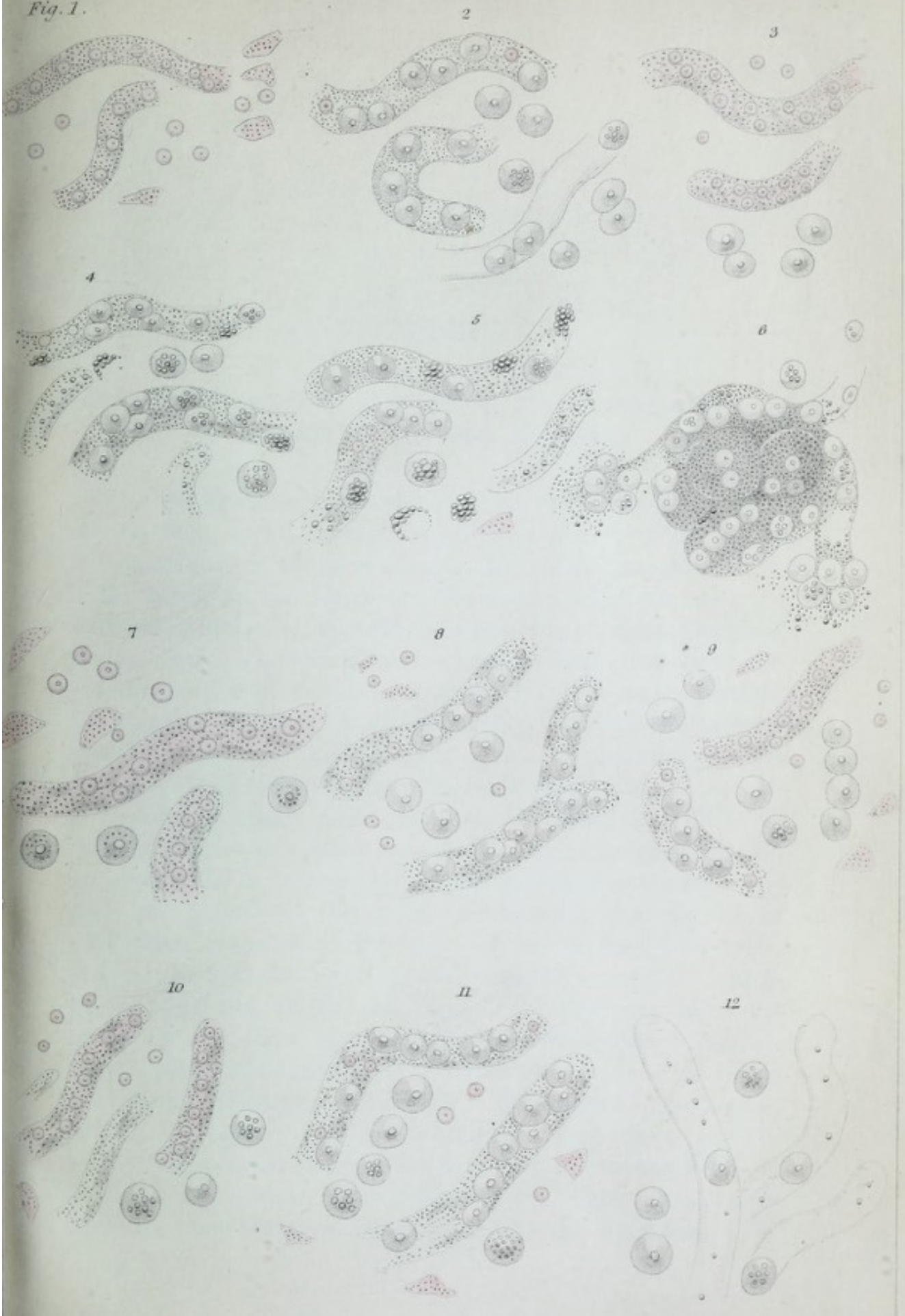
„ 9.—Second attack of hæmaturia.—Fibrinous blood-casts; fibrinous flakes stained with hæmatin; epithelial cells; one compound granule-cell.

RALPH W——.

„ 10.—Fibrinous casts; two large compound granule-cells.

„ 11.—Granular casts containing epithelial cells and blood-discs; one or two compound cells.

„ 12.—Hyaline casts; a few scattered epithelial cells; resplendent granules; in all probability free nuclei; two compound granule-cells.



R. Basham ad nat. del.

W. Greatbach sculp.

CHAPTER V.

ANALOGY BETWEEN SCARLATINAL DROPSY AND ACUTE ALBUMINURIA (MORBUS BRIGHTII).

The strong resemblance which exists between the dropsy after scarlet fever and albuminuria has been already noticed. So great, indeed, is the resemblance, that they may be said to differ in nothing but the cause; the scarlatinal poison being the exciting cause in the one, cold and wet acting on unhealthy blood in the other. The effects are the same in both, and the anatomical condition of the kidneys so similar, that we are justified in adopting the opinion of Rokitansky, that the scarlet fever poison is one of the most efficient agents in producing morbus Brightii. The following case illustrates these views:

Case V.—J. Hadway, æt. 6, admitted December 28th, 1857. He was the subject of general anasarca fourteen days after the disappearance of a trifling and imperfect scarlatinal rash. The face was puffed and the eyelids œdematous, and the serous infiltration extended to the back of the hands. The lower extremities were far less dropsical than the upper; the cuticle on the legs and thighs was imperfectly desquamating; the breathing was short and hurried. The urine was somewhat turbid, throwing down, at rest in a tube glass, a plentiful coarse, flocculent, reddish-coloured deposit. The supernatant urine had neither the blood-tinged colour of recent hæmaturia, nor the smoky hue so often observed in the urine after scarlet fever; it was of a dirty, faint straw-green; it was highly albuminous, more than half the tube being filled with the coagulum. The

microscope showed a most abundant deposit of various casts—some fibrinous, containing nothing but blood-discs (Pl. II, fig. 1), some containing both blood-discs and epithelial-cells. There were also many of the larger polygonal cells of the straight tubes held together by granular exudation, as if in twos and threes they had been thrown off from the basement membrane and carried with the tube-casts into the urine. There were also many free blood-corpuscles.

The treatment was by purgatives, antimonials, and warm baths, and by the surface being clothed in flannel. But little impression was made on the dropsy.

On the 7th of January, 1858, the urine presented the same albuminous condition, but with marked alteration in the character of the microscopic deposit. Scarcely a blood-disc was visible, the casts were entirely free from them. There were many fibrinous cylinders, of a fine granular appearance; there were others which contained numerous resplendent granules, evidently of free nuclei, several broken-up glomeruli, the integral parts of which, perhaps, were entangled in these fibrinous cylinders. There were larger tube-casts, highly granular, containing numerous epithelial cells. Some abortive epithelial cells, as well as free fat-cells, were also present. (Pl. II, fig. 2.) I could not view this change in the character of the deposit without expressing my fears that very grave conditions of the kidney were present, and that the issue of the case would be unfavorable. The finely granular casts containing free nuclei, the broken-up glomeruli, the fatty condition of the casts containing epithelial cells, spoke with emphasis of the rapid change in the textural condition of the kidney, which must be progressing with a fatal intensity. The anasarca rapidly increased, the œdema of the face nearly obliterated the features, the breathing became short and gasping, and the poor little patient succumbed under symptoms of œdema pulmonum on the evening of the 9th of January.

The kidneys were large for the age. They weighed severally four and three quarters and four and a half ounces. They were lobulated, marked on the cortical surface, which was very finely

granular when the capsule was removed, with numerous asteroid vascular spots. The colour was a pale fawn. A section displayed the cones of a deep red with strongly marked vascular striæ, surrounded by and apparently imbedded in the light coloured granular deposit. A milky fluid was easily pressed out from the apex of the cones, and it exhibited long lines of polygonal cells, with the epithelium of the straight tubes agglutinated together; a few compound fat-cells were visible, and several disintegrated glomeruli. The whole field was moreover covered with a fine granular matter freely moving about in the fluid. (Pl. II, fig. 3.) The appearance of the cortical portion when teazed out with needles, is represented in fig. 4. A Malpighian body and some convoluted tubes are seen blocked up and filled with a fine granular-looking exudation. In places, the epithelium seems detached from the basement membrane, and its place filled with granular and fatty material. Disintegrated glomeruli, abortive epithelial cells, and free nuclei, are dispersed about the field, together with an abundance of fine granular material.

The straight tubular structure at the base of one of the cones was torn out with needles, with a view of isolating some of the tubes. At the part where one of these was isolated, the basement membrane appeared naked and deprived of epithelial lining from the readiness with which the cells were detached when the tube was set free. The upper part of the tubes seemed blocked up with a granular exudation, in which the epithelial cells appeared impacted. Some free fat-cells were seen in the exudation. (Pl. II, fig. 5.)

This condition of the kidney is identical with one form of morbus Brightii, and represents the acute form of the disease. It illustrates the inflammatory origin of renal degeneration, as well as the share which a contaminated or vitiated blood has in producing this disease, and it confirms an opinion formerly expressed, that the scarlatinal poison must be reckoned one of the most active causes of an inflammatory state of the kidney, whch rapidly terminates in an exudation both tubular and interstitial.

In some cases the nephritis is slight, and soon passes away; in others, it appears to be relieved by a free hæmaturia; in a third class, either from the idiosyncracy of the patient, or the intensity of the febrile poison, and consequent inflammatory congestion of the organ, only partially or imperfectly relieved by hæmorrhage, the nephritis runs a rapid, tumultuous course; exudative products, abundantly formed, choke up the renal tubes, the cell structure is broken up, its place filled with a dense granular deposit; compression of, and obstruction to the renal circulation follows, for the organ becomes less capable of sustaining a free circulation as the product of exudation increases; a gradually increasing pallor of the cortical part follows; the obstructed tubes appear filled with abortive epithelial cells, granular matter, compound granule-cells, and disintegrated cells, the debris of which, in the form of isolated or irregularly collected fat-granules, give the note of warning, by their appearance in the urine, of the intensity and rapidity of the morbid process of degeneration. Close observation justifies me in averring, that whenever the granular and fatty cylinders, with compound fat-cells, make their appearance in the urine (Pl. II, fig. 2,) within a few days—six or seven—after microscopic evidence of hæmaturia; that is to say, when there has been no hæmorrhage from the kidneys visible to the unaided eye, and only faintly indicated by the casts containing blood-discs, and the few free blood-corpuscles in the urine seen through the microscope, there are then very grave reasons for inferring that a rapid and intractable disorder of the kidneys is hastening to a fatal termination. I would further observe, that it is not so much the abstract or special character of the deposit—not so much the mere fact of the presence of fibrinous cylinders containing free fat-grains, or of disintegrated compound granular cells or of abortive epithelium, as it is the period at which these appear in the urine. Now and then, at long intervals, in chronic cases, some of these are seen; rarely, if ever, occurring together. It is when they suddenly make their appearance, following almost immediately upon the period of inflammatory

engorgement, that fears should be entertained that they bespeak a rapid and fatal progress.

The evidence afforded by this and analogous cases, from my point of view, places beyond doubt the inflammatory origin of morbus Brightii.

Case VI.—Two days after the death of the child Hadway, a female child, five years old, was admitted under the care of my colleague, Dr. Radcliffe, with general dropsy. The little patient was suffering when I saw her under the suffocative symptoms and restlessness of œdema pulmonum. The child had been ill about a fortnight; and the swelling commenced the week after an attack of scarlet fever. She was not brought to the hospital till *in extremis*.

The lungs were gorged with fluid. The whole surface of the body was anasarcous. The kidneys weighed four ounces and a quarter, and five ounces. They were pale, with a few scattered stellar spots of vascular injection. The capsule was adherent in places, and developed a slightly granular surface when removed. The cortical part of the kidneys was much augmented, was of a fawn colour, exhibiting the markings characteristic of engorgement of the Malpighian tufts, presenting strongly marked striæ of a deep red, perpendicular to the surface. The cones were of a natural colour, their bases well defined, and distinct from the cortical portion. The vascular portion of the cones was also injected, and presented striæ of heightened colour, running parallel to the straight tubes, and diverging from the apex to the base.

The post-mortem conditions of these kidneys did not differ from those in Hadway's case, and microscopically the appearances were the same as shown in Pl. II, fig. 4. The convoluted tubes were gorged with granular exudation. The basement membrane in places was denuded of cells, and replaced by granular matter and compound fat-cells. In places the tubes retained their natural appearance. The straight tubes were also gorged, and in places entirely deprived of epithelium.

If these cases be compared with that of Osborn and the

microscopic condition of the kidneys in both cases be contrasted, a very strong family likeness will I think be found. The late Dr. Miller ('Pathology of the Kidney in Scarlatina,' by James Miller, M.D., 1850) published a series of cases to illustrate the pathology of the kidney in scarlet fever. His conclusions are, that the state of the kidneys both before and after death, are the counterpart of one form of Bright's disease. Dr. George Johnson ('Medico-Chir. Trans.', vol. xxix, p. 16) denies that scarlatina ever produces Bright's disease. Although in his work on the 'Diseases of the Kidney,' (pp. 121, 122), he mentions what he considers an exceptionable case, where the patient suffered two attacks of scarlatina, the last of which terminated in fatty degeneration of the kidney. Rokitansky ('Pathological Anatomy,' vol. ii, p. 202), however, classes scarlet fever as one of the causes of Bright's disease, both in children and adults.

If the pale, bloodless, fawn-coloured, enlarged, and sometimes slightly granular kidney, found in the majority of fatal cases of scarlatinal dropsy, be not an example of morbus Brightii, of what disease is it an example? In both there is exudation of a finely molecular material into the tubular as well as the interstitial portions of the organ. If the convoluted tubes, choked-up with a molecular exudation and broken and abortive epithelium, be not an example of Bright's disease, of what disease is it an example? If the general dropsy, the pallid surface, the albuminous urine, with its epithelial casts, becoming fatty and granular, be not symptoms of Bright's disease, of what disease is it an example?

Till greater semeiological and anatomical distinctions can be shown to exist between the two, it is both more convenient and more consistent with scientific arrangements to bring this form of disease into the catalogue of those which Dr. Bright was the first to describe and illustrate, than hypothetically to assume a special process and a distinct form of disease.

Some English pathologists doubt whether a state of hyperæmia or inflammatory engorgement of the kidney is a constant or necessary preliminary to the development of morbus Brightii.

Dr. George Johnson ('Medical and Chirurgical Transactions'), Dr. Handfield Jones ('Pathological Anatomy,' Jones and Sieveking, p. 596), and some others, think that hyperæmia or antecedent congestion is not a necessary element of the morbid process. A careful investigation of numerous cases of renal dropsy, both as regards the history of the early period of chronic cases, as well as of the evidence which a microscopic examination of the urine affords in the first stage both of the acute and chronic forms, has induced me to adopt the opinions of Frerichs, Rokitansky, and others, and to regard this disease as essentially the result of an inflammatory process, terminating in an exudation of inflammatory product, which, under the several forms of a granular, albuminous, or fatty deposit, gives to the kidneys various degrees of coarseness, according as the deposit is limited to the Malpighian bodies, or more diffusely spread through the convoluted tubes of the cortex: the coarsely granular kidney, with its roe-like granulations, representing the more limited deposit—the smooth, soft, enlarged, white kidney, representing the more diffuse deposit through the tubuli.

We are ignorant of the causes of these differences. They appear to represent different degrees of intensity or duration: yet the large, pale, bloodless kidney, is often found in acute cases, as well as in chronic and protracted ones. (See the cases of Osborn and Eden.)

Great difference of opinion still prevails among pathologists as to the relation of these different states of the kidney with each other.

Some inquirers are inclined to view these variations as representing different morbid processes. But though the product differs in amount and diffusion, though its character varies in the proportion of fatty molecules it may contain, or the degree of disintegration the cell-structure may have suffered, whether the process terminates in a large, pale, bloodless kidney, or a coarsely granular, even tuberculated kidney, the commencement of the disorder is from a state of hyperæmia, well marked in some cases, though obscurely declared in others. Dr. Bright has always considered the incipient stage of the disease to be a state of congestion, followed by a deposit of granular matter,

which ultimately renders the organ impermeable to blood, and produces the exsanguine pallor so characteristic of the disease in its more advanced degree.

Rokitansky ('Pathological Anatomy,' Sydenham Society ed., vol. ii, p. 199) unequivocally attributes the various forms to an inflammatory process. "We consider," he says, "the nature of Bright's disease to consist in an inflammatory process, which proceeds from a stage of hyperæmia to one of stasis, and then gives rise to a product, which is not only remarkable for its peculiar character, but which, in well-marked cases, by its excessive accumulation, causes a singular alteration in the appearance and structure of the kidney. It commonly runs a chronic course, with occasional exacerbations, but it is sometimes acute. In the latter very important cases, in which, from the tumultuous violence of the exudation, the product is mixed with a large amount of serum, and is generally reddened by the colouring matter of the blood, and in which the characteristic milky or creamy coagulated substance of well-marked Bright's disease is not formed, we should be obliged to consider the condition as one of very acute simple inflammation of the kidneys, were it not that the characteristic general symptoms and the constitution of the urine established it as a case of Bright's disease."

If the eye derived no assistance from the microscope, if our judgment was formed only from the external appearances and qualities of the kidneys, it would be difficult to conceive that the large, pale, soft, bloodless, kidney, was the result of the same morbid process as the kidney with its roe-like granulations, its mottled and chequered surface, exceeding but little in weight the healthy kidney. Yet microscopic investigation tells us that they differ only in the degree and diffuseness of the exudation.

In reference to the morbid processes producing these various conditions of the kidney, it is not a little significant that the symptoms during life are in each, if not identical, yet possess so many features in common, that the character and progress of the dropsy, the morbid conditions and complications

associated therewith, the albuminous state of the urine, and the usually fatal termination of the disease, are circumstances common to all forms except that of the nodulated, shrivelled, and contracted kidney; the pathology of which appears to differ from the rest, as do the symptoms during life. So that during the progress of the disease, one common principle of treatment is applicable to each variety. From the catalogue of symptoms ordinarily present, we cannot decide during life which form of renal degeneration is going forward. Dr. George Johnson has successfully shown that a microscopic examination of the urine will serve as a guide for discriminating between the large fatty kidney and the contracted nodular kidney, between what he calls acute desquamative and chronic desquamative nephitis, between the non-desquamative disease and the fatty and granular disease. As a pioneer in this direction of inquiry, he has done good service to the cause of renal pathology. But I venture to think that he has framed a nomenclature for different stages of the same disease, and that he has overlooked the fact that, in a protracted and chronic case of morbus Brightii, there have been both the desquamative and non-desquamative periods. The urine showing granular casts with epithelium at one period, then becoming less granular, with less epithelium, more transparent, and, perhaps, more fatty as the disease advances. In truth, every case of morbus Brightii exhibits a stage—often overlooked, and short though it be—in which more or less of the epithelium appears entangled in the granular casts, and which Dr. Johnson would call either acute or chronic desquamative disease. As the disease progresses, little or no epithelium is visible, the cast becomes transparent, hyaline, or waxy, and this represents the non-desquamative disease of the above-named author. At the earlier period, when the casts are fibrinous or granular, with more or less of epithelial structure entangled therein, the disease is remediable and obedient to treatment. But in certain cases the disease commences with such violence, and runs so impetuous a course, that the most active measures are unavailing. Yet these cases of the acute forms of the disease, provided they

do not die in the early period of inflammatory engorgement, exhibit, so far as the urinary sediment affords proof, examples of the acute desquamative, the chronic desquamative, and the non-desquamative periods of Dr. George Johnson. The case of Osborn (No. VII) is an example; the casts, at first fibrinous with blood-discs, then become granular, and filled with epithelial and compound cells; the epithelial cells then become less numerous, with many free nuclei and abortive cells; the casts lose their granular aspect, and become day by day more transparent, and free from epithelial structure, but abounding in collections of nuclei and aggregated fat-molecules. The appearance of epithelium in the casts in the acute period is the result of the inflammatory disturbance, a condition common to all mucous surfaces. The epithelium decreases from one of two causes—favorable and unfavorable. The first, in consequence of the gradual return to the equilibrium of healthy action, the subsidence of the disturbing cause—just as in catarrhal inflammations of other surfaces, as the balance of the circulation is restored, the epithelial exudation diminishes, and at last disappears. The second and unfavorable cause of the absence of epithelium depends chiefly on the disintegration of the cell-structure, and its retention in the uriniferous tubes; abortive cells and granular and fatty molecules are seen impacted together, closing up the canals and Malpighian bodies.

The tubes at the base of the pyramids are usually seen in a state of disease, intermediate between the convoluted tubes of the cortex and the straight tubes of the apex of the pyramids; for the degeneration invariably proceeds from without inwards, and it is probable that from this transition part the casts are derived which are found in the last and advanced periods of the disease.

In the following cases, the period of inflammatory engorgement or hyperæmia is sufficiently well marked by the presence of hæmaturia, and the successive phases of the disease are significantly expressed by the characters of the urinary deposit.

Hæmaturia—general dropsy—morbus Brightii running an acute course—urinary deposits significant of the disease—rapid degeneration of the renal epithelium—œdema of the lungs—death. Kidneys much enlarged, pale, and fatty.

Case VII.—Samuel Osborn, æt. 24, employed as a carman, was admitted into Burdett Ward, March, 1856. There was anasarca of the entire surface of the body, the face was œdematous and of a wax-like whiteness; the arms, wrists, thighs, ankles, feet, pitted deeply on pressure, the scrotum was infiltrated with fluid, and the abdomen afforded some obscure evidence of fluid within it. The breathing was short and hurried, with frequent paroxysms of dyspnœa, and harassing cough with little or no expectoration. The resonance of the chest was defective, and moist mucous murmurs, with wheezing and cooing, were heard in all parts of the chest. The pulse was 90, full and hard. The tongue was furred, the bowels constipated, febrile thirst, and general restlessness. The urine was of a blood-red colour, of a specific gravity of 1·021, and highly albuminous. Examined the day after admission under the microscope, it afforded the appearance represented in Pl. II, fig. 6. Fibrinous casts containing blood-discs and epithelial cells, a few of the latter appearing fatty and abortive; prognosis unfavorable. His history was that of a young man of intemperate habits, freely exposed to all weathers. He stated that he had never been ill till within the last seven days, when he went home one night from work, having felt chilly and weak all day. He suffered at this time from dull, aching pain across his back; he noticed that his legs, feet, and ankles swelled at night. He frequently made water, and it seemed to him that he passed blood. On the following morning he felt his face swollen and puffy, and was unable to go to his work. Ten ounces of blood were taken from the arm, with immediate relief to his breathing. The clot was moderately firm and slightly buffed on the surface; the specific gravity of the serum was only 1·019. The bowels were freely

acted on by cream of tartar purgative, and the diaphoretic mixture gave relief to the febrile restlessness and thirst. He was relieved also by warm baths. The hæmaturia continuing, he was cupped two days after from the loins. On the sixth day from admission, the urine to the unaided eye appeared free from blood, was scanty, however, in quantity, and threw down a copious deposit of lithates. The deposit seven days after admission is represented at fig. 7; the fibrinous casts now contained epithelial cells, as well as a few scattered blood-discs. The most characteristic object, however, was the granular casts of the tubes, containing epithelium in great abundance. Here and there were a few detached epithelial cells, but the greater mass of them was enclosed or entangled within the casts. A few gave signs of fatty degeneration; in the form of fatty molecules, either on or within their walls. Twelve days from admission the dropsical condition remained unsubdued, although relief had been afforded to the breathing; indeed, the anasarca seemed to increase. He now took Elaterium, in half-grain doses, every alternate day. The purgative produced most salutary hydrogogue effects. The pills acted vigorously and copiously, and he bore the purging well. After the third pill a marked diminution of the dropsy became apparent. The fluid disappeared from the scrotum, the œdema of the face notably diminished, the breathing was free and easy, the stomach was able to appropriate light nutrients. The urine was very scanty, and contained a great deal of epithelium in granular casts (fig. 8), with much free fat- and some compound fat-cells. The amendment which followed the action of the Elaterium was of short duration: before the end of the week, the third since admission, the anasarcous state of the surface again increased. He took Digitalis and Squill, with the effect of increasing the quantity of urine, but not of abating the dropsy. The urine became more abundant however, lighter coloured, and of low specific gravity—1·009. The deposit in the urine exemplified the progress of the disorder in the direction of granular degeneration. The casts became more and more fatty and granular, numerous compound fat-cells made

their appearance, and these changes told unequivocally how rapid was the progress of the renal disorder. The irritability of the stomach returned, the respiration became more disturbed from the increasing œdema of the pulmonary tissue. Symptoms of exhaustion came on, the breathing became more and more laboured and gasping, and he died on the 21st of April, thirty-four days from admission, and about forty-one from the earliest appearance of the hæmaturia.

Post-mortem examination.—Every tissue of the body seemed infiltrated with water. When a section was made through the abdominal walls, the dropsical state of the areolar tissue presented a singular appearance, from the contrast between the cells filled with serum and a few scattered ones still containing fat. The cut surface presented an almost gelatinous look, and was very like blubber, striped with muscular layers. Both the pulmonary and abdominal cavities contained some fluid. There were slight pleural adhesions. Both lungs were gorged with fluid, pitted on pressure, and presented the usual appearance of œdema pulmonum. A great quantity of a thin, frothy serosity escaped from them on a section of the parenchyma. The bronchial mucous membrane throughout was injected of a madder-red—it was tumid and soft. The heart was large and flabby, weighed twenty-two ounces. On the surface of the right ventricle was a patch of opalescent opacity, about an inch square—(macula albida). The valvular structure of the heart was complete, the cavities were not disproportioned to the size and weight of the organ. Both kidneys were very large, lobulated, and of a pale colour; when the capsule was removed a few arborescent vessels were seen on the surface, which was very finely granular. The left kidney weighed ten ounces; the right, ten ounces and a half. A section showed that the granular deposit had almost obliterated the cones; it compressed the calyces and diminished the capacity of the pelvis very considerably. Microscopically examined, the Malpighian bodies and the convoluted tubes of the cortex were seen filled with granular matter, containing abundance of highly resplendent fatty and oily molecules, which were easily removed by ether, leaving the granular matter

undissolved. The epithelial structures had, wherever visible, undergone marked degeneration. In the tubes, teazed out from the scanty portion of the mammillary cones, some of the epithelial cells presented the usual appearance; but the canal appeared filled with free fat-molecules, compound fat-cells, and granular matter. (Pl. II, fig. 11.)

The microscopic conditions of the urine during the lifetime of this patient, compared one with another, clearly demonstrated the progress and direction which the renal disorder was taking; and I think we obtain proof of the reliance which may be placed on the progressive changes which the urinary deposit undergoes as the disease advances.

The tube-casts at first were fibrinous, containing blood-discs and a few epithelial cells. Even thus early some of the epithelial cells appeared abortive, containing several distinct fatty nuclei. The casts then became more granular, and there was a larger proportion of epithelial structure; free fat-molecules, and one or more compound fat-cells, with abortive epithelial cells, made their appearance. Within a fortnight the casts became more characteristic of the degenerative process, the compound fat-cells (Gluge's) were still more numerous, the casts more fatty, the epithelial cells more abortive, and within a week of the patient's death, further evidence presented itself of this rapid and intractable disorder. I think, therefore, we may accept these successive changes in the appearances of the urinary deposit as specific conditions, and inferentially they may be received as trustworthy exponents of the course of the disease. The increasing number of, or the continuous presence in the urinary sediment of, these compound fat-cells (Gluge's corpuscles), brought away with the granular casts of the tubes, mixed with ordinary or abortive epithelial cells, is a pathological fact —however it be interpreted—associated with an unfavorable progress. Dr. Birkett, in his excellent edition of the late Dr. Golding Bird's work on 'Urinary Deposits,' remarks on the frequency of these inflammatory globules of Gluge in morbus Brightii, and asks whether it be possible that these globules may here be indicative of subacute inflammatory action going

on in the structure of the kidney? Considering that the renal disorder commences with symptoms of inflammatory engorgement, and that these compound granule-cells appear after, or indeed immediately succeed, these symptoms of acute inflammatory action, there might exist fair reasonable grounds for supposing their presence indicative of a subacute inflammatory process. Their presence, moreover, in subacute inflammatory conditions of other mucous surfaces, lends additional force to the conclusion that they are expressive of similar pathological conditions in the kidney. But whether this view be accepted or not, their presence in increasing number is a certain indication of the fatal progress of the renal disease.

If the inflammatory, or at least the hyperæmic stage, be conceded as an essential element of the disease, and if we view the succeeding states as products of that stage, we have yet to trace the disease—that is, the earliest manifestation of renal disturbance—to remoter causes. The renal engorgement is not a primary, but a subsidiary condition; it is not the first in the order of morbid change, although it be the most prominent and the most apparent; it is most certainly secondary to more remote morbific action pervading the system throughout. There must be some obscure condition pre-existent, which determines the incipient renal engorgement, and an altered, defective, or contaminated state of the blood is the source, in all probability, of the morbid phenomena which follow. A careful inquiry into the antecedents of those patients, will exhibit the predisposing causes of their failing health; and these will ever be such as exercise a marked influence over the quality of the blood, rather than having any special reference to the kidneys. Thus the most frequent and patent of these predisposing causes are, habits of intemperance, inducing an alcoholized state of the blood, leading to hydrœmia; the various febrile poisons, particularly the scarlatinal, which is, perhaps, the most constant if not the most powerful of any; the scrofulous habit of body; the tuberculous constitution. If improper, deficient, or unwholesome food, or the deleterious influences of cold and wet, co-operate with these predisposing states, we have agents

powerful and effective to vitiate the purity of the blood; for they are severally capable of bringing about such molecular changes in its composition, that the equilibrium of healthy function is destroyed, and local congestions, or states of hyperæmia and stasis, are the consequence. Imperfect nutrition, impeded function, degeneration of structure, follow; secreting cells become abortive and fatty, or disintegrated; their place is supplied by a granular and albuminous deposit, the increasing amount of which impedes more and more the passage of blood through the kidney, till it reaches the point at which barely a vestige of secreting structure is left, and the blood becoming more and more watery, the patient succumbs, either with symptoms of œdema pulmonum, or from uræmic poisoning.

PLATE II.

HADWAY.

Fig. 1, *a*.—Fibrinous cast containing blood-discs, and stained with hæmatin.

b.—A cast containing only epithelial cells.

c.—A granular cast, containing epithelial cells, blood-corpuscles, and compound granule-cells.

„ 2.—Granular casts containing renal epithelium, and compound cells.

b.—Granular casts containing free nuclei, presenting the appearance of highly resplendent molecules. Compound cells (glomeruli).

c.—Here and there were aggregations of fat molecules deprived of their cell wall, as of a broken-up glomerulus.

„ 3.—Microscopic appearance of the fluid pressed out from one of the cones.

a.—An epithelial cast.

b.—Some epithelium from the straight tubes.

c.—Some compound cells; broken-up glomerulus; many free nuclei and granular matter diffused through the field.

„ 4.—From the cortical part of the kidney. It represents a Malpighian body and tubes filled with a dark granular deposit or exudation. A convoluted tube appears, not deprived of its epithelium; but its interior filled with a similar dark granular exudation—compound cells, free nuclei, and disintegrated cells.

„ 5.—Tubes teazed out from the base of one of the cones. One part of the canal seems choked with granular exudation and detached epithelial cells. The basement membrane at one part seems entirely deprived of epithelial lining.

PLATE II.

OSBORN.

Fig. 6, *a*.—Fibrinous blood-cast.

b.—Granular casts containing blood-discs and epithelial cells already becoming abortive. Many free nuclei.

„ 7.—Granular casts containing epithelial cells, compound granule-cells, clusters of nuclei, and scattered blood-discs.

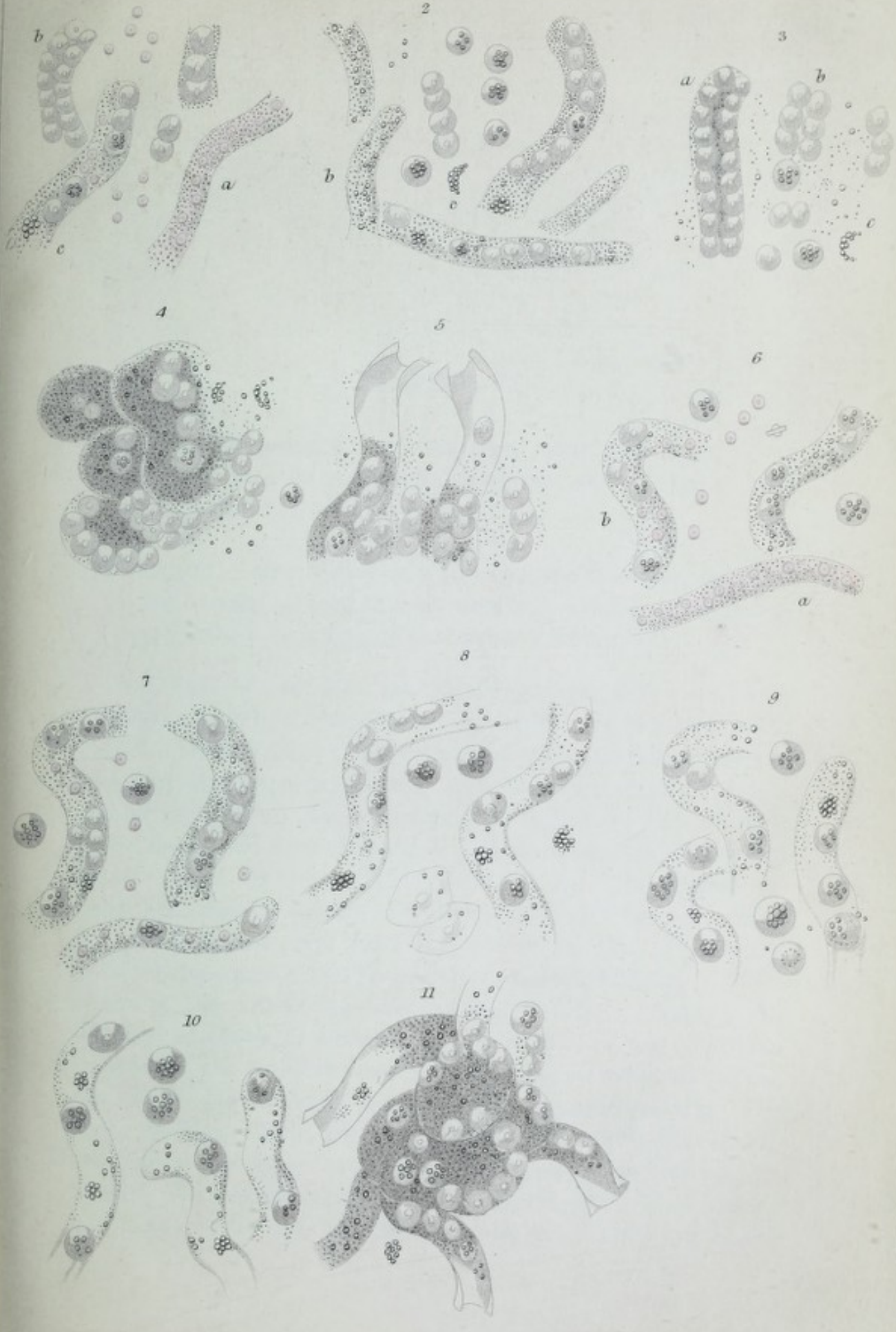
„ 8.—The casts becoming less granular, the epithelial cells more abortive and fatty, many free nuclei, and grape-like clusters, as if deprived of the cell-wall.

„ 9.—Casts becoming more hyaline, the epithelial cells more abortive; many compound granule-cells and free and clustered nuclei.

„ 10.—The casts quite or nearly transparent, studded with compound granule-cells, free and clustered nuclei, evidence of the extent of the disintegration of cell-structure.

„ 11.—A portion of the cortical part of the kidney, teazed out with needles. The Malpighian bodies and convoluted tubes, appear filled with a granular exudation, with which is mixed abortive cells, free nuclei, compound granule-cells, and clusters of fat-granules. The epithelial cells seem to have been broken up or destroyed, and the tube filled with their debris. Here and there normal epithelium is still adherent to the basement membrane.

Fig 1.



CHAPTER VI.

CONNECTION OF MORBUS BRIGHTII WITH GRANULAR AND FATTY DEGENERATION OF THE ARTERIES OF THE BRAIN, AND OF THE HEART-FIBRE.

Albuminuria,—general dropsy,—granular and hyaline casts in the urine:—relief:—relapse in six months:—progress of degeneration:—death by apoplexy and cerebral hæmorrhage.

Case VIII.—John L—, æt. 50, a bricklayer, first came under my observation in the month of July, 1856. He had been out of work for many weeks in consequence of gradually failing health; and want and exposure seem to have been immediately instrumental in reducing him to his present condition. About eight days since he first began to swell in the ankles and feet; his breath became short, his face puffed in the morning. He noticed his water had become scanty and dark coloured. On admission, the anasarca extended from the ankles to the thighs, and involved the scrotum and prepuce in dropsical infiltration. The aspect of the patient was characteristic of renal dropsy; the skin had an alabaster whiteness. The surface of the chest was anasarcous, the breath sounds were obscure, no moist murmurs: the cough was frequent, but there was no expectoration. The pulse was eighty-four, and the sounds of the heart were natural. The urine was clear, moderately albuminous, and of sp. gr. 1·018. The deposit is represented at Pl. III, fig. 1. His history was obscure; he had been intemperate, but his general health

appears not to have suffered at any time till within the last six months, when he gradually failed in vigour and strength, and was not equal to work. There was no evidence of hæmaturia at the commencement of the present attack. He was very ill about three months since. He was well purged with the cream of tartar and jalap, and three days after admission there was considerable subsidence of the dropsical effusion. He took digitalis with the tartrate and bicarbonate of potash with great advantage; for ten days after admission the swelling is described as having entirely disappeared from every part but the ankles. His breathing was natural, but he complained much of lumbar pain, and of nausea. A few days later the scrotum and thighs again exhibited dropsical conditions. The urine presented the same appearances—granular casts containing renal cells in a state of advanced fatty degeneration; nevertheless, by the beginning of August, he could walk for an hour or two without any swelling of the ankles. He was placed now on the citrate of iron and ammonia. His condition rapidly improved—he gained strength; the urine, however, still contained albumen, but in very small quantity. After being six weeks under treatment, and feeling in better health than for months past, the anasarca having entirely subsided, he requested to be dismissed. He was told if at any time his symptoms returned, or he became again out of health, that he could be readmitted.

I felt sure, from the microscopic condition of the urine remaining unchanged notwithstanding the disappearance of the dropsy, and the general amendment of his health, that he had obtained but temporary relief. But he continued able to do light work from September, the period of his discharge, to the month of February, 1857, when he was again admitted, suffering from an aggravation of the symptoms of the previous July. There was now considerable febrile disturbance. The tongue was thickly coated. The face was œdematous, and the eyelids swollen with serous infiltration. The respirations were humid, and there was cough with expectoration of a thin mucoid fluid. The pulse was 100. There was much thirst, and loss of appetite, the temperature of the surface of the body was not elevated.

There was extensive anasarca of the lower extremities, extending to the abdomen, but there was no evidence of ascites. The patient stated that he had been free from dropsy from the time he left in September till within the last two days; but that he constantly suffered from giddiness in his head and pain in the occipital region of the scalp. He was also troubled with frequent nausea and even with vomiting. He had not noticed any blood in his urine, but it had lately become very scanty and high coloured, and he was troubled with a frequent desire to pass it. The state of the chest implied an œdematous state of the lungs: the heart's sounds were feeble but natural. The urine was of a sp. gr. 1·020, high coloured, and deposited a coarse flaky albumen by heat and nitric acid. The febrile condition was allayed by ammoniacal salines,—the Mistura Ammoniæ Acetatis with Sp. Ætheris Nitrici; and he was well purged at first with the compound jalap powder, and subsequently with the compound camboge pill. In a few days the febrile symptoms subsided, the pulse became natural, the tongue clean, the thirst disappeared, and the dropsical state of the surface materially abated. He suffered, however, from such constant vertigo and pains in the head, accompanied by nausea and vomiting, that apprehensions were entertained that symptoms of uræmic poisoning would develope themselves. The urinary casts, however, did not differ in character from those first represented. The urine continued moderately albuminous. I was convinced from the appearance of the deposit that degeneration was progressing in the kidneys, and probably in other structures of the body. He took the tincture of the sesquichloride of iron in fifteen-minim doses with apparent advantage.

Between the 6th of March and the 25th, he ceased to make satisfactory progress. The œdema returned for a day or two, there was some febrile disturbance with thirst; these symptoms abated—again returned. On the 25th, no report having been made for six days, the ward-book states, that since the last report the condition of the patient has apparently improved. The anasarca had not returned for six days; the urine was still albuminous, and the deposit as before. He thought himself so

much better that he wished to go out on the following Tuesday. At nine o'clock on the evening of the 26th, Mr. Perreau, my clinical assistant, who carefully watched the case throughout, was sent for and found him in a fit of apoplexy. The predominating symptoms were, pallor of the face; a flickering, scarcely perceptible pulse; stertorous breathing; pupils very much contracted, the right leg and arm being paralysed; there were no convulsive movements; deep coma with stertor prevailed; and he died four hours after the seizure.

A post-mortem examination was made sixteen hours after death. The surface of the body was slightly anasarcous. An effusion of loosely coagulated blood was found in the substance of the pons varolii, from whence it passed behind the medulla oblongata. Blood was also extravasated into the fourth ventricle. The arteries of the base of the brain were opaque and rigid, the larger ones even quill-like; some small branches contiguous to the seat of the hæmorrhage were teazed out with needles, and the microscopic appearance is represented Pl. III, fig. 6. The lungs were of ordinary appearance, the bronchial mucous surface being pale, a few old pleuritic adhesions existed on the left side. The heart was natural in size, the valves healthy, its muscular structure appeared paler than in a well-nourished heart. The pericardial surface was marked with a few opalescent patches (maculæ albidæ). The kidneys were of increased size, lobulated, weighed severally eight and a half and nine ounces; in colour they were of a pale flesh tint: when the capsule was removed, the entire outer surface was seen covered with minute stellar spots, arising from an arboresent or star-like disposition of the blood-vessels on a surface finely granular. A section displayed the cortical part of a pale tint, contrasting forcibly with the striated deeper coloured pyramids. The pale cortical portion surrounded them and seemed in progress of supplanting them, as the base of the pyramids was ravelled out in a fan-like expansion, the white granular deposit appearing to invade the straight tubular structure of the cones.

The microscopic deposits in the urine in this case are full of practical and useful instruction. From the first day the

patient came under observation they told of a degeneration which would ultimately pervade the entire organ, and perhaps invade other tissues of the body. The earliest period of the failing health of this man did not come under my observation; he had been out of health for six months previously, and had some attack the exact nature of which could not be made out, thee months before his admission into the Hospital. It must be evident from the character of the urinary deposit when first examined in July, that renal disease had been making progress for some time. The finely granular tubes with free nuclei, the abortive and fatty epithelium, were too expressive of renal disorganization to leave any doubt that the disease could be of any very recent date. An unfavorable estimate was at once formed of the ultimate recovery of this patient; but the sequel shows how much may be effected by treatment. The remedies exercised a most beneficial influence, first, in removing the dropsy, and, secondly, in so ministering to the improvement of the general health of the patient, that some months were passed in comparative freedom from inconvenience or distress; and it may be presumed the progress of the disease was during this interval retarded. For five months he stated that he had been free for dropsy. The disease, however, returned in February. It must be assumed that the urine continued throughout albuminous, more or less. The urinary sediment in February did not differ in character from that previously passed, except that the casts were less granular and more fatty (fig. 4), unequivocal evidence of the advance of the disease. Nevertheless remedies again temporarily removed the dropsy, and with it the more distressing symptoms of the patient. He appeared to be progressing favorably, excluding the deposit in the urine, and the inference to be drawn therefrom—a recovery seemed probable. He was seized with apoplectic symptoms, and he died of cerebral hæmorrhage. The termination of this case illustrates, that fatty degeneration of the kidney is not a partial or local disorder, its presence in these organs implies a greater or less disposition to decay in every part of the organism.

Post-mortem observation teaches that the heart fibre and the arterial textures ultimately participated in this fatty decay. It is in these tissues that its effects are most sudden, serious, and fatal. We have not evidence to show that these textures are more predisposed to fatty degeneration than others, only that altered states of nutrition in these tissues more immediately lead to fatal results. The muscular fibre of the left ventricle of the heart exhibited traces of fatty degeneration. (Pl. III, fig. 5.) Fig. 6 represents the fatty condition of some of the small blood-vessels in the immediate neighbourhood of the cerebral hæmorrhage. The elastic coat of the artery is lost by this fatty deposit, it becomes easily ruptured and torn, and destructive hæmorrhage follows.

The examination of the kidneys showed the extent of fatty and granular deposit which had taken place in the cortical structure of those organs. This had certainly not reached its maximum. It was rapidly invading the pyramids; but these stood out in colour and appearance, a marked contrast to the pale and fatty cortical part. The process of degeneration is always from the cortex inwards. The pyramids or cones are the last to become invaded by the morbid deposit. The epithelium of the straight tubes appears to be little liable to fatty change; the spheroidal glandular epithelium of the convoluted tubes especially so.

Pl. III, fig. 7, shows the epithelium of the calyces and pelvis unchanged. Figs. 8 and 10 exhibit the epithelium of the straight tubes of the cones nearly natural, while the canal of the tube appears choked with granular and fatty deposit, which could be readily squeezed out of the apex of the cone by pressure.

The fatty and granular state of the cortex is represented in fig. 9. The appearances here represented justify the conclusion, that the epithelial cells become detached from the basement membrane, and are impacted in the granular deposit. The tubes are blocked up by the increasing deposit, and while an albuminous fluid may filter through, but little of the exudative matter appears in the urine. This I think explains why, in

these chronic cases of fatty degeneration, so little epithelium appears in the urine, and to this extent has led Dr. George Johnson to consider them as possessing the character of non-desquamative disease.

The facility with which the epithelium becomes detached when the tubes are teazed out, and the outlet made free, is illustrated in fig. 12. The epithelial cells appear agglutinated together, and impacted in fine granular deposit.

PLATE III.

Fig. 1, July, 1856.—Cast slightly granular, containing nuclear granules, and two fatty abortive epithelial cells, a few larger epithelial cells natural, and some vesical epithelium.

„ 2, Feb., 1857.—Slightly granular casts, containing free nuclei, compound granule-cells, and abortive epithelium, some crescentic clusters of nuclei.

„ 3, March.—Casts becoming less granular, many free nuclei, and compound granule-cells.

„ 4.—The deposit here exhibits the same character as is represented in figs. 1, 2, and 3. The casts are still more transparent, the free nuclei more numerous.

„ 5.—Heart-fibre from left ventricle—some fibres in a state of fatty degeneration, others presenting the ordinary striæ.

„ 6.—A blood-vessel teazed out with needles under water from the neighbourhood of the hæmorrhage in the pons varolii. The coats are studded with fat-granules, which remained unchanged in dilute hydrochloric acid, but were dissolved in ether.

„ 7.—Epithelial cells from the calyces and pelvis of the kidney—natural.

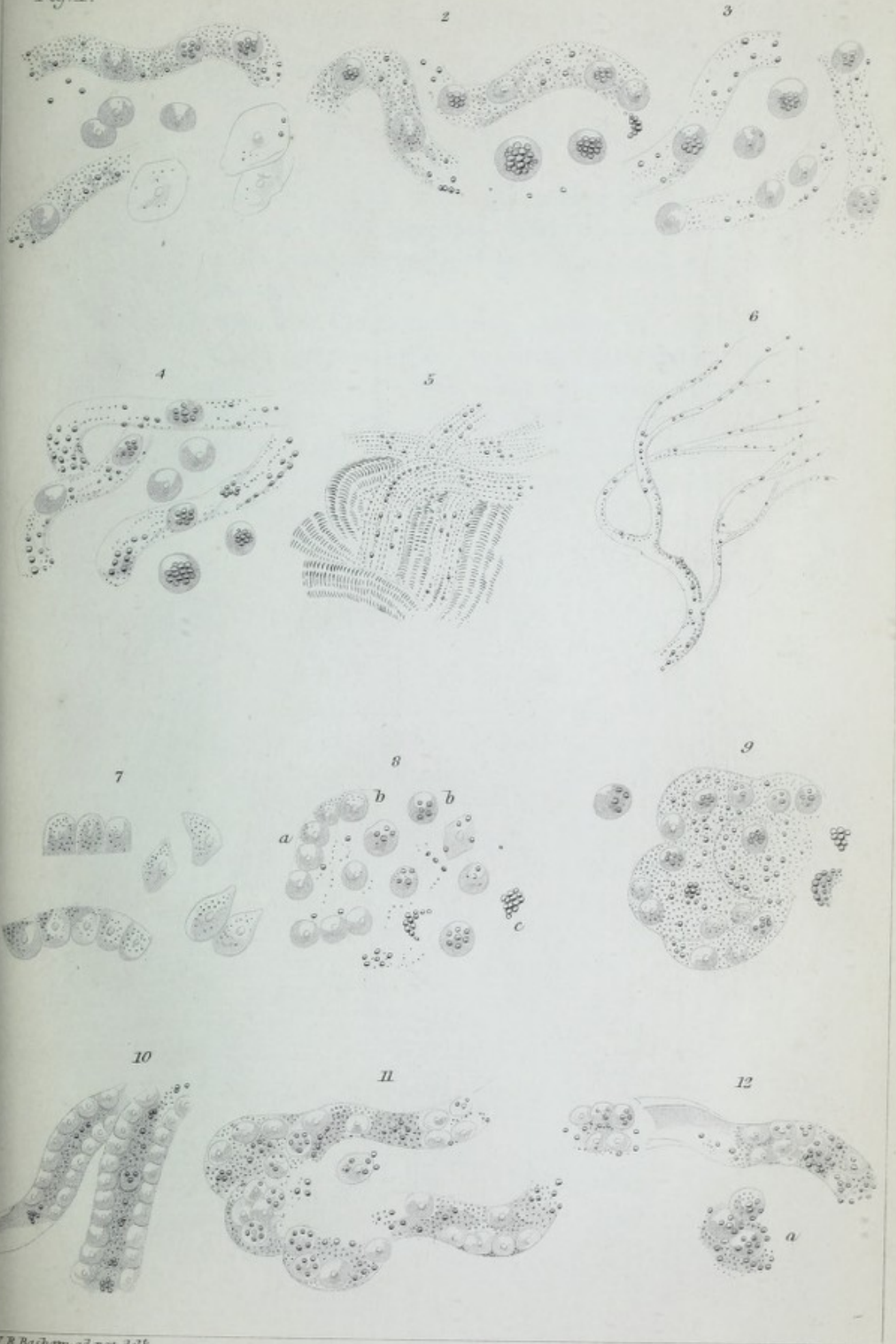
„ 8.—Epithelial cells from the fluid squeezed out from the apex of a cone.

a.—Epithelium from a straight tube.

b.—Epithelial cells, fatty and abortive.

c.—Grape-like and crescentic clusters of nuclei from broken up cells.

„ 9.—A portion of the cortical layer teazed out with needles. The convoluted tubes are filled with fine granular deposit, mixed with many free fat-cells. The epithelial cells appear highly granular, and many are detached, or set free from the basement membrane.



W. R. Basham ad. nat. del.

W. Greatbach sculp.

Fig. 10.—Straight tubes from the apex of a cone. The epithelial structure is natural, but the interior of the tube appears blocked up with granular deposit, free nuclei and granule-cells.

„ 11.—Convoluted tubes from the cortex of the kidney. Portions of the basement membrane are denuded of epithelium, and replaced by fine granular and fatty deposit.

„ 12.—A tube from the cortical part, showing the manner in which the cells appear to become detached as soon as the canal is set free. The cells appear abortive or atrophic, and are surrounded by a granular material, loaded with free nuclei and fat-granules.

a.—Some large granule-cells impacted in this granular exudation.

HYALINE CASTS, AND DEGENERATION OF CELL-STRUCTURE IN RELATION TO CHRONIC MORBUS BRIGHTII.

Albuminuria—headache and rheumatic pains—œdema of the feet and ankles, and subsequently general dropsy—transparent casts in the urine, symptomatic of advancing renal degeneration.

Case IX.—Thomas M—, æt. 40, a carman, admitted Jan. 23, 1855. This patient, on admission, presented the symptoms of syphilitic rheumatism, superadded to those of febrile disturbance and anasarca. He complained of severe gnawing pain in the head—referred to the parietal and frontal bones. There was some tenderness of the scalp, but neither nodal eminences nor thickening could be detected. There was pain also seated in the ulnar ridge of the forearm, as well as in the shin bones, aggravated at night. The periosteal surfaces of the tibiæ were sensitive to the touch, but were free from nodes.

The skin was hot, the tongue foul, and there was thirst and anorexia. He had a troublesome cough, with a profuse catarrhal expectoration.

The chest expanded well, and the resonance was not altered, but wheezing and moist mucous murmurs were heard in all the large bronchial tubes. The heart's sounds were natural. There was œdema of the feet and ankles, but no evidence of dropsy elsewhere. He stated that he had suffered for several winters from cough, expectoration, and occasional shortness of breath. His feet and ankles swelled about a month since. He has been troubled with a frequent desire to make water, particularly at night. He had never paid any attention to the appearance of his water, and did not know if it had ever been blood-coloured. He recollected that when his feet swelled he made very little water at a time. He had some medicine from the dispensary at that time, which purged him, and he got better. He suffered from syphilis severely a few years since. He was ordered purgatives,

with diaphoretic salines and warm baths. The urine was examined the day after admission. It was of a specific gravity 1·018. It contained a deposit of lithates, and was moderately albuminous; it was scanty in quantity, and contained many casts, some slightly granular, containing epithelium, some transparent, with a few scattered and isolated fat-granules. All the epithelial cells presented the appearance of a degenerative process, scarcely one that did not contain one or more fat-corpuscles in its interior. A few compound fat-cells were visible. (Gluge's compound inflammation corpuscles.) (Pl. IV, fig. 1.)

The febrile symptoms having abated, on the fourth day from admission, the chief symptoms were the rheumatic pains of the scalp, forearms, and shin bones; to these must be added increasing œdema of the lower extremities, extending up to the thighs, the scrotum was infiltrated also with dropsical fluid; there was increasing difficulty of breathing. The urine was scanty and more albuminous than on admission, and his condition presented all the most unfavorable indications of advancing disease of the kidneys. Spurious rheumatic indications are so common in the progress of Bright's disease, that had it not been for an unequivocal syphilitic history, and the location of the pains in the periosteal surfaces most usually affected in the secondary forms, we might have considered the rheumatic pains as subordinate to the renal disorder.

For a few days he was placed on sarsaparilla and the iodide of potassium, but the dropsical effusion continuing to increase, the face being slightly œdematous in the morning, and the swelling of the legs and scrotum not diminishing, these remedies were discontinued, and he was purged briskly with the cream of tartar and jalap, and ordered hot baths and antimonials. This treatment continued for four days, and having been well purged, the œdema disappeared from the scrotum, the ankles remaining slightly affected. Progressively with the diminution of the dropsical state of the lower extremities, the urine became more abundant, of lighter colour, lower specific gravity, 1·012, still albuminous, and contained the same form of casts which were observed soon after admission; these are

represented in Pl. IV, fig. 2, and indicate, or rather confirm, the opinion first formed, that degeneration of the kidneys was slowly advancing. The state of the breathing was much improved, the cough not troublesome, and the sounds heard were limited to some moist mucous murmurs in the large tubes. The rheumatic pains had diminished, apparently through the agency of the warm baths and antimonials. He now took the tincture of the sesquichloride of iron, in ten-minim doses; occasional purgatives were administered. By the latter end of the month of February, the dropsy had disappeared from the thighs, scrotum, and indeed from the feet and ankles, except towards night, when a slight puffiness of the instep was present. The breathing was quite free, and there was neither cough nor expectoration. He was discharged on March 2d.

At the time of this patient's discharge, he was cautioned about the probability of the dropsy returning, and I remarked at the time that I thought it would not be long before he would again require medical treatment. For, notwithstanding the subsidence of the dropsy, and the abatement of the rheumatic pains, and the absence of bronchial symptoms, the peculiar character of the deposits in the urine indicated to me unequivocally the progressive advance of renal degeneration. The continued presence of albumen in the urine, although in much diminished quantity, would certainly imply the existence of renal disease; but its gradual diminution, almost progressively with the subsidence of the dropsy, would be accepted as a fair and reasonable index of the probable recession of the disease. We have in this case, and at this stage of the disorder, abundant evidence, I think, to prove that any inference derived from calculations based on the amount of albumen daily excreted would be fallacious. The pale, watery urine, of a low specific gravity, is doubtless at all times an unfavorable symptom, but the disappearance of all the graver symptoms—the subsidence of the dropsy, the relief to the embarrassed breathing—would be accepted by most practitioners as favorable signs of improvement; and the state of the renal disease would be assumed to be either retrograding or stationary. But the character of the

material passing off from the kidneys forbade any such conclusions; and the only satisfactory inference derived from the present condition of the patient was, that by proper management most of the graver symptoms of renal degeneration might be mitigated for a time, and though the degradation of the renal tissue could not be at this stage arrested, the complications which aggravated the sufferings of the patient might be relieved, and life perhaps prolonged.

The predictions which the microscope suggested, and which the microscopic revelations would alone justify, were in three weeks' time verified. On the 26th of March he was readmitted. He had returned to his employment as a carman. He stated that he continued to feel pretty well and able to go through a day's work, but that at night his feet and ankles swelled. He could not say that he had recently been exposed to cold or wet; but three days since he felt his breath again becoming short, and he suffered from troublesome cough. The swelling of his legs extended upwards, and on admission involved the scrotum, and even the loose areolar tissue of the prepuce. The aspect of the patient presented that doughy, pasty look oftentimes seen in this disease. The dropsy extended into the abdominal cavity, and there was distinct evidence of fluctuation in the abdomen. The urine had become high coloured and scanty —specific gravity 1·018, and it almost solidified by heat. The microscopic characters of the deposit are represented in Pl. IV, fig. 3. The respirations were frequent, the breathing short, and difficult; frequent cough; moist mucous murmurs were heard all over the chest; pulse 90, full; no heat of skin or indication of febrile disturbance. He was ordered hot baths and the compound jalap powder, in drachm doses; but these, though they purged him freely, failed to lessen the dropsical effusion. The hot-air bath gave great relief to the thoracic symptoms, aided by some antimonials and purgatives; for these bronchial conditions chiefly depend on dropsical effusion into the pulmonary parenchyma. As the anasarca continued to increase, half-grain doses of elaterium were given, and with cream of tartar succeeded, after taking three pills, in rapidly lessening the amount

of effused fluid. The dropsy of the scrotum and prepuce subsided, the fluid in the abdominal cavity disappeared, and the œdema was limited once more to the feet and ankles. The breath-sounds became less embarrassed as the dropsy abated, and great relief was experienced by the patient of the more aggravated symptoms present on admission. The urine also increased in quantity—the proportion of albumen was again on the decrease; heat producing a milky coagulation, which when set at rest did not occupy more than one fourth of the tube: fortnight previously it all but solidified by heat. The microscopic appearances have, however, in no respect altered; indeed the fat-cells increased in abundance, and the fatty degeneration of the epithelial cells was evidently on the increase.

On the 10th of April he was well enough to be up and about the ward. On the 14th, he left the hospital of his own accord, in consequence of some irregularities. I regretted very much to have lost sight of this case at this period of the disease. A month afterwards I learnt that he became rapidly worse on leaving the hospital. From a very imperfect description given me, I could only learn that the dropsy quickly returned, that he suffered much in his breath, and died at his lodgings, in Westminster. The kidneys were the only organs for which permission was given to be examined. They appeared somewhat increased in size, but I had no means of weighing them. The capsule was easily removed, and displayed the cortex coarsely granular—almost roe-like, mottled in colour—and a section showed some deep-coloured vascular marking perpendicular to the surface. The pyramids were striated also with vascular injection. The microscopic appearance of the roe-like granulations of the cortical part is represented at fig. 4. The Malpighian bodies are seen filled and distended with a fatty molecular exudation—the convoluted tubes much less so. The epithelial cells appear detached in parts. The straight tubes of the pyramids presented nothing remarkable. Although the microscopic character of the urinary sediment during life was not more significant of the coarsely granular than of the finely granular kidney, it never-

theless revealed the advanced stage at which the disease had arrived, and led to an unfavorable prognosis, even when the condition of the patient was otherwise promising.

This form of renal degeneration, moreover, does not advance uninterruptedly. The exudative process in chronic cases is apparently subject to intermissions, and at these intervals not only is there a subsidence of the dropsical symptoms, but the casts often disappear from the urine, although this excretion continues albuminous: moreover, the disease does not always progress with equal rapidity in both kidneys. One kidney is often seen in a more advanced state of degeneration than the other, and on this supposition we must rest the explanation of the reappearance of casts containing perhaps a few healthy epithelial cells, after an interval in which no casts could be found, and the dropsical symptoms had abated. The two intervals of such marked improvements could scarcely be anticipated from the appearance of the highly degenerated epithelium, and the hyaline tubes filled with free and aggregated fat-cells. But in each of the examinations of the urine at these periods was seen granular casts containing epithelial cells free from fat, and exhibiting the characters of those thrown off in the earlier stage of the most favorable cases. I think these appearances afford evidence of portions of the renal structure being behind other parts in progressive decay. Probably through the instrumentality either of one kidney not so far advanced in disease as the other, or through the agency of those portions of the kidney not yet arrived at the last stage of functional incompatibility, these favorable though short and temporary periods of improvement were obtained. I think, moreover, and experience justifies the observation, that while among the poor, and those exposed to the hardships of exposure, and perhaps want, this form of disease progresses, in the majority of cases, with an unchecked rapidity, yet that in classes of life better cared for and less exposed, remedial measures can do much to retard the onward course of the disease; but their efficiency depends on the period of the disorder in which they are administered; for when once

the renal degeneration has reached a certain stage, its arrest is hopeless.

Pain simulating the character of chronic rheumatism is so frequent a symptom in morbus Brightii, that it may be questioned whether the pain suffered in the earlier period by this patient was not rather of this character than of syphilitic origin.

CHAPTER VII.

MORBUS BRIGHTII, IN CONNEXION WITH DISEASE OF THE LUNGS AND HEART.

General anasarca—hæmaturia—albuminous urine—disease of the mitral valve—pulmonary complications—acute and capillary bronchitis—pneumonia—pulmonary apoplexy—death. Kidneys in the early stage of inflammatory engorgement.

It is not often that morbus Brightii proves fatal in the earliest stage; and when it is so, we must seek the cause of death rather in the inflammatory complications affecting other organs, than as exclusively depending on the renal disease. Such cases are, however, highly instructive, and supply a valuable link to the chain of pathological facts, illustrating the inflammatory origin of this disease.

Case X.—Sarah Fenton, æt. 18, was admitted on March 30th, 1849, suffering from great distress in her breathing, cough, and general anasarca. She caught cold about ten days since. She had some rigors. Her face began to swell. She made but little water, and that very frequently. "It was as dark as blood." Her face was œdematous, turgid, and inclined to lividity. There was anasarca of the lower extremities, extending above the knees. The backs of the hands were slightly swollen. The respirations were frequent and short, 36. The pulse rapid and sharp, 140. The chest was imperfectly resonant—sonorous and cooing sounds were heard in every region; and moist mucous

crepitation all over the chest. The præcordial dulness was not more extended than natural. The systolic murmur was rough, particularly under the left mamma; from the frequency of the heart's action, the diastolic sound could not be measured or distinguished. The abdomen was somewhat swollen, and gave obscure signs of fluctuation. The cough was frequent and harassing, and the expectoration was white and frothy. The temperature of the breath was lower than natural. The urine was loaded with lithates—dark coloured—deep as brown sherry. It was highly albuminous, and contained blood-casts and free blood-corpuscles. As the bowels had not been relieved for some days, an enema was administered, and she took the compound jalap powder. A small quantity of blood was taken from the arm; and she was ordered a diaphoretic mixture, with excess of antimony. The bleeding relieved the chest so much, that she slept quietly for some hours. The next day the respiration was much less embarrassed. The face was less livid and œdematous. The cough was less harassing, and the expectoration was freer, and consisted of a clear, tenacious, viscid fluid, slightly streaked with blood. The temperature of the breath was higher. The fine moist crepitation in each region had somewhat subsided, and a coarser sound was heard. At the posterior part of the right lung there was a spot of deficient resonance, where some inspiratory crepitation was heard. The pulse was very irritable, jerking, and undulating, or unsteady, 140. Respirations, 30. Later in the day the symptoms became more aggravated. The respirations increased to 38, and at the base of the right lung the area of dulness had increased, and the inspiratory crepitation was well marked. Moist mucous murmurs were heard in all the other regions. The face had become again dusky, and the expression was anxious. Urine as yesterday.

The next day the anasarca of the surface had increased; the face was more swollen. The pulse had fallen in power, but increased in frequency to 146; the respirations, 36. The state of the chest as before. Ammonia in a state of effervescence was ordered, and the chest enveloped in hot flannels. On the 3d

of April the dropsy was still on the increase. In the posterior part of the chest the sounds were deficient; but coarse moist sounds were heard anteriorly. The lividity of the face returned; she gradually became comatose, and died on the 4th of April.

A post-mortem examination was made twenty-four hours after death.

There was no cadaveric rigidity. There was anasarca of the whole surface of the body, the areolar tissue being everywhere infiltrated with serum. The abdominal cavity contained a considerable quantity of bright yellow serum. The lungs did not collapse on opening the chest. There were no pleural adhesions. The left lung was gorged with blood; it was spongy throughout, and, on a section, a frothy, blood-stained serosity oozed out in abundance. The upper third of the right lung was of a dense solid consistence, and when a section was made, there appeared, of the size of a hen's egg, a circumscribed, well-defined sanguineous deposit, presenting the usual character of pulmonary apoplexy. In the posterior part of the middle lobe the pulmonary tissue was consolidated into a red hepatised mass—first stage of pneumonia. The bronchial mucous membrane, throughout both lungs, to the minutest tubes which the eye could recognise, was of a madder red colour, and smeared everywhere with a tenacious glue-like excretion.

The heart was enlarged, flabby, and the surface somewhat fatty; exocardium opalescent. Muscular structure pale; the cavities were filled with fluid blood. No coagula. The aortic valves were free and transparent. The margins slightly thickened and the corpora aurantii exaggerated in size.

The mitral valve was thick, rigid, and unyielding. Much fibrinous deposit, as of a succession of layers, rendered its margin stiff and patent; so that during life it must have permanently presented an open ring. The valves of the right cavities were natural. The auricle and ventricle were much distended with fluid black blood. The kidneys were somewhat irregular in shape, having an angular appearance. They

weighed more than natural—five ounces and five and three-quarters respectively. The capsule was not adherent, but easily detached, and being removed, exhibited the kidneys of a colour approaching purple madder—perhaps something redder. The surface was decidedly not granular; but was studded over with innumerable red points or dots, which seemed slightly elevated. The internal structure presented the same deep hyperæmic colour; the cones or pyramidal bodies being marked out strongly by deeper and more purple striæ, in lines corresponding to the direction of the tubes of Bellini. The mucous membrane of the calyces and pelvis had a red colour, and was much marbled with arborescent vascularity. The liver presented well-marked characters of deep portal congestion.

There were many features in this case of great pathological interest. It was much to be regretted that we could get no antecedent history. The poor girl was too ill and too distressed in her breathing to justify us at this period of her suffering in fatiguing her with questions, and she had no one with her able to give any satisfactory account of her previous state of health. The disease of the heart, in all probability, was of some antecedent date, and may, without hesitation, be assumed as the remote cause of the various morbid conditions diagnosed during life, and demonstrated after death. The permanent incompleteness of the mitral valve must have been a constant source of embarrassment to the function of respiration. Whatever embarrasses the freedom of the pulmonary circulation, is an obstacle to the current of blood flowing through the right cavities of the heart. Whenever retardation exists at this point of the vascular apparatus, the most efficient and powerful cause of general dropsy is present. For not only is that state of venosity produced and kept up which is most favorable for the development of dropsy, but the functions of those organs which pour their blood direct into the inferior cava are notably disturbed; and where that function, as in the kidneys, is designed for the escape of excrementitious fluid from the blood, any impediment to the secreting activity of these organs is an addition to the dropsy-producing causes.

So that where disease of the mitral valve is associated with such pulmonary disorders, as acute bronchitis, pneumonia, and ultimately pulmonary apoplexy, morbid conditions are brought into operation which exercise an obstructive influence on the current of blood flowing through the emulgent veins, as effective for the development of renal congestion, as was the ligature on the emulgent veins in producing hæmaturia in those poor victims to physiological science, the rabbits, experimented on by Dr. George Robinson. ('Inquiry into the Pathology of Granular Disease of the Kidney.') But it must be observed, that the passive congestion induced by impediments to the free current of blood through the heart and lungs, is not of itself sufficient to excite morbus Brightii. The kidneys were an interesting example of the earliest stage of inflammatory hyperæmia in morbus Brightii. They were not simply congested—passively—by the impediments in the flow of blood through the great venous trunks. No doubt these circumstances materially aggravated the renal disorder. But the rigors, followed in a few hours by œdema of the face, with scanty, high coloured, and blood-stained urine, marked with unquestionable certainty the epoch of renal hyperæmia, and its origin in exposure to cold and wet, the most common of the exciting causes of acute morbus Brightii. The microscopic appearances observed in the kidneys were very interesting. The minute red specks on the surface, and in the cortical part of the kidneys, were the Malpighian bodies filled with effused blood. (Pl. IV, fig. 5.) The convoluted tubes seemed filled also with coagulated blood, and the straight tubes of the cones presented an appearance of being filled with granular casts, apparently derived from the secreting portion of the organ. The complications observed in this case are exactly those which hypothetically might be assumed as likely to become developed by, and to succeed to, disease of the mitral valve. The rapidity and formidable intensity, however, with which they proved fatal, must be attributed rather to the accidental exposure to cold and wet, and the succeeding symptoms of renal engorgement and dropsy, than directly to the disease of the heart. This doubtless favoured and abetted

the activity of the pulmonary mischief. But it was not the cause. When it is recollected that pulmonary complication is almost inseparable from acute morbus Brightii, and that it is rare to witness this form of disease without bronchitis or pneumonia, or even both, more or less intense, being developed during its progress, we shall have less hesitation in referring these inflammatory complications to the peculiar dyscrasia inseparable from renal disease, rather than to the mechanical influence of an obstruction caused by the imperfection of the mitral valve. Regurgitation of blood from the ventricle into the auricle at each systole, is the immediate result of this imperfection of the valve; the blood becomes embarrassed in its passage from the lungs to the heart; and pulmonary congestion follows. Hæmoptysis and pulmonary apoplexy, which are the usual attendants on pulmonary engorgement from this cause, may, without difficulty, be traced to the obstructed circulation through the lungs. The current is impeded, and it must either overflow its channel, or burst through its walls. But, for the development of bronchitis or pneumonia, no such mechanical explanation will suffice. These diseases can only arise from special qualities which the blood itself has acquired; and the inflammatory process, whether in the pulmonary or other tissues, is explicable only by reference to alterations in the vital properties of this fluid. We witness its free passage through the capillaries arrested; unequal or irregular movements of the corpuscles are seen; they cohere together, or adhere to the wall of the vessel; and this stagnation or interruption leads to transudation of the plastic element of the blood, and consequences follow which a mere mechanical impediment to the freedom of the circulation, operating from a distance, could not possibly bring about.

I conceive, therefore, that an obstruction in the current of the circulation from the lungs through the heart, competent as it may be to overload the lungs with blood and embarrass their function, cannot of itself induce inflammatory action, although doubtless inflammation, once excited, is rendered more active and intense by whatever favours the accumulation of blood in

the affected part. If, therefore, it be conceded, that disease of the mitral valve cannot of itself produce inflammatory diseases of the lungs, still less efficient will it be as a direct agent in causing inflammation of the kidneys. Yet, as in the lungs, if an inflammatory state of the kidneys coexists, an impeded current through the cava and right side of the heart will add to the adverse conditions, and hasten the disease to a fatal termination.

The following case will prove that disease of the mitral valve may exist for a lengthened period, and ultimately prove fatal through pulmonary inflammation, liver disease, and dropsy, without the kidneys being implicated further than by passive congestion.

Case XI.—Henry Piercy, æt. 44, calling himself a porter, but getting a precarious livelihood by carrying messages and sweeping a crossing, well known to the inhabitants of this neighbourhood, was admitted into Burdett Ward, February 20th, 1857. The aspect and general condition of this patient presented many features of interest. He was deeply jaundiced. The conjunctivæ were not only of a golden yellow, but extensive ecchymoses of blood covered the lower half of the eyeballs, and even the inner folds of the eyelids. The whole surface of the body was anasarcous, the lower extremities most so; the wrists and back of the hands were also œdematous; and the abdominal cavity afforded evidence of considerable dropsical effusion. The countenance of the patient was distressingly anxious. The respirations were frequent—short and gasping. The pulse was very small and thready. The mobility of the chest seemed reduced to a minimum: both sides were deficient in clearness of sound anteriorly. Posteriorly and laterally, both sides were dull and dry, fine inspiratory crepitations were equally marked on both sides. The heart's systole conveyed a harsh and grating murmur, but the frequency of its action and its feebleness did not at this period convey any very marked indication of disease. The cough was distressing, from its uninterrupted frequency, and the sputa were gouts of blood,

or mucus so deeply tinged that it could not be distinguished from them. This patient had been under my notice for some years past. He suffered every winter from severe paroxysms of difficulty of breathing; in fact, the slightest catarrhal affection of the bronchial mucous membrane was always accompanied by severe dyspnœa. During these attacks I had become cognizant of the presence of disease of the mitral valve, which caused a coarse, grating murmur to accompany the systole—heard distinctly at the apex and to the left side of the heart, less audible at the base and to the right. His habits of life had not been calculated to promote either health or longevity; yet it could not be said that he was a drunkard. It was much to his credit that some gentlemen in this neighbourhood took great interest in his fate, and it spoke well for his character that they had employed him on odd jobs for years. The remedies employed were of no avail; he lived but forty hours after his admission.

The body was examined twenty-four hours after death. The cuticular surface was everywhere stained of a rich bile-yellow hue, and the whole body was anasarcous. The lower extremities had a purplish colour, from the amount of venous distension, and a few vesications existed on the ankles and tibiæ, containing a bright yellow serum. The abdominal cavity was much distended with fluid of the same orange colour. On opening the chest the lungs scarcely collapsed. There were old pleuritic adhesions, very dense in structure, in the left cavity. The right lung was free, of a sodden feel and leaden hue, and was distinctly œdematous on pressure, but this only related to the anterior aspect; for, on removing the lungs, several detached, consolidated masses were felt. There were two or three in each lobe, and they equalled in size a hen's egg—a section of these consolidated portions of lung substance displayed them of a dark brown red colour, and they presented something of the character of patches of pulmonary apoplexy, yet they wanted the well defined border of that form of pulmonary hæmorrhage, for their margins seemed gradually to merge into the surrounding tissue. There were as many as eight of these isolated masses of pulmonary engorgement. In the inferior lobes of

both lungs, and located at the extreme posterior border or edge of the lung, were two patches of consolidation which possessed all the characteristics of the red hepatization of pneumonia. On the pleural surface immediately contiguous to these spots, patches of recently effused gelatinous lymph were seen. The bronchial mucous membrane throughout was stained of a deep madder red. The heart was much enlarged, it weighed sixteen ounces and three-quarters. On the exocardial surface near the apex was a small patch of recent lymph. Towards the base two *maculæ albidæ* were noticed. The walls of both ventricles were remarkably thick, and the cavities equally enlarged. So dense and firm were the chordæ tendineæ, that they appeared like white cat-gut. The valves of the aorta were free, but considerably thickened, and one was sufficiently pouched to cause some obstruction to the flow of blood in the direction of the aorta; some atheromatous deposit was seen in the aortic sinus. The mitral valve was so diminished in extent, that it presented an opening scarcely larger than a small button-hole. The margin of this opening felt hard and bony, and resisted the knife with a grating earthy harshness. The wall of the right ventricle appeared to equal in thickness that of the left! The columnæ carneæ were extravagantly large and thick. The pulmonary valves were healthy. Both auricles were dilated to a capacity equal to twice that of the ordinary standard. All the cavities were filled with black fluid blood, without coagula. The liver was gorged with blood, and the deep bile tint with which the acini were stained gave the organ a peculiar orange-purple tone, inclining to yellow. The congestion was dependent on the accumulation of blood in the portal vessels.

The kidneys were in every respect natural, except that they were gorged with venous blood; their colour, when first removed, was of a madder red; this soon disappeared on a section being made; and when examined two hours afterwards, the appearance of venous turgescence had left them, and with the aid of the microscope the convoluted tubes of the cortical part, as well as the straight tubes of the cones, presented all the characters of health. (Pl. IV, fig. 6.) This patient had been under

observation for at least six years. During the whole of this period he was known to have disease of the mitral valve. The aggravation of all catarrhal attacks, and the dyspnœa which accompanied them, were attributed correctly enough to this cause; but no indication at any time existed of a disposition to renal disease.

Renal disease *may be* connected with disease of the heart, as in the last case; but it is by no means so necessary or certain a sequence as pulmonary or hepatic disorder. Reasoning hypothetically, nothing appears indirectly to minister to renal engorgement so effectually as obstruction to the circulation through the left cavities of the heart, which in succession affects the lungs, the right cavities, and eventually leads to retardation of blood in the cava, its influence extending ultimately to the remotest parts of the venous capillaries: thus cardiac dropsy may be produced. But observation and experience both teach us that something more is requisite for the development of morbus Brightii than simple passive venous congestion. A special disposition or diathesis, a peculiar divergence or disturbance in the vital energies or forces, strongly expressed in the altered qualities of the blood and equally so in the deterioration of cell-growth within these organs; and further exemplified by the rapid disintegration or breaking up of these abortive cells, and the accumulation within the tubes of their granular and fatty contents. The origin of such pathological conditions must be sought in causes far more remote than disease of the mitral valve, which, while it ultimately leads to an impeded venous circulation and general dropsy, does not necessarily implicate the kidneys in any of those forms of disease which terminate in degeneration of their structure.

CONNEXION OF MORBUS BRIGHTII WITH INFLAMMATION OF THE LUNGS, AND GRANULAR DEGENERATION OF HEART-FIBRE.

Anasarca of the lower extremities, scrotum and thighs—Pneumonia—Death two days after admission—Splenification of the lung—Fatty state of heart-fibre—Kidneys dark madder red throughout—First stage of inflammatory engorgement—Tubes filled with granular exudation.

The character and symptoms of cases of acute renal dropsy have much in common. They differ from each other in little but in the intensity or rapidity of their course, or the stage at which the fatal catastrophe takes place. These observations are applicable chiefly to the unchecked career of those cases which are neglected, or which come under treatment at a period too late to arrest the vehement progress of the disorder. The tractability of these cases greatly depends on the period at which treatment commences. In the more acute forms of the disease the delay of twenty-four hours may permit such inflammatory complications to gain force, as to preclude all hope of arresting the disease. In hospital practice it is commonly observed, in those cases of renal dropsy fatal in the earliest stage, that the patient has remained at home, and has not sought medical assistance for some days; and only when serious and aggravated symptoms, more particularly in relation to the chest, come on, that he seeks aid from an hospital.

Case XII.—The case of Charles Crisp, æt. 25, will illustrate these remarks, and it will add another example of the state of the renal tubes, filled and choked with granular exudation, in the early stage of inflammatory engorgement. Another point of interest is, that notwithstanding the high state of hyperæmia, and the proofs afforded by a microscopic examination of the inflammatory state of the kidneys, that there had been during

life no hæmaturia; so that the absence of this symptom does not justify the conclusion, that the first stage of Bright's disease is not one of inflammatory engorgement.

The patient, on admission, April 15th, 1856, stated that he had suffered from cough and shortness of breath for nearly a fortnight; that he had gone about as usual, but that a few days since, noticing the swelling of his face to be increasing, and that his breathing became worse, he came to the hospital for relief. He complained of a severe post-sternal pain, frequent cough, great shortness of breath, and swelling of the lower extremities.

The mobility of the chest was very limited. Anteriorly, the resonance was equal in the corresponding regions. Posteriorly, below the inferior angle of the right scapula and to the right, there was a spot of deficient resonance, and over which a deep breath developed fine inspiratory crepitation. The respirations were 50, and the pulse 120. The expectoration was viscid, frothy, and of a deep plum colour. The urine was high coloured, sp. gr. 1·021, albuminous, and the sediment, examined by the microscope, exhibited some granular casts containing epithelial cells, a few scattered blood-discs, and some amorphous flakes stained with hæmatin. The dropsical swelling did not extend above the knees. The scrotum was anasarcous, and the face slightly puffed. He was bled from the arm with some relief to the respiration, and he took potassio-tartrate of antimony and opium, in half-grain doses.

The next day, the 16th, the area of dulness had increased; no crepitation could be heard, but tubular breathing was present, as well as bronchial transmission of the voice through the stethoscope. There was no mitigation of the symptoms, the respirations became fuller and more frequent, the face became dusky, and he died on the evening of the 17th.

The body was examined eighteen hours after death. There was anasarca of the lower half of the body. The right lung was adherent to the ribs by old pleuritic adhesions; the left lung was free. On a section being made of the right lung, except at the apex, it was throughout its extent of a consistence less dense than what is represented by the term hepatization; it was of

a colour approaching a purple madder, and it exhibited the character of what has been called splenification of the lung. At several spots some greyish granules were observed, indicating that the secondary stage of the pneumonic process had commenced. There was no evidence of inflammatory action in the left lung; it was, however, gorged with blood. The bronchial mucous membrane throughout the right lung was highly injected, swollen, and covered with a frothy prune-juice coloured exudation. The cavities and valves of the heart were natural, the exocardium had an opalescent appearance, and one or two maculæ albidæ were visible. The muscular fibre from the walls of the left ventricle exhibited the characters of granular degeneration. (Pl. IV, fig. 10.) The kidneys were increased in size and weight; they weighed seven ounces each. They were of a purplish brown red colour, and a section displayed the same colour within. The capsule was easily detached, though at one spot it was slightly adherent. The cortical surface was marked with star-like and arborescent vascularity. The cones were deeply striated, of a purple red colour. With the aid of the microscope the tubes of the cortical part appeared filled with a fine molecular exudation, in which a few scattered blood-corpuscles were seen. The epithelium was in many parts detached from the basement membrane, and the individual cells appeared very granular. Even under the microscope, with a strong light, all parts had a brownish red tint.

The kidneys, in this case, represent also the early stage of inflammatory engorgement, and the commencing period of exudation. The tubes were filled with a fine molecular matter, which I conceive to be the product of the inflammatory stasis. Much cell-structure had disappeared, and its place occupied by this exudation. Can that finely granular material which chokes the tubes be derived from the disintegration of the epithelial cells? Or is it a specific transudation, as in pneumonia—an inflammatory product, causing destruction of cell-structure by its presence. This latter view is the most probable. The molecular exudation or deposit is at first highly stained with the colouring matter of

the blood, so that the kidneys at this stage have a deep brown red colour. The microscope shows that this arises from the tinting of the exudation, rather than from simple congestion of the blood-vessels. The colour rapidly disappears, and the exudation assumes a yellowish brown, and eventually a light fawn, or even lighter colour, proportioned in respect to intensity to the interval between the period of inflammatory engorgement and the fatal termination. It may be assumed as tolerably correct that in acute morbus Brightii the kidneys will be paler, the more protracted the case. Similar changes take place in the exudation choking the air-cells in pneumonia. The red hepatization is this exudation highly stained with hæmatin. The grey hepatization represents that stage where the colouring matter has been removed. In pneumonia the exudation is not interstitial, or only rarely so; it is into the air-cells and minute twigs of the bronchial tubes that the exudation is poured. So in morbus Brightii, the exudation rests in the convoluted tubes of the cortex and in the Malpighian bodies. It is, perhaps, only in purulent nephritis that the exudation is interstitial; but in that disease the symptoms during life have nothing in common with renal dropsy. The exudation in pneumonia rapidly undergoes purulent change. The exudation in acute renal disease less so, or only partially; but that pus-cells are produced, though not in abundance, accompanied by compound granule-cells, is seen by reference to the casts represented in Pl. V, fig. 3.

Fig. 1.

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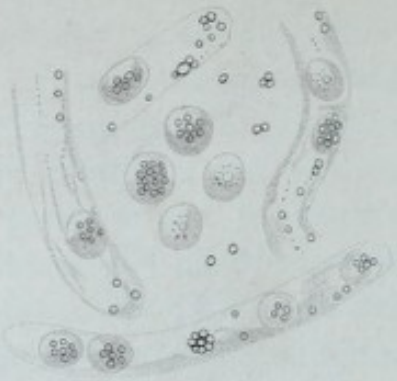

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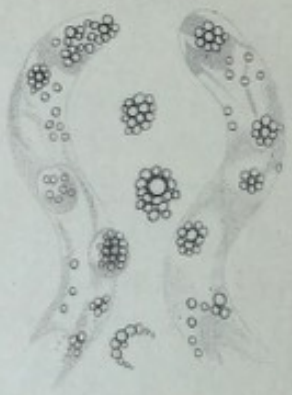

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W. R. Basham ad. nat. del.

W. Greatbach sculp.

PLATE IV.

MACK.

Fig. 1.—Casts partially granular, containing fatty or abortive epithelial cells; free fat-granules; a cast with epithelium, natural in appearance; scales of vesical epithelium, containing fat.

„ 2.—Transparent casts, containing fat-granules in greater abundance; epithelial cells in an advanced state of fatty degeneration; a few unchanged epithelial cells; many free nuclei.

„ 3.—Transparent casts containing epithelium more advanced in degeneration; fat-granules coalescing together; glomeruli, (when occurring in great abundance, a sign of rapidly advancing degeneration); many free nuclei.

„ 4.—Appearance of a section of one of the roe-like granulations made perpendicular to the surface. The Malpighian bodies appear filled with a fatty and molecular exudation. The convoluted tubes less so. Many abortive epithelial cells and clusters of fat-granules.

FENTON.

„ 5.—Malpighian bodies distended and filled with blood; the convoluted tubes also contain blood.

PIERCY.

„ 6.—Convoluted tubes from the cortical part of the kidney, quite healthy.

„ 7.—Straight tubes from one of the cones, quite healthy.

„ 8.—Muscular fibre from the left ventricle, well nourished and healthy.

CRISP.

„ 9.—Convoluted tubes from the cortex, filled with molecular exudation stained with hæmatin.

„ 10.—Heart fibre, very granular and fatty.

CHAPTER VIII.

RELATION OF THE HYALINE, TRANSPARENT, OR WAXY CASTS TO THE EARLY AND REMEDIABLE STAGE OF MORBUS BRIGHTII.

It has been already shown that the early period of renal degeneration, whatever be the form, commences in a state of hyperæmia, or inflammatory engorgement of the renal tissue. One or both organs become infiltrated with a sero-sanguinolent fluid, which transudes through the walls of the tubes, receiving an accession of blood from the rupture of some of the Malpighian capillaries; which hæmorrhage, coagulating in the tubes, is subsequently washed from them by the urinary current, and appears in that fluid, when voided, as fibrinous casts, stained with hæmatin, and entangling at first, blood-discs only: epithelial cells soon become mixed with the exudation—these, at the commencement, present no other than a healthy appearance—mixed in small proportion with inflammatory granule-cells. In favorable cases the cast or cylinder in which they appear lodged becomes more and more transparent, and here and there an isolated cell, or a few scattered nuclei, mark the subsidence of the renal disorder. If, however, the disease progresses, the epithelial cells undergo manifest alteration in development; inflammatory or compound granule-cells become more numerous, and fat, aggregated in grains or in scattered groups, increases in the tube-casts. These changes in the character of the tube-casts, if carefully observed, will be found a

safe guide for an estimation of the direction and progress of the disease. In the inflammatory stage of morbus Brightii the blood-stained aspect of the urine is partly derived from direct hæmorrhage—that is to say, from rupture of the capillary structure of the Malpighian tufts; hence the liquor sanguinis and blood-corpuscles pass directly into the tubes, coagulate there, and afterwards appear in the urine. But the disproportion existing between the number of blood-corpuscles and the coagulated fibrine on the one hand, and the intensity of the colouring matter and the amount of albumen on the other, forbid us to suppose that the constituents of the blood so disproportioned can be only derived from one source—the rupture of the Malpighian capillaries. Those disproportioned elements, then, which cannot be accounted for by direct hæmorrhage, must be referred to the transudation through the renal tissue of the blood-stained sero-albuminous elements, in the same manner as sanguinolent exudation takes place through the walls of the air-cells in pneumonia, without direct rupture of the capillaries. The state of the kidney in those rare cases in which death takes place in the early stage of inflammatory engorgement affords, I think, presumptive evidence that such transudation of the blood-stained serum does, in fact, occur. The entire organ in these cases is infiltrated with a madder-red sanguinolent fluid; every part of the organ displays the deep discoloration of blood-stasis; the pyramids are streaked with purple-red lines, and the mucous membrane of the calyces and pelvis is of the same dusky hue. The slightest pressure causes a thin blood-stained fluid to ooze from the apex of the cones, and in a section of the organ a turbid, thin, sanguinolent serum drips from the cut surface. In these fatal cases this state of engorgement has doubtless reached its maximum; but I am inclined to think, that in all cases of hæmaturia caused by inflammatory engorgement a similar condition of kidney exists, differing only in degree from that just described. As the hyperæmic state of the kidney subsides, the urine becomes free from all trace of blood, the blood-corpuscles disappear, the albumen diminishes, the fibrinous casts of the tubes are replaced by casts containing

epithelial cells; these become fewer, more and more transparent, less and less granular, and ultimately disappear, the urine for some time after containing, here and there, isolated epithelial cells, probably from the larger straight tubes. Such is the progress which favorable and tractable cases exhibit as to the character of the exudative material thrown off from the kidneys. The following cases will illustrate these views.

Hæmaturia—albuminuria—dropsy. Recovery.

Case XIII.—J. Hancock, æt. 56, a carman. This patient was admitted into Burdett Ward, March 19th, 1856, suffering from some trifling febrile disturbance, with headache, occasional cough and expectoration of a catarrhal mucus, occasional dyspnœa, frequent desire to make water, blood-stained urine, œdema of the feet and ankles, puffiness of the eyelids and back of the hands, loss of appetite, and thirst. The aspect of the patient was not unfavorable, having the fresh-coloured look of one whose avocations were in the open air. The chest was resonant, mucous murmurs, with cooing and wheezing sounds were heard, both anteriorly, laterally, and posteriorly. The heart's sounds were natural; the pulse full and hard; the tongue pale, and slightly coated; the urine was deficient in quantity, blood-stained, and highly albuminous; micturition frequent, particularly during the night. There was pain and weight felt across the loins, but percussion and pressure did not aggravate these symptoms. The patient stated that he had been ill about a fortnight, dating the commencement to exposure to cold at night. He felt chilly and feverish on going to bed, and in the morning he found his eyelids stiff and swollen, his face puffy, his ankles and feet swelled, as well as the back of his hands. He noticed the frequent calls to make water and the bloody appearance of the urine, which not giving way he applied for admission. He appears to have enjoyed average good health. He states his habits to be temperate; but he appears to have been singularly a sufferer from accidents, as he has suffered fracture of the leg three times, and once fractured his ribs. The urine was of a

dark madder-brown hue; some undissolved lithates rendered it turbid, but on warming, these were taken up. Before reaching the boiling point copious coagulation took place. The specific gravity was 1020.

Pl. V, fig. 1, represents the tube-casts on the first examination of the urine the day after his admission. As the hæmaturia was of a fortnight's duration, and, according to the statement of the patient, was less bloody than it had been, there were but few casts of coagulated fibrine. The greater part of the deposit consisted of granular casts containing healthy epithelium, and a few scattered isolated blood-discs. He was cupped from the loins to ten ounces. He took the cream of tartar and jalap purgative, and he was ordered a simple diaphoretic saline. The purgative acted copiously. On the fourth day from admission the œdema of the face and upper parts of the body had disappeared, the cough was not troublesome, and the state of the chest implied that the catarrhal condition of the bronchial tubes had yielded. The urine was scarcely tinged with blood, more abundant, and less frequently passed. It was, however, still highly albuminous. Examined under the microscope on the 24th, the appearances presented by the deposit are represented in fig. 2. The casts are very transparent, one slightly granular. He was this day ordered the sesquichloride of iron, in ten-minim doses, three times a day, and the cream of tartar purgative twice a week, or as frequently as the state of the body required. The anasarca of the feet and ankles subsided, and no vestige of any dropsical effusion could be observed on the 1st of April. On March 30th the microscope showed the appearance represented at fig. 3, and on April 4th those in fig. 4. The urine had become natural in appearance. On March 30th a slight haziness was produced by heat and nitric acid; but on the 10th of April no trace of albumen could be detected. On the 14th of April the man declared himself sufficiently recovered to go to his work, and, as the subsistence of his family depended on his exertions, he was discharged. For greater security against a relapse, it would

have been desirable to have kept him in the hospital a week longer.

This case confessedly represents a very mild type of the disorder. Dr. George Johnson would call it a case of desquamative nephritis, Rayer albuminous nephritis; but call the symptoms by what name we will, they are unmistakeably those which characterise the early stage of Bright's disease. The bloody urine, the dropsy, the tube-casts, are unequivocally the initiatory condition of that intractable disorder. But a careful study of the casts throughout the attack did, I think, justify the favorable prognosis I ventured to offer while the case was under observation.

I am convinced from this, as well as from Welch's case, and many others of like character, that when these hyaline casts make their appearance immediately after the first or inflammatory stage of the disorder, a favorable opinion may be entertained of the result.

Relation of the hyaline, transparent, or waxy casts to remediable cases of renal dropsy.

Case XIV.—John Welch, æt. 39, a stone-mason, residing at Woking, in Surrey, was admitted December 24th, 1856. He stated that he had been ill about six days, suffering from pains in the chest, slight dyspnœa, cough, and expectoration of catarrhal mucus. Pulse full. The chest was resonant, but moist mucous murmurs were heard all over the chest. The heart sounds were natural. There was slight œdema of the lower extremities; and he complained of pains in the left lumbar region. The urine was moderate in quantity, high coloured, sp. gr. 1018, deposited lithates, and contained albumen. The patient was a strong, well-made man, with a healthy aspect. He attributes his present illness to exposure to cold, having got wet through—followed by chilliness, pain in the chest, dyspnœa, and cough. His habits appear to have been temperate. He was bled, and took diaphoretic salines. In four days the chest symptoms had subsided; the cough was less frequent; and

the expectoration of an ash-gray, tenacious mucus. The lumbar pains continued, and the anasarca of the feet and ankles did not subside. The first microscopic examination of the urine was made January 2d. (Pl. V, fig. 7.) Fibrinous casts containing blood-discs, one very transparent; other faintly granular casts containing granular cells—a few free nuclei, and a blood-disc or two in the tube. This urine was free from lithates, was albuminous in a moderate degree, and sp. gr. 1018. He was cupped from the loins, and continued the diaphoretic. The œdema rather increased than otherwise; for, on the 3d of January, the scrotum was infiltrated with serum. The cupping was repeated on the 7th of January, with relief to the pain in the left lumbar region, and the following day spontaneous diarrhœa occurred. The urine became less abundant, and again deposited lithates, but the anasarca considerably diminished. On the 15th of January the urine was of a slight cherry-red colour, and evidently contained blood; the microscopic examination demonstrated granular casts, containing a few blood-discs, and numerous free blood-corpuscles (fig. 8). But the casts were so slightly granular, that but for the granule-cells and epithelium they might have been overlooked.

He was again cupped, and took the gallic acid. On the 20th of January the anasarca had entirely disappeared. The respiratory sounds and movements were healthy. The pulse was soft and natural; and but for the albuminous state of the urine, he might have been pronounced convalescent. The urine was more abundant, sp. gr. about 1015. The casts were completely transparent, although a blood-disc or two was observed in several of them; free nuclei in the casts were also visible, and a few abortive epithelial cells (fig. 9). The transparency of these casts about equalled that of the mucus of ordinary bronchial catarrh.

Notwithstanding the favorable progress which was apparently taking place, on the 2th of January, without any assignable cause, the urine became suddenly charged with a blood-red colour; there was accompanying feverishness, loss of appetite, and hot skin. Œdema and stiffness of the eyelids,

and puffiness of the backs of the hands and ankles, preceded by a few hours this return of hæmaturia. The urine microscopically examined, presented the ordinary conditions of this stage—a return of fibrinous casts and free blood-corpuscles. He was briskly purged with the cream of tartar and jalap, had a warm bath, and took the diaphoretic mixture. On the 29th of January the urine was albuminous, but free from fibrinous casts. He had greatly improved—there was no febrile disturbance, and he was ordered the tincture of the sesquichloride of iron in ten-minim doses.

Day by day, from this date, the urine became less and less albuminous. On the 5th of February the urinary casts were transparent, with a few scattered free nuclei and granule-cells. These casts became true hyaline cylinders, the only material accompanying them being minute resplendent granules, which I have always considered to be the nuclei of some unformed or broken-up cells. On the 16th of February the patient was convalescent. The anasarca had disappeared; the urine was clear, containing but the faintest trace of albumen, sp. gr. 1016.

After the most careful examination on three occasions of many samples, no casts of any kind could be discovered. A few scattered granule-cells, some abortive epithelium, and some pavement epithelium, were only visible. He continued under observation till the 2d of March; the urine at that date was free from albumen, and from all trace of cylindrical casts—a few isolated cells, as at the last examination, were still seen.

This case would be viewed by some as one of inflammatory dropsy; where exposure to cold arrests the cutaneous function, and leads to inflammatory engorgement of the kidney, febrile symptoms, anasarca, hæmaturia, and albuminous urine. Dr. Handfield Jones ('Pathological Anatomy,' p. 597) believes that there is not more connexion between this state of hyperæmia or inflammatory engorgement of the kidney, and the truly degenerative process of morbus Brightii, than between an attack

of bronchitis and succeeding pulmonary phthisis. But the analogy I think cannot be sustained. In bronchitis the inflammatory process is strictly limited to the bronchial mucous membrane—the parenchyma of the organ is not involved—hæmorrhage never takes place, or, if a streak of blood appears in the expectoration, it results rather from the strained efforts of coughing, than from any hæmorrhagic condition of the part. Pneumonia presents features of greater parallelism with inflammatory engorgement of the kidneys. The croupous or fibrinous exudation into the air-cells is always accompanied by the elements of the blood; and, before purulent liquefaction commences, this fibrinous exudate bears a striking resemblance to the fibrinous and granular material of the tubes in the stage of inflammatory engorgement of the kidney. Where the inflammatory exudation in pneumonia is interstitial as well as vesicular, we know that tubercular deposit may follow, and thus an analogy between the degenerative processes in the pulmonary tissue with those of the kidney might be sustained.

All other conditions being equal, all other symptoms and circumstances being the same, are we justified in excluding this case of Welch from the category of morbus Brightii, because the disorder is arrested, and stops short of that degenerative process which follows so frequently in cases with every other symptom in common? In what, it may be asked, except in the intensity and rapidity of the disease, does the case of Osborn (Case VII) differ from this? The general symptoms were the same, differing only in degree. The urinary sediment in the period of the hæmaturia, differed but little; but this sediment, in the former case, day by day furnished proofs of the rapid degeneration of the epithelium; while in the latter, that of Welch, the casts became more and more transparent, more allied to a simple catarrhal exudation, and indicated a satisfactory approach to the restoration of the healthy functions of the kidney.

Where the casts, after the stage of hæmaturia has subsided, rapidly lose their granular aspect, and become more and more transparent, and the structures associated with them are but a few scattered free nuclei and granular cells, and, if epithelial

cells be present, their appearance deviates but little from the normal type, then from such characters in the urinary sediment a favorable prognosis may be safely entertained. So far from these hyaline cylinders being moulded in tubes that are deprived of their epithelium, it appears to me that epithelial cells are as essential to the formation of this product as they are in any form of mucous catarrh; and that in these cases these transparent cylinders, when they occur soon after an attack of hæmaturia, may be accepted as a sign that the disease is passing off in the form of what might be called a renal catarrh.

Case XV.—Joseph Staunton, æt. 38, a wood-cutter, of reputed temperate habits, was admitted December 23d, 1856, with slight anasarca of the ankles and feet, and puffiness of the eyelids and face; there was some bronchial catarrh with moist sounds all over the chest. The urine was moderate in quantity; it was clear, had a sp. gr. of 1018, and contained albumen; micturition was frequent, particularly at night. He stated that the commencement of his illness was about three weeks since, when he had rigors followed by burning heats and perspiration, with cough and expectoration. He did not notice his water whether it contained blood or not; he recollects that he was much troubled at night by a frequent desire to pass it. His legs swelled, but the swelling disappeared when he lay down. As he did not get better he applied for admission. The aspect of the patient was by no means characteristic of albuminuria.

The microscopic examination of the urine on January 4th, 1857, revealed very transparent casts, containing a few epithelial cells, and one or two compound granular cells, with numerous free nuclei. On admission he had warm baths, the compound jalap powder, and the ammoniated saline mixture. The bronchial symptoms quickly abated; the anasarca disappeared after the first week—the urine became more abundant, less frequently passed, and but for the albuminous state of this fluid the patient would have been pronounced convalescent. He was ordered the tincture of the sesquichloride of iron, and digitalis.

On the 19th of January the urine was still slightly albumi-

nous, although the anasarca had disappeared nearly a fortnight, and the sediment presented some transparent casts, whose outline was rendered the more visible by the resplendent granules, or free nuclei, which they contained. A very few isolated compound granule-cells, with a crystal here and there of oxalate of lime, were also observed in the sediment. Before he left the hospital it was ascertained that this patient had suffered a similar attack to the present about four years since, commencing with symptoms of catarrhal fever, and terminating in swelling of the legs; and he moreover stated that he distinctly recollected that, at seven years old, after an attack of scarlet fever, he passed blood with his water and that he swelled all over.

May not these facts show that there was a kind of constitutional predisposition to renal disturbance, originating probably in the secondary conditions following the scarlet fever. We find this patient, not otherwise unhealthy, upon two occasions, after slight exposure, suffering from anasarca, and with the greatest probability albuminous urine on the former as on the recent attack. In the interval of four years his health has been uninterrupted. I cannot conceive that any form of chronic disease has been silently progressing during that interval. The microscopic evidence from the urine, and the favorable and speedy subsidence of the constitutional symptoms, forbid such a conclusion. It appears to me to be one of those cases in which a strong predisposition to renal disease exists; that exposure, or any cause disturbing the equilibrium of health, to use an engineer's expression, throws the kidneys out of gear. Engorgement, followed by derangement of their excretory function, takes place; dropsical effusions come on; albumen appears in the urine; and an exudation takes place from the tubes of the kidney characteristic of the mildst form of disturbance to which they can be exposed. This exudative material in such cases as these, coupled with the mild and tractable constitutional symptoms, and the recurrence of which does not appear to be connected with any permanent disorganization, would appear to justify our speaking of such cases as simple

catarrah of the renal tubes. But, inasmuch as catarrh of the bronchial tubes recurring again and again, is either symptomatic of, or leads to permanent disease of the lungs—so, such attacks of the kidneys, mild and yielding as they may be at first, from repetition will lead, in all probability, to permanent disorganization of these organs.

PLATE V.

HANCOCK.

Fig. 1.—Fibrinous casts, containing blood-discs and epithelium; one slightly transparent, with scattered epithelial cells and blood-discs.

„ 2.—Several very transparent casts, with scattered free nuclei, with one or two compound granule-cells—a cast partly granular with a few free blood-corpuscles. Exudation-corpuscles aggregated into grape-like clusters. The cast which contains the compound granule-cells has at its extremity four exudation- or pus-corpuscles.

„ 3.—Vesical epithelium, granule-cells adhering, bead-like, and prolonged into a transparent film of what looked like mucin. This film-like elongation was less in diameter than that of the cells. Several other similar casts.

„ 4.—Casts partly granular and partly transparent. Free nuclei and epithelial cells. One cast granular at one end, and terminating in transparency.

„ 5, 6.—Bronchial catarrhal mucus, compound granule-cells, buccal, laryngeal, and bronchial epithelial cells, imbedded in a viscid, glairy mucus, abounding in minute molecular granules and free nuclei.

WELCH.

Fig. 7.—Fibrinous casts, containing blood-discs. Casts faintly granular, containing free nuclei and epithelial cells.

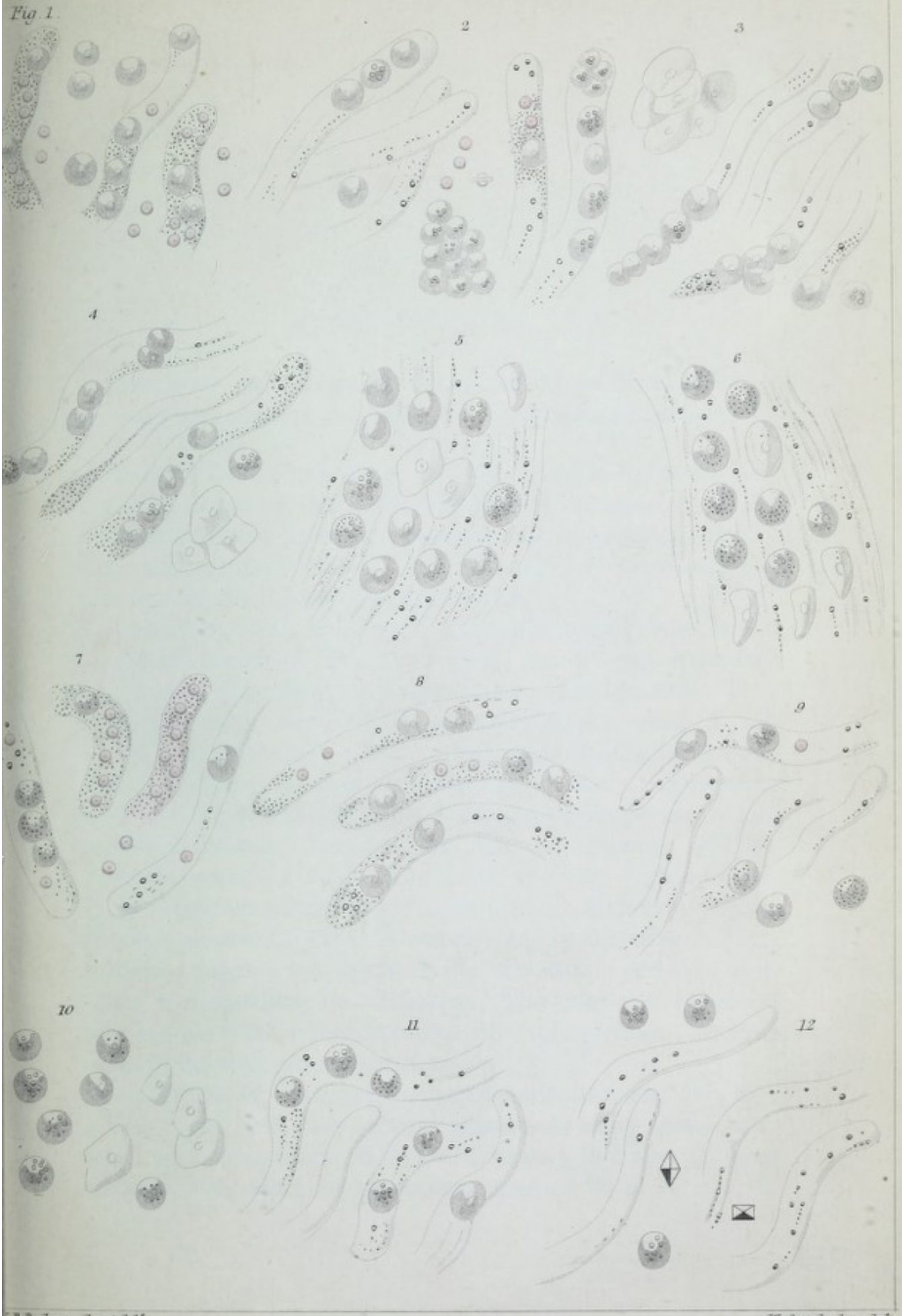
„ 8.—Casts becoming less granular, partly hyaline, containing blood-discs and epithelium.

„ 9.—Casts very transparent, with only here and there an epithelial cell, one or two compound granule-cells.

„ 10.—No casts visible—a few scattered epithelial cells from the tubuli—a few compound cells.

STAUNTON.

„ 11, 12.—Represent the same hyaline casts with a crystal or two of oxalate of lime. These transparent casts contain a number of free nuclei.



R. Basham. ad. nat. del.t
W. Greatbach sculp.t

CHAPTER IX.

RELATION OF THE HYALINE, TRANSPARENT, OR WAXY CASTS TO THE MORE CHRONIC AND FATAL FORMS OF MORBUS BRIGHTII.

Case XVI.—Robert Eden, æt. 38, a smith by trade, was admitted February 3d, 1857, suffering from anasarca of the lower extremities, ascites in moderate extent, frequent micturition, and scanty urine. There was cough, dyspnœa, and expectoration of ordinary catarrhal mucus.

He had been with the Army Works Corps in the Crimea, where his health remained for a time good; but he was ultimately seized with dysentery, and sent home. He has never been thoroughly well since; but he continued able to work off and on till last Christmas, when he had some febrile symptoms, with dark cherry-coloured urine, small in quantity. About this time he felt his ankles and legs swell, and the dropsy has of late rapidly increased. The anasarca was now general, and the abdomen contained fluid. The urine was very high coloured, sp. gr. 1022, throwing down on cooling an abundant deposit of fawn-coloured lithates. It was also highly albuminous. The coagula occupying two thirds of the tube after a period of rest. There was diarrhœa on admission. This was not interfered with beyond what influence gallic acid might produce. He had warm baths with great advantage.

On the 9th of February the urinary sediment was first examined. The urine was quite as albuminous as on admission—was high coloured, and it became necessary to dilute the urine with distilled water, at the temperature of 90 to 95, for the

purpose of keeping in solution the lithates, and allowing whatever tubular sediment might be present to subside. The lithates of ammonia and soda often cohere in very suspicious-looking linear groups, and I have known an inexperienced observer mistake them for granular casts. Therefore, however small the quantity, if the lithates give the slightest cloudiness to the urine, their solution by the addition of warm water is necessary for microscopic observation, for they may be precipitated on the casts, and, adhering to them, give them a spurious granular appearance. The casts found in the urine at this first examination were partly granular, partly transparent. There were many free nuclei, and several grape-like clusters of fat-granules or nuclei, without any cell-wall. The healthy epithelial cells were very few in number.

The treatment by warm baths and gallic acid seemed to be beneficial, for the urine became clear, the proportion of albumen less, the anasarca decreased, and the respiratory movements free. The bowels becoming torpid, he took the compound jalap powder, and continued the gallic acid. On the 16th of February the anasarca was considerably reduced, but the urinary sediment remained unchanged. The urine examined on February 20th, February 27th, and March 4th, (Pl. VI) presented the same general appearance. Transparent casts, occasionally slightly granular, with abortive cells—large compound granule-cells, many free nuclei, and many botryoidal clusters of nuclei, without any cell-wall. These appearances of the urinary sediment continuing unchanged, notwithstanding the apparent improvement of the patient, the decrease of the dropsy, the diminished frequency of micturition, and other evidences of amelioration, led me to form an unfavorable opinion.

On the 12th of March the urine, which had increased in quantity, again became deficient, and the anasarca rapidly increased. He now took elaterium with temporary advantage. The anasarca again became less. The urinary sediment, if anything, gave proof of advancing renal degeneration. The compound granule-cells became larger and more abundant;

the casts preserved their hyaline character, with free nuclei. In the beginning of April, the symptoms generally being the same, the urine showing a disposition to become more abundant, he took digitalis and cream of tartar with temporary benefit; the flow of urine becoming greater, and the anasarca not increasing; the urinary sediment presented the same features, and this excretion continued quite as albuminous. The treatment by digitalis and the bitartrate was continued for a month; and, in the first week in May, the report was very favorable; the urine abundant; the anasarca confined to the legs below the knees, the hands and upper part of the body being quite free. There was fluid in the abdomen, but the infiltration of the scrotum had disappeared. The urinary sediment was abundant and unchanged.

He continued thus, with the dropsical symptoms varying in extent, till the first week in June, when dysenteric symptoms manifested themselves—tenesmus, sanguineous dejections, with shreddy lymph-like flakes, and copious diarrhœa continued, uninfluenced by remedies, to add to his exhaustion; the effect of these discharges was the rapid subsidence of the anasarca; but he daily became more exhausted, and died June 18th.

The post-mortem examination revealed the kidneys most enormously enlarged. The right weighed seventeen ounces; the left something under sixteen. They were of a pale-white fawn colour—lobulated, and soft. The surface smooth, and free from vascular marking.

A section displayed the almost entire obliteration of ordinary renal structure. The pyramids were apparently merged in the mass of surrounding degeneration, so that only a few faint pink lines, converging to a point, represented the cones. The colon throughout was injected; but the inferior part, towards the rectum, as well as that portion of the intestine, were of a slate-gray colour, somewhat nodulated or puckered, and in the lowest portion the mucous surface presented the appearance of a friable, blackish, carbonaceous deposit.

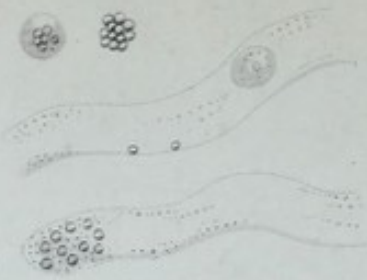
There were some adhesions in the pleuræ—the lungs were free from œdema. The liver was large, soft, granular, and

fatty. The heart had two maculæ albidæ on its surface. The cavity of the abdomen contained a considerable quantity of dropsical fluid.

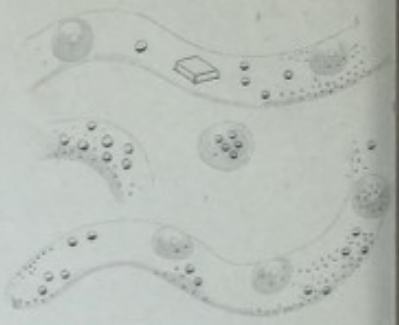
Drawings were made of the microscopic appearance of the kidneys—both of the pale fawn-coloured mass, as well as of the few remaining tubuli of the cones. These drawings have unfortunately been lost. But the appearance of the cortical part was as of tubes choked up and surrounded by a fine granular and fatty deposit. Wherever cell-structure was visible, the appearance was of finely granular cells—much smaller in size than the ordinary epithelium of the convoluted tubes. The few straight tubes which were teazed out with needles exhibited the epithelial layer disorganized, and the canal apparently choked with granules and fat. The inference I draw from the microscopic conditions of the urinary sediment throughout the five months this case was under observation, is, that when the casts continue to present week after week a great number of free nuclei, associated with these hyaline cylinders—numerous compound granule-cells, some with, some without cell-walls—the progress of renal degeneration in the most obstinate and intractable form is fatally progressing. The most significant appearance is that of botryoidal clusters of nuclei without a cell-wall. And the only distinction which can be found of any importance between the hyaline casts in favorable cases, and those where the disease is fatally progressing, consists in the presence of these clusters of nuclei, expressive of broken-up and disintegrated cells.

Fig 1. Febr 9th

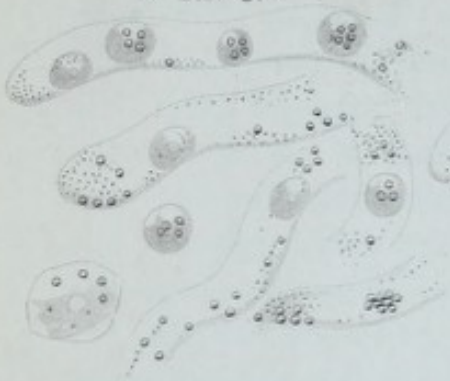
2. Febr 16th



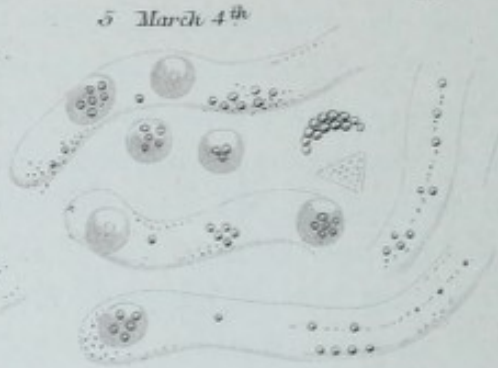
3 Febr 20th



4 Febr 27th



5 March 4th



6 March 18th

7 March 24th

8 April 10th

9

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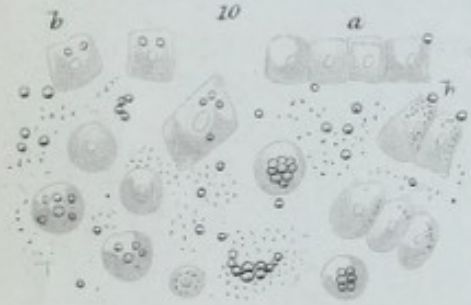

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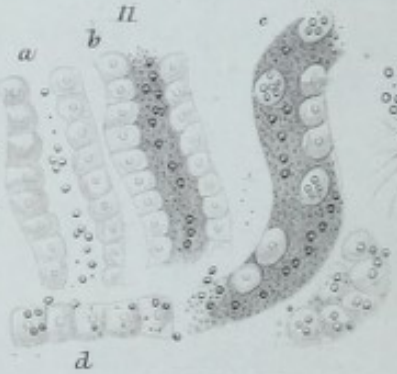

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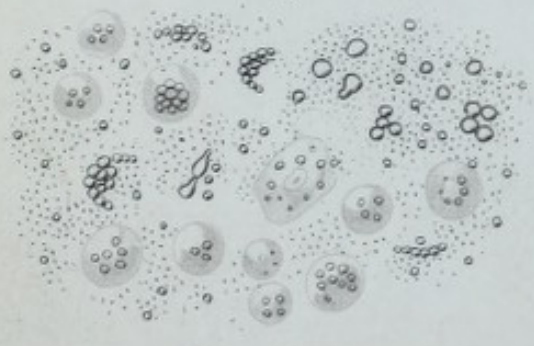

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PLATE VI.

EDEN.

Fig. 1, Feb. 9th.—Urine orange coloured, abundance of lithates, highly albuminous. Casts partly transparent, partly granular; highly resplendent free nuclei dispersed through them; many nuclei aggregated together, without a cell-wall.

„ 2, „ 16th.—Casts very transparent; many free nuclei; at the extremity of one, numerous fat-granules and grape-like clusters of nuclei without a cell-wall.

„ 3, „ 20th.—Casts slightly granular, a crystal of lithic acid imbedded in one; many free nuclei, both in the casts and scattered over the field. Casts studded with granule-cells.

„ 4, „ 27th.—Casts more or less transparent; several very large compound granule-cells; free nuclei in abundance, and grape-like clusters of nuclei without a cell-wall. The granular matter occurred chiefly in contiguity with the free nuclei, arising probably from the breaking up of abortive cells.

„ 5, March 4th.—The casts very transparent, containing a few free nuclei, small granule-cells, and nuclei aggregated together without a cell-wall.

„ 6, „ 18th.—Casts very transparent and faint; many free nuclei in grape-like clusters, and large compound cells; many aggregate nuclei without cell-wall.

„ 7, „ 24th.—Casts very transparent; compound granule-cells, very large.

a, a.—The cell-wall in two, apparently just ruptured. Pavement-epithelium very granular.

„ 8, April 10th.—Casts very delicate and translucent; free nuclei and large compound granule-cells.

a, a, a.—The cell-wall of more than one of these appears just ruptured, as in fig. 7: and the contents of the cell, as of some viscid material like mucus, seemed drawn out in an elongated film.

PLATE VI, (*continued*).

DARNTON.

Fig. 9.—Hyaline casts, with free nuclei, fat-grains, and abortive epithelium. A week before death.

„ 10.—Fluid squeezed out by pressure from one of the cones; various forms of epithelium—*a*, *a*, from the straight tubes,—*b*, *b*, from the calyces many free nuclei, and compound fat-cells.

„ 11.—Tubes from the apex and base of one of the cones; *a* and *b* are the same tube from the apex, under variations of focus—the canal seems to contain many free nuclei; *c* is a tube from the base of the cone. The epithelial cells in spots are detached from the basement membrane, the canal seems obstructed by granular matter, free nuclei, and abortive cells; *d*, *d*, are epithelial cells from the straight tubes, becoming fatty and abortive.

„ 12.—The appearance presented by a section of one of the more prominent and larger granulations of the surface of the kidney. The Malpighian bodies appear choked with granular matter, free nuclei, fat-grains, and abortive epithelium, and to be imbedded in a fibrilloid matter which might be viewed as new product.

„ 13.—Appearance of the soft central portion of the yellow deposit in one of the cones. Large compound cells, much free fat, granular matter, and abortive cells, such as are usually seen in softening tubercle.

„ 14.—Muscular fibre from the left ventricle, partially fatty and degenerating.

CHAPTER X.

RENAL DROPSY COMPLICATED WITH OTHER DISEASES, PHTHISIS, CANCER, ETC.;

RELATION OF MORBUS BRIGHTII TO PHTHISIS.

Tubercular deposits in both lungs—acute phthisis—albuminous urine—death by asthenia—kidney mottled, not enlarged, but infiltrated with fat and granular matter.

Case XVII.—J. Darnton, æt. 23, a gardener, admitted March 17th, 1857, with well-marked symptoms of acute phthisis. He had been suffering from cough for two months, but continued at his employment till within the last week, when the increase of his cough, with expectoration and shortness of breath, compelled him to relinquish work and seek admission.

The chest was narrow, and ill-clothed with muscle. The clavicles were very prominent from the hollow depressions beneath; there was defective mobility of the chest, dulness at the apex of both lungs, defective respiratory murmur, prolonged jerking expiratory sounds in left apex, less marked in the right, and some gurgling on deep inspiration. The urine was clear, not deficient in quantity, and albuminous. There was some swelling of the wrists, and slight anasarca of the ankles a week before death. The urinary sediment was only examined once, six days before he died. (Pl. VI, fig. 9.) He lived a month, and died from asthenia. There were no particular symptoms other than phthisis usually exhibits.

The body was much emaciated. Dense firm adhesions united

the apices and upper third of both lungs to the costal surface. Both lungs were nearly solidified with the extent of the diffuse tubercular (gray) deposit. There were a few small ragged cavities, none exceeding a marble in size. Many of the tubercular spots did not exceed the diameter of a pea, and were in the stage of early softening. The heart was not increased in size, but it was pale and flaccid; its fibres were fatty. The mesenteric glands were the seat of tubercular deposit, some few were soft and cheesy. The kidneys were but slightly enlarged; they weighed respectively five and three quarters and six and a half ounces. The capsule was easily removed, though slightly adherent, and the cortical surface then appeared coarsely granular, pale, slightly notched, and covered with stellar vascular groups. The granulations in one kidney were larger than the other, and almost reached the size of mustard seeds. A section of the kidney showed the cortical portion of a pale tint, with dark coloured lines or vascular markings perpendicular to the surface, in the direction of the base of the cones. This pale deposit seemed encroaching on the pyramids. In the centre of one of the cones was a mass of an oval shape of yellowish deposit, surrounded by a well-defined margin of red vascular injection. The centre of this deposit was softer than the rest; it was of a deeper buff colour, and of a jelly-like consistence. The microscopic appearance of this deposit is represented in Pl. VI, fig. 13. A great deal of coarse amorphous granular matter was diffused over the field, amongst which were dispersed large glistening fat-cells, many free fat-granules, and a few epithelial cells, both abortive and fatty. Several disintegrated compound cells were also present. The urinary fluid obtained by pressure from one of the cones contained granular matter, free fat-granules, compound fat-cells, and epithelium more or less degenerating. Some of the straight tubes teazed out presented the appearances of fig. 11. The canal of these tubes was apparently permeable, but having granular and fatty matter and detached cells in the canal. The figures *a* and *b* represent the same tube under alterations of the focus by transmitted light; *c* is a tube from the base of one of the

cones. The epithelium appears detached from the basement membrane, and the canal is choked with granular and fatty deposit. One of the larger granulations of the surface of the kidney in proximity to the area of the asteroid vascular spots, presented the appearance of several Malpighian bodies stuffed with a dense granular and fatty deposit, in which abortive epithelial cells were mixed, and which, by the pressure exerted on the canal of the vessel, seemed effectually to obstruct the passage of blood through it. (Pl. VI, fig. 12.) The muscular structure of the heart exhibited the characteristic appearances of fatty degeneration in an early stage, as transverse striæ were seen in fibres that were partially fatty. (Fig. 14.) The liver was fatty, the hepatic cells being loaded with fat-granules.

Is there any relation between pulmonary phthisis and morbus Brightii? Is the co-existence of one form of Bright's kidney with tubercular disease of the lungs accidental or essential? Our present knowledge does not entitle us to say more, perhaps, than that this relation is apparently not more definite than what exists between the cancerous diathesis and fatty degeneration of the kidney, or what may be seen to exist in all those forms of chronic disease characterised by decay or degradation of cell-structure, whether that degradation assume the malignant form of cancerous deposit or the not less fatal one of diffuse scrofulous degeneration.

It cannot be doubted that the scrofulous habit of body is specially disposed to the development of one form of degeneration of the kidney, so that in those cases of phthisis in which the scrofulous taint is highly marked, we may expect to find evidence of renal degeneration partaking of that type which characterises the tubercular diathesis, and find the structures infiltrated with an oleo-albuminous exudation, and the cells becoming vitiated and abortive in the highest degree of fatty decay. Dr. Bright considers that there is no essential relation between renal degeneration and phthisis. Indeed, he thinks that there is something of antagonism between them, and that renal disease is hostile to the development of phthisis. The pulmonary com-

plications which are always found more or less active in both the acute and chronic forms of morbus Brightii, are certainly not in the direction of tubercular deposit. Bronchitis, or bronchial catarrh with dropsy of the pulmonary parenchyma, or pleurisy with effusion, or pneumonia of a low type, are the most frequent and most fatal complications. It is very certain that if tubercle does not exist in the commencement of the renal disturbance, it rarely forms in the progress of that disease, however protracted. Dr. Bright's opinion is, therefore, to this extent confirmed by observation, that where tubercles do not pre-exist, renal disease is not favorable to their development. But the subject may be considered from another point of view. Is the tubercular habit disposed to develop renal degeneration in any form, and if so, what form? The question is not whether the kidneys suffer from tubercular deposit, but whether, in the progress of phthisis, or associated with the tubercular dyscrasia, there be any disposition in the renal textures to suffer any of the forms of degeneration usually classed as morbus Brightii. I think this question must be answered in the affirmative to this extent—that frequently in phthisis, probably as the result of the general vitiation of the tissues, we find one form of fatty degeneration of the kidney, not always, but so frequently as to give rise to a surmise that the connexion is not accidental. In these cases the kidneys are not much increased in size. The capsule is easily detached and the cortical surface may be granular or smooth. Microscopically, the Malpighian bodies, as well as the convoluted tubes, are seen filled with granular abortive epithelium, more or fewer free fat-granules, compound fat-cells, and in some cases the fatty matter may be so abundant as to look like oily drops.

In the centre of one of the pyramids was a deposit of a yellow white colour, surrounded by a well-defined red areola, an example of the *Plaques blanches de lymphe plastique* of Rayer; these have sometimes been erroneously thought to be tubercular. We are ignorant of their cause, for they are met with in very different morbid states, and even found in kidneys not otherwise diseased, so that the granular, fatty, and degenerated kidney

has no connexion with these apparently accidental and isolated deposits.

The inquiry seeks a solution from general, not from local causes, and asks whether this, or any form of renal degeneration, has any connexion with the tubercular habit of body. Whether the tubercular diathesis, expressed as it is by vitiated processes of nutrition, is not frequently associated with renal degeneration, not accidentally, but as a consequence of those depraved processes. It is very certain that in all those cases of phthisis which have fallen under my observation, in which the kidneys were granular or fatty, the heart-fibre was found to exhibit unequivocal indications of fatty degeneration, either incipient or advanced.

Connexion of morbus Brightii with phthisis—tubercle in the lungs running a chronic course—extensive anasarca—albuminous urine, with deposits highly fatty and granular—kidneys in the highest state of fatty degeneration.

Case XVIII.—John Thompson, had suffered from phthisis for a long period; he had been a patient at the Brompton Hospital; he was subsequently admitted into the Westminster, under Dr. Hamilton Roe, under whose care he continued till that gentleman's resignation of office, when the patient came under my observation. There had been extensive anasarca of the lower extremities, as well as of the face and hands, but this had subsided to a great extent when I took charge of the patient, in the middle of March, 1857. The urine was at this time abundant in quantity, pale, of a low sp. gr. 1010, and threw down a most abundant coagulum by heat; a flocculent cloudy deposit was precipitated when the urine was set at rest in a tall glass. The first examination was made on March 17th, and from the appearances then, as well as those of the following day, I had no hesitation in expressing an opinion that this case would exemplify a very high degree of fatty degeneration of the kidney.

The field exhibited many very large compound fat-cells, some

disintegrated; some granular casts studded with free fat; some isolated granular masses, also fatty; many compound cells, both granular and fatty; many abortive epithelial cells, and even the form of epithelium known as the pavement was both granular and fatty. (Pl. VII, fig. 1.) Notwithstanding the subsidence of the dropsical state of the surface, the urine continued highly albuminous, and the flocculent deposit obtained by allowing the urine to settle assumed a mucoid character. This precipitate was resolved by the microscope into masses of epithelial cells, of every variety belonging to the urinary organs, all of which were either fatty or exhibited the characters of abortive development. There was a great deal of free amorphous granular matter mixed with free fat-granules. The whole deposit had a slight viscous consistence, which in all probability arose from the disintegration of many abortive epithelial cells, yielding their granular and fatty contents, as well as their mucus, to the fluid in which they had become broken up. Each examination of the urine to the time of the patient's death, in May, yielded similar appearances. (Pl. VII, figs. 2, 3, 4.)

Large glomeruli, compound fat-cells, were always present in abundance, as well as highly fatty tube-casts. The patient died the first week in May. The dropsy had increased during the last few weeks. The lungs contained tubercular deposits, some in an active state of ulceration, producing one or more small cavities. One mass of tubercle in the apex of the left lung, about the size of a marble, was of a cheesy consistence, and was easily turned out of what appeared to be a capsule surrounding it.

The liver was nodulated—commonly called hob-nailed. The heart was small, the muscular substance pale and flaccid, and gave evidence under microscope of fatty degeneration of its fibres. (Pl. VII, fig. 9.) Two patches of maculæ albidæ had slightly elevated edges, which enabled the white opalescent film to be easily peeled off. The kidneys were slightly increased in weight, they weighed severally six and six and a half ounces. When the capsule was removed the cortical surface presented a smooth glistening appearance, a spermaceti or wax-like brightness. Here and there minute arborescent vessels were seen.

Towards the concave border of both kidneys the surface was studded with minute sabulous grains of deposit; it gave to the surface a scabrous, rather than a granular appearance, and contrasted strongly with the smoothness of the convex portion. A section of the kidneys displayed the cones of a light salmon-flesh tint. The cortical portion presented well-marked thread-like markings, perpendicular to the surface, as of a deposit of a material glistening like spermaceti. When the kidneys were placed in water the external surface, as well as this section of the cortical part, presented an appearance of being studded with minute glistening grains of a wax-like brightness.

This as well as the former case illustrates the connexion of renal degeneration with the tubercular diathesis. The urinary deposits during life were very characteristic, and afforded evidence of the special form of kidney disease which was present.

The microscopic appearances of these kidneys illustrate the degeneration of epithelial structure and the fatty deposit in the tubes in a very advanced form. The cells from every part of the urinary passages presented indications of this decay even during life, and the post-mortem conditions showed the extent which this process had reached in the cortical part of both kidneys. The minute sand-like grains of glistening appearance were perhaps some Malpighian tufts, stuffed with free fat. The abundance of the compound fat-cells (glomeruli) would serve to indicate the extent and rapidity of the morbid process.

An examination of the tubular structure at the base of the cones, and of a tube taken from the apex, illustrate perhaps no new fact; they nevertheless clearly demonstrate that the progress of degeneration is from without inwards. The tube from the base of the cone is filled with abortive cells and free fat, its walls are deprived of epithelium, and one tube appears filled with nothing but fat and granular matter; while a tube from the apex of the same cone presents the epithelium lining the tube scarcely altered in appearance; a few fatty granules appear in one or two of the cells; and the centre of the tube appears filled with the debris of cells brought down from the base of the cone.

Nodulated kidney. Dr. Bright's third variety—a fatty degeneration, with atrophy and obliteration of vessels and tubes.

Case XIX.—Wm. Pitt, æt. 37, was a patient of the Westminster Hospital in the latter part of 1856, suffering from scrofulous ulceration of the left thigh, above the knee. He was transferred to the care of my colleague, Dr. Fincham, in January, 1857. No history of the case was obtained while in the surgical wards. When he came under Dr. Fincham's observation there was moderate anasarca of the surface. The urine was highly albuminous, pale, and of low specific gravity. No examination of the sediment was made. He died with symptoms of low inflammation of the lungs, and œdema pulmonum. The kidneys were not increased in size; the cortical surface was studded with numerous yellowish small tubercles, about the size of, or rather larger than a mustard seed. A section of the kidneys displayed the cortical part shrunken, and the base of the pyramids approaching close to the circumference of the kidney. The kidney exhibited very much the appearance represented in Dr. Bright's third plate. The cones were frayed out and their tubular structure closely approximated in places to the very cortex. The case was a well-marked one of granular degeneration, and the microscopic conditions of the kidney are represented in Pl. VII, figs. 10—15. The tubercular eminences or granulations seemed formed by Malpighian capsules, the adjacent convoluted tubes being stuffed to repletion with fine granular and fatty matter; in one part not a trace of epithelial structure was visible; in some of the convoluted tubes, here and there one was apparent. The spaces between these tubercles or granular deposits seemed of a denser material, was not so yellow in colour, and under the microscope presented the appearance of condensed fibrous structure. It was with difficulty torn or teazed out into shreds; it broke abruptly. It is represented in figs. 13, 14, 15. An obscure tubular arrangement is visible in parts. A part yielded to the process of tearing by

needles, and film-like bands, very thin and diaphanous, as of compressed and atrophied tubes, became apparent. (Figs. 13 and 15.) In figure 15, the dense fibrous-looking part, *a*, became resolved into and continuous with the tubes frayed out at *b*. This dissection supports Dr. Gairdner's view, that in those parts of the kidney which are no longer subservient to secretion, from the degeneration or destruction of the glandular epithelium, the vessels or tubes become obliterated; the vascular structures, as well as the tubular, become condensed and obsolete; and as this takes place unequally—some tubes and Malpighian tufts continuing stuffed with granular matter and fat, as shown at figs. 11 and 12, an irregularity of surface is the result,—which may be either coarsely granular, roe-like, or tuberculated, according to the extent of atrophy and obliteration which has taken place in the parts contiguous to those in which the deposit has taken place. Dr. George Johnson would call this a case of non-desquamative disease. But the epithelium has evidently been shed or destroyed, from the naked appearance of the half obliterated tubes; no effort of renewal has been made; and the parts lost to the function of secretion, pressed on by surrounding exudative material, become atrophied, obliterated, and dense; they shrink, and give to those isolated parts stuffed with granular and fatty deposit the appearance of tuberculated irregularity of surface.

PLATE VII.

THOMPSON.

Fig. 1.—March 18th.—Urinary deposit composed of faintly granular casts, containing free nuclei, abortive or atrophic epithelial cells, vesical epithelium, fatty; a large compound cell (Gluge's corpuscle), and a crescentic group of granules.

„ 2.—Urinary deposit seven days later. Finely granular tubes containing much free fat and fatty cells. Epithelium of the pelvis and bladder implying fatty decay.

„ 3.—Mucoid or viscid deposit a few days later, composed of masses of several varieties of epithelial cells, all having the appearance of fatty decay.

a, a, a.—Squamous epithelium from the bladder.

b, b.—Epithelium from pelvis of the kidney.

c, c.—Abortive epithelial cells.

d.—Glomerulus or compound fat-cell.

e.—Crystals of lozenge-shaped uric acid.

A great deal of free fat and granular matter dispersed over the field.

„ 4.—Deposit within the last week of life.

a.—Large compound fat-cells, disintegrated or broken up.

b.—Abortive and fatty epithelial cells.

c.—A cast highly fatty, even oily; one or more crystals of uric acid present.

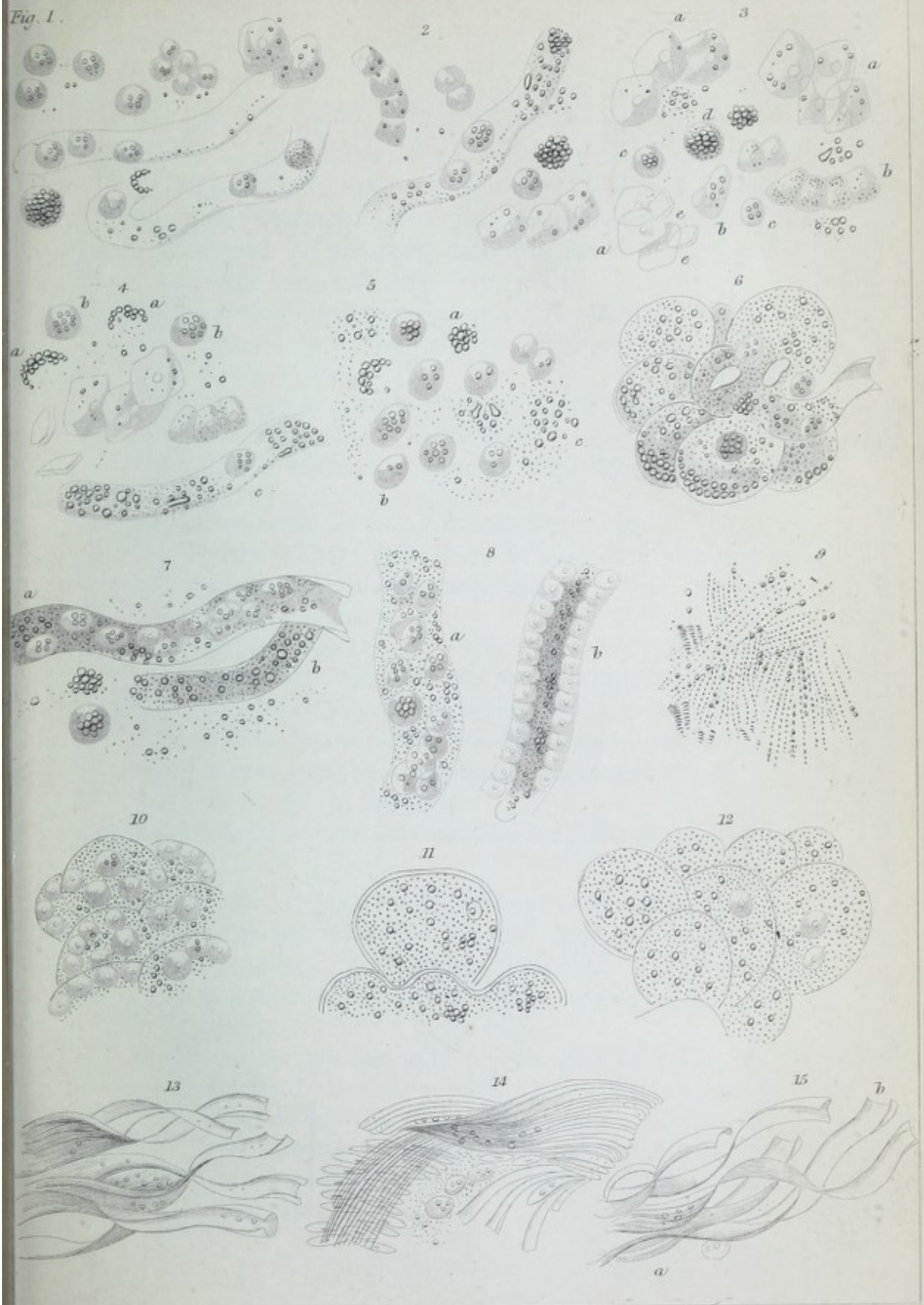
Post-mortem.

„ 5.—One of the wax or spermaceti-like grains on the cortical surface of the kidney.

a.—Large compound cells, some broken up.

b.—Abortive and fatty epithelial cells.

c.—Free fat granules mixed with oily drops and amorphous granular matter dispersed over the field.



R.Basham, ad nat. del.t

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PLATE VII, (*continued*).

Fig. 6.—One of these minute spermaceti-like granules carefully picked out. The convoluted tubular structure was still obscurely visible; the whole appeared a dense deposit of fat grains and granular matter; some large compound cells were visible.

„ 7.—Microscopic appearance of one of the striated wax-like lines of the cortical part, its direction perpendicular to the surface.

a.—The appearance was of a tube filled with free fat, and abortive and fatty epithelium.

b.—A tube containing nothing but free fat and granular matter.

„ 8.—Tubes teazed out from the mammary cones.

a.—From the base of the cone. A tube filled with compound cells, abortive and fatty epithelium, free fat, and granular matter.

b.—A tube from the apex of the cone. The appearances differ but little from the healthy structures. The canal seems filled with fat-cells and granular matter, but the epithelium of the tube appears not to have passed into the stage of fatty degeneration, save in one or two of the cells.

„ 9.—Muscular fibre of left ventricle, fatty and degenerate.

W. Pitt.

„ 10.—Convoluted tubes from base of one of the cones. Some epithelial cells are detached from the basement membrane, and appear imbedded in granular matter and free nuclei; others appear unchanged and still adherent to the tube.

„ 11, 12.—A vertical section of one of the tubercles on the surface of the kidney. Fig. 11 is probably a dilated Mapighian tuft, filled with granular matter and free fat-grains. Convoluted tubes filled with the same material.—Fig. 12 shews convoluted tubes filled with the same.

PLATE VII, (*continued*).

Fig. 13.—A portion of the denser part of the cortex, teazed out with needles. The appearance is that of a tubular structure, empty, flattened, condensed, &c.

„ 14.—A section of the more dense part at the base of one of the cones. It exhibits the character of a fibrous stroma, a portion having the appearance of condensed and atrophied tubular structure. A good deal of free fat was dispersed through it.

„ 15.—A part of the least condensed portion of the last section, teazed out with needles. The appearance is that of an original tube-structure, as at fig. 13, flattened and ribbon-like. A few isolated nuclei and some fat-granules are apparent, but all vestige of the epithelial structure lining the tubes is lost.

CANCER IN CONNEXION WITH MORBUS BRIGHTII.

Case XX.—A female, about thirty-six years of age, C. Bruce, a patient of my friend and colleague, Mr. Holt, whose breast he had removed for cancer, became extensively anasarcous. About six weeks after the operation, some trifling febrile disturbance was followed by hæmaturia, which Mr. Holt at that time thought significant of cancerous deposit in the kidney. I did not see the patient till some six weeks after the occurrence of the hæmaturia; from that period the dropsical condition increased, and when I saw her, both upper and lower extremities, as well as the abdominal cavity, were the seat of dropsical infiltration. The urine had become pale lemon-coloured, of low specific gravity, and abundantly albuminous. The casts which were found in this urine were finely and delicately granular; they were loaded with free nuclei, both in groups, and scattered. The cells, few in number in the casts, were highly granular and fatty, and the corpuscles scattered, and free compound fat-cells, and abortive epithelium. (Pl. VIII, fig. 1.) I had no hesitation in expressing an opinion that the case was one of rapidly advancing fatty degeneration of the kidney. She lived about a fortnight.

At the post-mortem examination the kidneys were found slightly increased in size; they weighed severally six and three-quarters and six ounces. In consistence they were flabby and soft. The colour very pale, and of a waxy whiteness. The capsule being removed, exhibited the cortical surface smooth and glistening, with a few arborescent vessels disposed here and there.

The tubes of the cortical part, when teased out with needles, appeared filled with glistening resplendent fat-grains and epithelium, fatty and abortive. Some tubes, as represented at fig. 4, contained only fat-grains, and those in which cell-structure was still apparent presented cells differing materially in character from the ordinary glandular epithelium of these tubes. They were very small, granular, and seemed to choke up the tube, rather than

to form any part of its structure. The tubes of the pyramids were of ordinary appearance; within the canal, however, were many compound cells and free fat-grains.

The heart was small and flabby; the muscular structure of the ventricles had a dirty look, not the bright colour of well-nourished muscular flesh, and under the microscope very few transverse striæ of the muscular fibrillæ could be found. The fibres were everywhere fatty and degenerated. (Fig. 6.)

I regretted very much that I had not seen this case from the period of the hæmaturia, and that I had no opportunity of examining the urine till within a fortnight of her death. No cancerous deposit existed in the kidneys, nor in any other tissue of the body that was examined. The interval between the incipient stage of hæmaturia and the death did not exceed three months. She was under observation as in-patient the whole period. On admission her general health appeared good and favorable for the operation, or Mr. Holt would not have undertaken it. Yet six weeks after the operation, the wound not having gone on very favorably, without any obvious exciting cause,—confined to bed, and watched and cared for and supplied with every necessary want; a slight febrile disturbance is accompanied by blood in the urine, followed by rapidly increasing dropsy, and the patient dies in less than three months, with kidneys in the most advanced stage of fatty degeneration. The case confirms my opinion that an incipient stage of subacute inflammatory engorgement is the starting point from which issues the rapidly degenerative processes by which cell-growth becomes abortive, degraded, and fatty. Although there were no well-marked characteristics of the scrofulous habit, yet the fatty degeneration of the heart-fibre would show how wide spread must the tendencies have been in the direction of imperfect nutrition and consequent decay.

Fig. 1.

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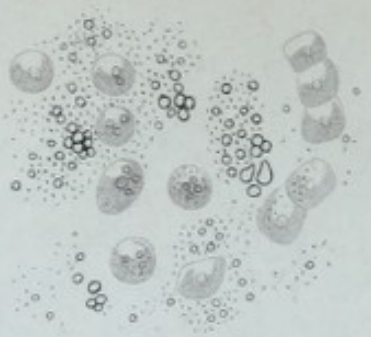

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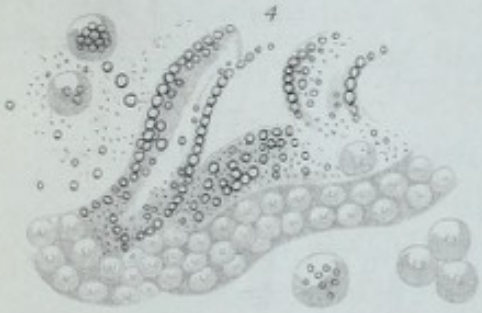

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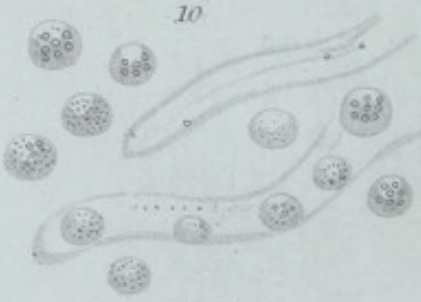

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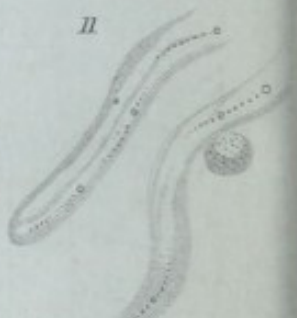

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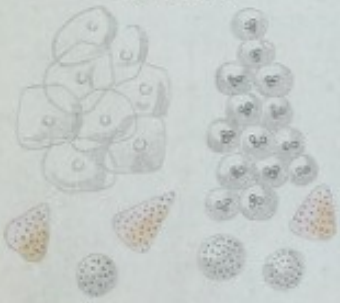

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PLATE VIII.

BRUCE.

Cancer, in connexion with morbus Brightii.

Fig. 1.—Sediment from the urine about ten days before death. Highly granular casts, loaded with free fat-molecules; fatty and abortive epithelial cells.

„ 2.—The turbid juice squeezed from the apex of one of the cones, consisting of granular matter loaded with fat; epithelial cells of the straight tubes but little altered.

„ 3.—Convoluted tubes teazed out of the cortical part, loaded with fat-grains; many compound fat-cells are present; some epithelium more or less abortive.

„ 4.—Other tubes from the cortical part. Several contain nothing but fat-grains; others appear choked with cells much smaller than the ordinary glandular epithelium, with a single nucleus; a few compound fat-cells.

„ 5.—Tubes from the apex of one of the cones. The epithelium lining the tubes is natural in appearance; the canal of the tube contains some fat-cells and free fat.

„ 6.—Heart-fibre from left ventricle. But very few transverse muscular striæ visible.

Atrophied kidney.

„ 7.—Microscopic appearance of one of the nodules on the cortical surface of an atrophied kidney.

The epithelial cells appear detached from the basement membrane. They are small and abortive, and are surrounded by, or imbedded in, a fine molecular granular matter, the debris of broken-up cells, ready to be washed away by the urinary current.

The convoluted tubes still visible are in close apposition with a dense fibrous-looking material, in which the remains of tube-structure can be obscurely traced.

PLATE VIII (*continued*).

Fig. 8.—The heart-fibre, highly granular and fatty.

A. Gearing.

„ 9.—Sediment in the urine of a patient suffering from chronic gout. Exudation or mucous corpuscles; compound granule-cells; amorphous crystals of uric acid (uric acid sand or grit); granular flakes stained with hæmatin.

„ 10.—Very hyaline casts, with compound granule-cells.

„ 11.—Very hyaline casts, unaccompanied by cell-structure.

CHAPTER XI.

DISEASE OF THE KIDNEY, GIVING RISE TO SYMPTOMS OF CEREBRAL DISEASE FROM URÆMIC POISONING.—KIDNEYS FREQUENTLY ATROPHIED AND SHRUNKEN.

Disease of the kidneys will occasionally give rise to symptoms, which appear to have little reference to the renal functions, and which may be and frequently are accepted rather as evidence of disease of the cerebral organs. In these cases dropsy is altogether absent, or the anasarca is of so trifling an amount as to excite but little attention. Symptoms referrible to the brain are those which exclusively attract the notice of the patient, or to which the care of the practitioner is directed. Headache, frontal or sincipital, dimness of vision, simulating the approach of cataract, slight convulsive attacks of an epileptiform character, followed by more aggravated paroxysms of convulsive disorder, constitute one class or series of symptoms: the other is expressed by headache and imperfect vision, followed by dulness of intellect, sluggishness of manner, frequent sopor or drowsiness, or occasional stupor, terminating usually in fatal coma. The absence of dropsy and the insidious approach of these symptoms are well calculated to misdirect the attention of the medical practitioner, and the remedies employed to avert the simulated and suspected apoplectic seizure may be those which hasten forward the fatal effects of uræmic poisoning. The form of renal disease which usually developes these symptoms is the atrophied, shrunken, and nodulated kidney. The

early history of these cases is always very difficult to obtain; for in hospital practice the patient is suddenly seized and is unable to give any reliable account of himself or of his antecedents. It is certain that the progress of this form of disease is exceedingly slow and imperceptible, and scarcely appreciable in its early stage, except by the accidental discovery of albuminous urine and the presence of hyaline casts in the sediment. The urine is not deficient in amount, and for the most part of very low specific gravity. The pathology of these shrunken and atrophied kidneys is at present somewhat obscure. I cannot recognise these wasted kidneys as the last stage of morbus Brightii, or as the sequel to any form of kidney disease associated with general dropsy. These atrophied and wasted kidneys, as Dr. Todd has shown, are, for the most part, closely allied to the gouty diathesis. The microscopic appearance of the renal structure suggests the opinion, that the epithelial cells become gradually disintegrated and broken up, without any power of renewal; the convoluted tubes gradually become empty, and subsequently, with the Malpighian bodies, suffer compression and condensation; while those which remain, scantily or imperfectly supplied with secretory epithelial cells, yield a secretion which is little more than an albuminous fluid of low specific gravity, containing but the faintest trace of urea, or the ordinary essential constituents of the urine. The urea thus retained in the blood and circulating through the system, manifests its poisonous influence specially on the nervous centres, and convulsions, coma, and death, emphatically pronounce the patient poisoned by his own blood.

Case XXI.—The following cases are examples of the obscurity which may surround our diagnosis, if attention be not directed to the character of the urine, the symptoms during life pointing to the brain rather than to the kidneys as the organ implicated in disease.

During the last epidemic of cholera a man about fifty years of age was brought to the hospital in a state of half unconsciousness, who was represented as having suffered from

diarrhœa for a few days, and had been treated for the prevailing epidemic, his present partially comatose condition being mistaken for the collapsed stage of cholera. But the pulse at the wrist, the temperature of the extremities, as well as of the breath and tongue, forbade such a conclusion. Moreover, the countenance and state of the eyes and pupils were not indicative of the algide stage of this epidemic. He passed some water a few hours after admission, and this being found albuminous, was thought a proof that the stage of reaction in cholera had commenced; but a few hyaline tube-casts justified my opinion that it was not the poison of cholera, but of urea, which was hastening on to a fatal termination. The coma increased, and the patient died twenty-four hours after admission. Not a trace of disease was found in the brain; the heart-fibre was very soft, and had a fatty-like feel. It was very granular and fatty. (Pl. VIII, fig. 8.) The kidneys were both very small and shrivelled, and nodulated on the surface. There was an accumulation of fat in the hilum, or cavity of the pelvis. The substance of both organs was hard and dense, and a section displayed the nodular eminences well marked, and of a white granular appearance. Under the microscope the denser portions in immediate contiguity to the nodes on the surface presented a fibrilloid, or even laminated appearance, and in which the remains of tube-structure might be obscurely traced. In those portions where the convoluted structure was still visible, the epithelial cells seemed only here and there in apposition with the basement membrane, and surrounded or imbedded in a fine granular or molecular substance. (Pl. VIII, fig. 7.)

KIDNEY-DISEASE SIMULATING BRAIN-DISEASE.

Coma succeeded by convulsions and death—one kidney atrophied, the other sacculated, and containing, lodged in the dilated calyces, numerous concretions of oxalate of lime.

Case XXII.—On February 24th, 1851.—Edmund Black, æt. 58, was brought to the hospital in a state of unconscious-

ness and partial coma. He breathed deeply and stertorously, with a blowing, expiratory movement of the lips and cheeks. The eyes were glazed, the pupils contracted, but were, to some extent, obedient to the stimulus of light. The surface of the body was warm and clammy from a cutaneous moisture, which emitted a faint, sickly (urinous) odour. The systolic sound was prolonged, and a murmur was heard both at the base and apex of the heart, and also to the left, under the mamma. The pulse was full and hard, about 100. There was no facial paralysis apparent. There was no rigidity of the extremities of either side; and reflex movements were slightly excited equally on both sides. Deglutition was imperfect, fluid given to drink passed back again by the corners of the mouth. He could not be roused to any degree of consciousness. Those who brought him to the hospital could give but an imperfect account of his past history. He came from an obscure lodging-house, where he appears to have been taken ill some three days prior to admission. He had complained of headache, which was followed by stupor, and this terminating in a more profound state of unconsciousness, a practitioner at once resorted to the expedient under which the ignorant and inexperienced equally take refuge —of opening a vein in the arm. The comatose condition increased, as might reasonably be expected. He was ordered stimulating enemata, and during the night deglutition returned, and he was able to swallow a little fluid nourishment. His pulse became softer and less frequent, and in the morning consciousness was partially restored, and he was able to answer some questions, though incoherently. At 9 a.m. the breathing was reported to be free from stertor; the pupils more natural and obedient to the stimulus of light. He passed some water, which was found to be albuminous, and contained a few hyaline casts and many of the so-called mucus-corpuscles. During the course of the day he became very restless, raising himself in bed, making many efforts to get up, and, as the clinical assistant reported, displaying many of the symptoms of a person suffering from delirium tremens. Profuse perspiration, having a strong urinous odour, broke out in the course of the

afternoon. The intellect became more rational; he took fluid nourishment without difficulty; the bowels had acted from the effect of stimulating enemata, and he appeared gradually passing out of the comatose condition, when convulsions suddenly supervened. They were, according to the report of those who were in attendance, of an epileptiform character; they lasted about three hours, when they suddenly ceased, and the patient died at 10 p.m.

Post-mortem appearances.—The external aspect of the body was natural. The pulmonary cavity presented no trace of disease. The heart was large, and certainly hypertrophied. There was a considerable atheromatous deposit in the aortic sinus; and the aortic valves were opaque, and somewhat rigid and unyielding. The mitral valve was thickened and stiff at its margin. The bladder contained a small quantity of transparent but albuminous urine. The left kidney was mottled on the surface, slightly lobulated, and covered with nodular eminences; the organ was shrivelled, of less than the usual size, and cut with a dense, hard resistance. Examined under the microscope, the tubes appeared in places compressed into a fibroid appearance. The appearances were very similar to those represented in Pl. VIII, fig. 7, of an atrophied kidney. The right kidney was large and sacculated. The cortical surface in parts was so much dilated, as to display the appearance of cysts. On a section being made, the dilated kidney contained four ounces of a sero-urinary fluid. The infundibulum of the ureter was blocked up by the impaction of a forked or branched concretion of urate of ammonia, mixed with small proportions of oxalate of lime. The calyces were severally dilated into cup-shaped cysts, containing numerous (fourteen) concretions of a dark brown colour, smooth surface, about the size of castor oil seeds, which by analysis were composed of oxalate of lime, with a minute uric acid nucleus. In the brain nothing was observed worthy of note, there was no indication of disease. The arachnoid was slightly opaque; the pia mater was pale; the cineritious substance was pale; there was no excess of fluid in the ventricles.

Neither the hands nor feet exhibited any trace of gouty deposit; but in the cartilage of both ears were one or two minute spots of a white material, which proved, on examination, to be urate of soda. This latter fact would show that the patient was of the gouty habit of body, if the state of the kidney did not otherwise declare such constitutional disposition. It was much to be regretted that no history of the patient could be obtained; nevertheless, in relation to the cerebral symptoms and the absence of all cerebral lesion, and the presence of that form of renal disorganization most calculated to be followed by the sudden arrest of the excretion of urea by the kidneys, this case is one of manifest interest.

The point of greatest practical value is the means of determining the cause of the coma and convulsive paroxysms, the signs by which we may confidently pronounce the coma to be caused by uræmic poisoning, and not by cerebral disorganization. In the absence of any previous history, or any marked antecedent symptoms, the task is the more difficult, but attention to the following points will afford a trustworthy guide.

1. The absence of paralysis, either facial or hemiplegic. The convulsive movements partaking chiefly of the clonic character, consisting of alternate contractions and relaxations, without any permanent rigidity or flaccidity.

The tendency to coma or stupor in the intervals of the paroxysms, and, except towards the latter or fatal period, an evident susceptibility to returning consciousness.

2. The peculiar odour of the cutaneous secretions.

3. The albuminous state of the urine.

All these conditions were fulfilled in this case. There was no facial distortion, or evidence of paralysis anywhere. The features were perfectly symmetrical, which was easily recognised when the blowing, puffing expirations distended the cheeks and lips.

Irritating the soles of the feet produced equal reflex movements on either side, and both arms were equally moved as the patient gradually exhibited indications of returning consciousness. Deglutition was only temporarily suspended. The odour

from the surface of the body in these cases is generally very peculiar. I have more than once noticed this urinous smell in similar cases, and when to this is added an albuminous urine, with hyaline casts in the sediment, little doubt need be entertained that the patient is the subject of uræmic poisoning. Such cases certainly hold out very faint prospects of being benefited by remedies. When symptoms of this class declare themselves, the renal disorder has advanced to its final stage consistent with life.

The most appropriate means of relief are sinapisms to the extremities, stimulating hydrogogue enemata, and if the patient can swallow, the chlorine mixture, made by dissolving ten grains of chlorate of potass in one drachm of hydrochloric acid and filling a ten-ounce bottle with water, should be at once administered. Nutriment and moderate stimulants being given with discretion.

The connexion of these atrophied kindneys with the gouty habit is obscurely shadowed in this case. As no history could be obtained, and as the feet and hands presented no evidence of previous gouty attacks, the inference of this constitutional taint must have been left to the evidence of the numerous concretions of oxalate of lime, had not those white deposits of urate of soda in the cartilages of both ears unequivocally pronounced in favour of the gouty habit. My own observations confirm Dr. Garrod's opinion, that the cartilages of the ear are hardly ever exempt from this deposit in the strongly pronounced gouty habit of body; and where there is any doubt of the diathesis of the individual, an examination of the helix or outer margin of the ear, or of the cavitas innominata, or of the antihelix, will set the question in the majority of cases at rest, by displaying one or more minute white deposits of the urate of soda.

But the numerous concretions of oxalate of lime lodged in the calyces of the right kidney supply evidence of the constitutional predisposition to the uric acid diathesis, and therefore inferentially, of the tendency during life to all the morbid consequences incidental to the gouty habit. As redundancy of uric acid is the source of those morbid processes denominated

gouty, so is it also the basis on which oxalate of lime is formed. Oxalate of lime crystals can never be found in fresh or recently passed urine; they are formed by a species of urinary fermentation set up by the mucus present, and are abundant in direct proportion to the amount of uric acid originally secreted.

Lehmann, in the appendix to vol. iii. of his 'Physiological Chemistry,' p. 453, says, "We must not forget that oxalate of lime may possibly be formed during this process. We know there is a close connexion between the excretion of uric acid and the formation of this salt, from the circumstance that in most specimens of urine, both sedimentary and non-sedimentary, oxalate of lime cannot be recognised by the microscope so long as the fluid is fresh, but as soon as crystals of uric acid present themselves, crystals of oxalate of lime may also be discovered; indeed, we generally find that in morbid urine the abundance of these crystals is proportional to the rapidity with which free uric acid separates."

Our present knowledge of the metamorphosis of uric acid under the influence of oxidizing agencies, and its conversion into oxalic acid, urea, and allantoin, or the simple conversion of it into urea and oxalic acid, through the agency of yeast and an alkali at a high temperature, will lead to the inference that the presence of oxalate of lime as a pathological product is to be traced to the transformation of an already formed redundancy of uric acid, rather than to the older conceived notion, that the presence of this acid was to be accounted for by special modes of living or diet. A vegetable diet has been thought capable of generating an excess of oxalic acid in the organism, but it will equally engender an apparent excess of uric acid; that is, in many constitutions a vegetable diet, or excess of vegetables or fruits, will, it is well known, cause the appearance of uric acid crystals in the urine. That the source of oxalic acid in the urine cannot be traced to the presence of preformed oxalates in vegetable articles of food, is, I think, proved by the fact that acid oxalates, or oxalate of lime, are not present in the great majority of vegetables ordinarily used as food.

An acid oxalate of potash is present in the petiole or leaf-stalk of *Rheum palmatum* and *undulatum*, eaten as spring tart. In the family of Chenopodeæ the oxalate of soda abounds, but the only species employed as vegetables are the spinach and the beetroot. The *Salsolas* and the *Salicornias*, once so valuable for the soda which their ash contained, are not eaten except in the rare and exceptional form of pickled samphire. *Crithmum maritimum* and *Salicornia herbacea* are severally used thus, the latter under the common name of glasswort. The former is the true samphire, and I believe does not contain oxalic acid.

The amount of oxalate of lime in the root of Jamaica ginger, and the quantity of that condiment taken with our food, are both too insignificant to be regarded. Even were the amount of oxalates in our vegetable food greater than is here represented, it is not difficult of proof that the preformed soluble oxalates are, in their passage through the organism, transformed into carbonates of their base, as the tartrates, citates, malates, and acetates. I cannot regard, therefore, the presence of oxalic acid in the urine, or of oxalate of lime as a concretion, as in any way dependent on the presence of oxalic acid in the vegetables we eat. Totally irrespective of diet, disturbance of the respiratory functions gives rise to augmentation of, or rather to the presence of, oxalate of lime in the urine, but not unless a large proportion of uric acid is first formed. It is constantly seen in the urine of patients suffering from emphysema, as well as in phthisis pulmonalis.

I have preparations of this sediment from the urine in these diseases, in which the field is covered with innumerable octohedra of this salt. But in specimens of such urine, if all the uric acid be at once precipitated so soon as passed by acetic or hydrochloric acid, no oxalate of lime makes its appearance. Whatever leads to the augmentation of uric acid in the organism may also lead to the development of oxalates in the urine. Both a vegetable diet and an animal diet equally tend to the increase of uric acid; disturbance of the respiratory process also increases the proportion of uric acid in the urine; and each

of these severally are recognised as conditions favorable to the presence of oxalate of lime. I think then it cannot be doubted that oxalate of lime is formed out of the metamorphosis of uric acid. Certainly, so far as the formation of oxalate of lime sediment in urine goes, I think the evidence is conclusive. But whether concretions of oxalate of lime, occurring as renal calculi, are formed by an analogous metamorphosis, is a question still involved in obscurity.

It is certain that the nucleus of all renal calculi is either uric acid or oxalate of lime, and these two pathological products are so intimately connected and appear so mutually dependent, as either to alternate in a succession of layers, which is the case in the so-called hempseed renal calculus, or, as in many uric acid calculi, a nucleus of oxalate of lime becomes surrounded by layer upon layer of uric acid. The calculi which were found in this sacculated kidney are beautiful specimens of this variety of the oxalate-of-lime renal calculus. They are perfectly smooth on the surface, of an oblong ovoid shape, of a mottled yellowish brown colour, of an appearance not unlike a castor oil seed, and on section displaying a number of concentric layers surrounding a uric acid nucleus.

The sacculated condition of the kidney appeared to have been brought about by the impaction of a concretion lodged in the infundibulum of the pelvis. This was very friable, branched, of dirty dark grey colour, and that portion which was broken off for analysis was composed principally of urate of ammonia, and the triple phosphate. Whether any of the renal calculi formed a nucleus to this deposit has not been ascertained, as it was desirable to preserve the preparation to illustrate the manner in which these sacculated kidneys are formed. The obstruction to the passage of urine along the ureter is only gradually completed; and in most cases the canal is not altogether impervious, as was the case here. The urine is secreted faster than the impeded canal can discharge it. In this way a steady, continuous, but not violent or over-strained pressure is sustained. The dilatation of the kidney thus slowly effected, leads to obliteration of the cortical or secreting part

of the organ, and very little of the convoluted structure is ultimately left visible. In this respect the state of both kidneys becomes similar, for the atrophy and shrinking of the left kidney brought about the same deficiency of secreting structure which the dilatation and a sacculated condition produced in the right; so that eventually both organs were inoperative for the complete excretion of the urinary constituents; these, or rather the urea, retained in the blood, which direct experiment has proved to be the poisonous agent, soon displayed its disturbing influence, and headache, defective vision, convulsive movements, coma, and death, comprise a series of symptoms eminently calculated to mislead our judgment as to the cause of the fatal termination.

Chronic gout—albuminuria—hyaline casts—abortive epithelium —large compound granule-cells.

Case XXIII.—The case of Alfred Gearing, æt. 34, a painter, is a good example of chronic gout, hereditary and acquired, with albuminuria, and probably atrophied kidneys. It is not often that we witness such ravages of the disease at this comparatively early period of life, except where the habits of the individual have been engrafted on a strong constitutional predisposition to the uric acid diathesis. I select this case, moreover, as an example of the ravages which gout inflicts on the renal organs, and as an illustration that in chronic gout we may expect to find albuminous urine with tube-casts; and that gout ultimately leads to disorganized kidneys, but of a character very different to what we meet with in morbus Brightii. In that class of renal disorders the kidneys most usually exceed in weight the healthy organ, while in gout the kidney more frequently becomes atrophied, shrunken, nodulated, and deficient in size and weight. Dr. Todd has very appropriately named this *the gouty kidney*. The atrophied kidneys, associated as they are with albuminous urine and tube-casts,

have been considered, more particularly by some Continental pathologists, as the third stage of Bright's disease—

The first being that of hyperæmia,
The second that of exudation and increased weight,
The third that of atrophy and complete degeneration.

But I cannot accede to this view. I have never been able to satisfy myself that the atrophied and contracted kidney had ever been the seat of exudation, or had passed through the stage of inflammatory engorgement, and its tubes blocked and choked with a granular and fatty molecular deposit, as is the case in true morbus Brightii.

These cases of atrophied kidney rarely exhibit any amount of dropsy. Trifling anasarca of the ankles may occur, the effect of asthenia and debility, but it is neither a constant nor a necessary symptom. The history of such cases furnishes no record of any antecedent dropsy. The urine is usually pale, of a low specific gravity at the latter periods of the disorder, and contains more or less albumen. At an earlier period uric acid and the urates abound, and may be observed as crystalline products in the sediment. Oxalate of lime is also frequently present. In fatal cases the cause of death may most frequently be traced to symptoms of uræmic poisoning, referrible to the influence of the retained urea on the nervous centres.

The atrophied kidney, then, though it gives rise to albuminous urine, never produces renal dropsy, nor any of the symptoms characteristic of Bright's disease of the kidney. It must be considered a disease of the kidney *sui generis*. It may occur in individuals who have not, during life, exhibited any gouty symptoms, but as it is most frequently associated with the gouty habit of body, it may, in accordance with Dr. Todd's views, be significantly designated as the *gouty kidney*.

This patient, Gearing, had been many times in the hospital with attacks of gout, but it is only recently that albumen had been observed in his urine. He had the first attack at the early age of seventeen; if his description can be relied on, this was

very slight, and confined to the knuckles of one hand. An interval of some years occurred before he had another. Recently they have become more frequent and more severe. His father suffered from the same disease. He has of late been out of work, and his means scanty. Has drunk freely of beer and gin. Five days previous to admission, he suffered from wandering pains in the limbs, settling in the elbows, and extending to the fingers of both hands, which became the seat of gouty inflammation. The ankles of both feet and the toes became similarly affected. The first and second phalangeal joints of the right hand were the seat of a deposit of urate of soda. All the joints of both hands are enlarged and thickened from previous inflammatory attacks. The tongue was coated with a white creamy fur; the pulse was full and rapid; the urine was clear, but threw down uric acid crystals on cooling, and was albuminous. The bowels were sluggish. He was ordered three grains of calomel and a grain of the acetic extract of colchicum at bed-time, and the following draught to be taken with citric acid after effervescence ceased:

℞ Potassæ bicarb. gr. x.
Ammoniæ sesquicarb. gr. iii.
Vini semini colchici, ℥x.
Aquæ, ℥j. M.
Fiat haustus.

The hands were placed in the spongio-piline gloves. Four days after, the inflammatory state of the hands and feet abated. There was less swelling and more mobility about the joints. The bowels acted very copiously. This active state of the bowels continued for several days, and was to be traced to the influence of the colchicum, for it ceased so soon as the colchicum was discontinued.

On the 31st of December, eleven days after admission, he was pronounced convalescent from this attack; but the joints of the fingers of both hands, by their thickened state, afforded proof of the frequency with which gouty inflammation must have assailed them, which was further confirmed by several

spots of chalky whiteness beneath the cuticle, resulting from deposits of urate of soda, which show a greater disposition to form in and around the lesser joints of the fingers than in any other part.

The patient went out daily for air and exercise. Whether, on these occasions, he was tempted to break through the abstinence from beer and fermented drinks which had been enjoined, or from exposure to cold, or from the gouty material not having been thoroughly expelled, on the 14th of January he suffered a relapse, and the gouty inflammation returned to the hands with more intensity than before. The urine was clear, moderate in quantity, and slightly albuminous. I determined this time to treat him without colchicum; he was ordered only the bicarbonate of potash and citric acid. In eight days this attack subsided, and by the 31st of January he was pronounced convalescent, and on the 4th of February was discharged. In the following year, on the 27th January, 1857, he was again admitted, suffering from gouty inflammation of both hands, and the following record was kept by Mr. Perreau, the clinical assistant: There was swelling and redness of the forefinger of the left and little finger of the right hand, accompanied by a deposit of gout stone, which was white and visible to the eye. There were wandering pains in the larger joints, settling more intensely in the right knee and foot, which became more aggravated at night and towards morning. The tongue was clean, pulse slow and irregular; sleeps badly; urine high coloured, cloudy, and deposited pink urates on cooling; redissolved by heat, which, being increased, caused the urine to become hazy by the deposit of albumen. During the last two months he had not been free from gout; inflammation lurking about the smaller joints, as fast as it subsided in one finger reappearing in another. From the aggravation of his sufferings at night-time, and having had no rest for some time, he was ordered half-grain doses of morphia, with two of the acetic extract of colchicum, at bed-time, and the carbonate and acetate of potass in effervescence with citric acid, three or four times daily.

Punctures were made with the point of a lancet through the

cuticle immediately over the deposits of urate of soda, which were let out with great relief to the patient, as the gouty inflammation did not re-appear at these joints.

On the 5th of February the ring finger of the left hand became much swollen, and a gouty deposit could be seen through the inflamed cuticle; this was also let out, with relief to the local symptoms. He suffered at this time from erratic pains, flying from joint to joint, principally affecting the shoulders, elbows and knees. He complained also of a peculiar distressing sensation across the superior portion of the sacrum, which he described as similar to a pail of cold water being dashed on it.

On the 9th of February the gouty inflammation of the hands had disappeared, but he continued to pass very bad nights, from the wandering pains in the larger joints. The colchicum had been discontinued after the fourth night; but he continued the morphia.

The urine had become quite clear, very pale, of specific gravity about 1015, and albuminous. The sediment of a sample, left at rest for a few hours, was examined under the microscope, and the objects seen were a few granular corpuscles and pus-cells, many large compound granule-cells—probably epithelium, in a high state of degeneration—several amorphous crystals of uric acid (grit), and a few flakes of granular appearance highly stained with hæmatin; no casts were observed. (Pl. VIII, fig. 9.) The saline medicine was continued. He had occasional purgatives of blue pill and colocynth, followed by a warm purgative draught in the morning. The urine became more abundant, of a sp. gr. 1010, and decidedly less albuminous.

By the end of February he had greatly improved in health. On the 9th of March the urine still slightly albuminous, hazy by heat, of a sp. gr. of 1010, was again examined under the microscope. Some fine transparent casts were seen, containing granular cells, in which no nucleus could be detected; large compound granule-cells, with very resplendent fat-granules within, and numerous scattered granule-cells looking like abortive epithelial cells. (Pl. VIII, figs. 10, 11.) There were also a great many granular flakes, stained of an orange red colour,

which I have reason to think was derived from the urine rather than from the blood.

On the 19th of March he was discharged in a very improved state of health. The spots from which the gouty concretions had been let out healed with some difficulty, and one continued to discharge a white creamy fluid of urate of soda till within a day or two of his discharge.

There are several points worthy of observation in this case of Gearing's.

Firstly. The early age at which the gouty deposit of urate of soda was formed, implying an hereditary predisposition.

Secondly. The little influence which colchicum appeared to exercise over the gouty inflammation.

Thirdly. The probable extent and nature of the renal disorganization which might be going on.

The ravages which the gouty inflammation had produced in the lesser joints of the hands, and the abundance of the urate which had been deposited, plainly testified to the inveteracy of the gouty material formed within the organism, and this should be regarded quite as much, if not more, the result of constitutional predisposition inherited, than caused by habits, however irregular or provocative of gout.

It can hardly be conceived that any amount of gout-forming food or drink, or habits however calculated to promote gout, should, without a marked constitutional predisposition, have engendered so much gouty material as, at the age of thirty-four, to have crippled the hands and lodged "chalk-stones" in almost every joint. This man's father was gouty—died of gout. The frequency of the transmission of this disease to offspring is nearly four times as great from the father as compared with the mother. That is, in forty-four cases of gout, where the parents were gouty, thirty-two were hereditary from the father, nine from the mother, and only three from both father and mother. These data are on the authority of Sir C. Scudamore. This is to be explained by the fact that gout is far more frequent among males than among females.

If we can believe this patient, he had gouty inflammation of

the hand at seventeen. If this be true, nothing could exhibit more forcibly the hereditary taint and disposition; for it is not conceivable that at that age habits had been acquired which were in themselves sufficient to generate gout. His subsequent course of life, however, had without doubt irremediably stamped on the constitution such susceptibility to the formation of gouty material, that the most trifling disturbance to the equilibrium of health sufficed for the production of fresh matter, and a renewal of the gouty attack.

Colchicum appeared to have had little influence over the gouty paroxysm. This remedy, once so popular, and regarded by some almost as a specific for gout, has fallen much in general estimation as a remedy in this disease. Experience tells us, that if it shortens a present paroxysm, it shortens also the intervals between the attacks. But I think this is only true when the patient has habituated himself to the use of colchicum, or when the remedy has been employed in sufficiently large doses to produce a sensible effect both on the nervous and circulating, as well as the excretory, systems.

There is a fashion in remedies as well as in dress. That which has been once popular and notorious, is very likely to be in its turn disregarded, and even neglected; and this is certain when a false value or a mistaken reputation attaches to medicinal remedies. One of the clearest duties of the physician, particularly he who is engaged in clinical teaching, is to determine on what principle a remedy acts; to be not content only with the *apparent* results of a given remedy, but able to explain, or even to demonstrate, the manner of operation, and consequently to show the reason why it is entitled to our confidence, and why its action may be expected to be beneficial in any particular disease.

Colchicum in medicinal doses will act either as a purgative or diuretic. In doses sufficiently large to produce the former effect it operates powerfully on the nervous system as a sedative, and consequently displays a corresponding influence over the force and frequency of the heart's action. It is thus supposed beneficially to control inflammatory action by lessening

the force of the circulation. In such doses it also acts violently on the mucous membrane of the intestines, and produces the well-known colchicum stools. The tincture, or the wine, or the acetic extract from the cormus, has been usually employed for these purposes. It may be regarded as doubtful whether such effects are productive of benefit; and experience, both of patient and physician, proclaims that colchicum thus given produces no lasting benefit; on the contrary, leaves the patient more susceptible to the gouty influences, and contracts the intervals of the attacks. But colchicum in small doses acts as a diuretic. The kidneys are the channels through which the morbid element of gout, the uric acid, is eliminated from the system. They are the special emunctories of this constituent of the urine, which, if not excreted in proportion to the rapidity of its formation, is retained in the blood, and becomes the proximate cause of the gouty inflammation. Is there anything peculiar in the action of colchicum as a diuretic which renders it, in small doses, specially remediable in this form of disease?

This question may, I think, be answered in the affirmative; for it can be shown that colchicum increases the amount of urea and uric acid excreted. ('Therapeutic Action of Colchicum,' by Dr. J. Maclagan, 'Monthly Journal of Medical Science,' January, 1852.) Now whatever, directly or indirectly, aids in the elimination from the organism of the uric acid and its allied constituent urea, must inferentially remove the morbid material of gout. Experience confirms these views, for while colchicum in large doses, acting as a sedative and purgative, but temporarily and imperfectly controls the gouty paroxysm, in small and frequently repeated quantities it promotes the excretion through the natural outlet of that material which is the immediate source of the disease. To obtain these effects from colchicum, from five to ten minims of the wine of the cormus should be given about three times a day in conjunction with any diuretic salt; the bicarbonate of potass in effervescence with lemon-juice is a convenient vehicle. The dose of the wine should never exceed ten drops.

In the case under consideration the character of the urinary

sediment, together with the presence of albumen, though in small quantity, testified plainly enough that the kidneys were undergoing a slow but certain process of disorganization. This, in the gouty kidney, usually consists in a shrinking or atrophy of the organ; the surface of the kidney becomes nodulated; the cortical structure seems entirely wasted, so that it forms a mere line of investment, the base of the cones approaching closely to the margin, and the straight tubular structure of these parts becoming frayed or spread out. The tubular structure of the cones remains unchanged to the last; so that it is in the cortical portion alone that the process of atrophy or wasting has proceeded. This seems to consist in the gradual destruction and breaking-up of the glandular epithelium of the convoluted tubes, without any effort of reproduction. In the different conditions of the kidney in morbus Brightii, the tubes are filled either with a fine molecular granular matter, with more or less fat intermixed, or in the true fatty kidney, with the latter product predominating; these are, with every probability, derived from the disintegration or breaking-up of healthy or abortive cells; but the material is retained, and in the fatty kidney the fat-nuclei, aggregating together, form accumulations giving a waxy or spermaceti-like aspect to the section of the organ. But in the contracted and atrophied kidney the very reverse of this obtains. The cortical portion of the kidney, or what remains of it, appears to consist of a condensed fibrous structure, as of tubes compressed into filaments. Where the tube-structure is yet apparent, it appears deprived of its epithelial lining. The epithelial cells in those convoluted tubes which are yet visible appear detached and mixed with a fine granular matter, ready to be washed away by the stream.

The glandular epithelial cells thus isolated readily break up in the watery albuminous fluid poured out from the Malpighian tufts, and the debris is washed away in the current. There is no reproduction of cell-structure, and the empty tubes become compressed and consolidated, and diminished bulk and shrinking of the organ is the natural consequence.

These conditions are verified by the microscopic appearances

of the tube-structure of an atrophied kidney. (Pl. VIII, fig. 7.) During the last cholera epidemic, a man about fifty years of age was admitted, suffering from what was thought to be choleraic diarrhœa, which had been on him for ten days; it ceased the day after admission, and he became comatose for thirty-six hours, with some stertor, but no convulsions. The urine passed six hours before death was albuminous. There was nothing in the brain to account for the coma. Both kidneys were shrunken and atrophied, nodulated on the surface, and containing an abundance of fat in the cavity of the pelvis. The left kidney was the smallest, and weighed less than three ounces. (Preparation, Hospital Museum, Ser. VII, 1, 2.) The right was not so far advanced. The cortical portion of the kidney was seen only in the nodular eminences, which had a white-fawn colour. The base of the cones seemed to merge, by the frayed-out tubes, into this thin cortex. The microscopic character of one of the nodular eminences is represented in Pl. VIII, fig. 7. The tubes appear everywhere deprived of epithelium. All the cells tached, and buried in granular material. These appearances visible are degradually merged into a dense fibrous-looking structure, in which all tubular form was lost.

The frequent occurrence of atrophy of the renal structure in the gouty habit of body leads to the inference that the gouty material, in its passage through the kidney, ultimately exercises a destructive influence on cell-structure. How this is brought about we are at present ignorant. Whether in this kind of disorganization we have an example of atrophy following long-continued over activity of function, cannot yet be determined. It would almost seem, from the appearance of the renal structures, that the constant strain occasioned by the presence of the morbid material of gout led to the gradual destruction of the gland-cells, without any tendency or effort to reproduction. The debris of the cells is carried away by the urinary current, and the empty tubes, pressed on by surrounding parts, collapse, shrink, and eventually appear condensed into a fibrous-looking structure, giving to the kidney a contracted nodular surface.

CHAPTER XII.

DROPSY AND ALBUMINOUS URINE IN CONNEXION WITH PREGNANCY.

Œdema of the feet and ankles is a symptom of such frequent occurrence in the later and advanced periods of pregnancy, that to associate it with dropsy, or gravely to consider it a morbid condition, would be justly considered an excess of pathological refinement. Yet this swelling of the feet and ankles, which is, in the majority of cases, but a temporary inconvenience, arises from causes similar to those which may in certain cases produce a more general dropsy, and even give rise to much distress and serious alarm, if not correctly interpreted. The pressure of the gravid uterus interferes more or less with the free circulation of blood through the common iliac veins and vena cava, and this obstruction produces a swollen or œdematous state of the ankles and feet. The horizontal position relieves the pressure, and the swelling disappears. After delivery, with the removal of the cause, the swelling does not return.

In other cases, however, the influence of the gravid uterus extends further, and by pressure on contiguous parts indirectly interferes with the circulation in the more important abdominal organs. This indirect pressure may be exercised as high up as the hepatic duct, and give rise to jaundice, which also quickly disappears after delivery. Such cases, however, are not

of common occurrence. It occasionally happens that the swelling of the ankles and feet gradually increases, and extends higher up the extremities, involving the thighs, and producing an anasarcous condition of the inferior parts of the abdomen. Even the arms and back of the hands may swell. The patient becomes alarmed. The medical attendant is sent for. He finds the urine scanty, dark-coloured, containing blood perhaps, and it is albuminous. These symptoms appear formidable. They are such as express the early stage of morbus Brightii, and they are calculated to excite the gravest apprehensions. But the patient goes her full time. Delivery takes place; the dropsical state rapidly disappears; the urine, which had continued albuminous up to this period, becomes abundant, free from all trace of albumen, and altogether healthy. These apparently formidable symptoms have been brought about by the indirect pressure exercised by the gravid uterus on the emulgent veins, and obstructed circulation through the kidneys follows—engorgement, hæmaturia, albuminous urine, and dropsy succeed, and continue so long as the uterine pressure continues; that removed, the unobstructed blood freely flows, and secretion goes on unimpeded, and for a time even with increased activity. The kidneys, in these cases, do not appear to suffer any permanent mischief, or exhibit any tendency to subsequent disorganization. Dropsy, therefore, even with albuminous urine, in connexion with pregnancy, may be of no serious consequence. But there are cases in which, either from the peculiar idiosyncrasy of the patient or from exposure to the exciting causes of renal inflammation, or from the existence of renal disorder previous to conception, permanent disorganization of the kidneys takes place, and confirmed morbus Brightii is the result.

It may be easily conceived that in special constitutions, the scrofulous for instance, the amount of renal engorgement, produced by pressure on the emulgent veins continuing for some weeks, may lead to such modification of cell-structure in the convoluted tubes and Malpighian bodies as to lay the foundation for the more serious disorganization which follows; and

therefore, in such cases, we may not be surprised to find that although after delivery the dropsical condition has rapidly disappeared, yet that after a few weeks it has returned, and with it urine highly albuminous, as well as other indications of hydremia, so characteristic of renal dropsy.

If the renal disorder has either pre-existed or has been excited at the period of, or even subsequent to conception, then those concomitants of the disease, of which the quality and character of the blood are not the least remarkable, exercise a palpable influence over the development of the ovum, and abortion is almost certain to ensue. Experience justifies the assertion, that a female pregnant, and otherwise *apparently* healthy, exposed to any of the ordinary exciting causes of renal dropsy, will just as readily suffer as if pregnancy did not exist. The reason why such cases are not more frequent may be found in the greater care with which a woman's habits are regulated who is conscious of pregnancy, and consequently that exposure to cold and wet, sudden chills, &c., are scrupulously avoided; and, moreover, that this form of dropsy, the renal, is not so common among women as it is in the male sex. There are thus two forms of dropsy which may co-exist with pregnancy —one limited in duration, dependent on and caused by indirect uterine pressure on the emulgent veins, and disappearing rapidly after delivery; the other arising from structural changes in the kidneys, quite independent of and unconnected with the state of the uterus; usually leading to abortion; or, if the patient goes her full time, returning after parturition, and running a chronic and perhaps intractable course. The symptoms which characterise these two forms, springing as both do from the kidneys, have necessarily much in common. There is little to distinguish them. The extent of anasarca does not differ. In both the urine may be scanty and high coloured; in both it is albuminous. There is frequency of micturition in each, the respiratory function may be disturbed, and the heart's action hurried and irritable. Diarrhœa may be a symptom in each, or head-symptoms may be present in either. From symptoms so similar—they may be called identical—a correct

diagnosis is with difficulty formed, but a microscopic examination of the urinary sediment will promptly decide the point.

Case XXIV.—Catherine Marks, aged 26, a married woman, the mother of five children, three of whom are living, was admitted March 27th, suffering from general dropsy. The face was œdematous, as were also the back of the hands, the arms, legs, thighs, and lower part of abdomen. This cavity also contained fluid. The breathing was much oppressed, and the respirations frequent and short, accompanied by a troublesome cough, with very scanty expectoration of a catarrhal mucus. The stomach was irritable, and there had been occasional vomiting. The pulse was small and frequent, but its ratio to the respirations was not increased. Her water was scanty and micturition very frequent, disturbing her rest. The water was of a pale colour, highly albuminous, and threw down at rest a somewhat copious deposit of a flocculent appearance. Its character is represented Pl. IX, fig. 1, and consisted of every variety of epithelial structure to be found in the urinary organs. Some hyaline tube-casts, containing a few glandular epithelial cells; here and there a pus-cell; several large compound granule-cells, and several botryoidal clusters of fat-granules. The various forms of epithelium were mostly held together in groups, as if adherent, or coalescing by some viscid secretion accompanying them. Some of the casts were very granular. Many of the isolated epithelial cells were of aborted appearance, having four, five, and six nuclei. An unfavorable opinion was expressed as to the termination of the disorder, for no doubt could be entertained from these appearances in the sediment that the kidneys were rapidly degenerating. The patient stated that during her first two pregnancies her health continued good, but that on the occasion of her third pregnancy she noticed that her feet and ankles would swell to an inconvenient extent. At this period she was employed in a laundry, and exposed constantly to wet feet; and from her shoes being bad, she would stand for hours in all but naked feet, wet and cold. She went her full period, and all the swelling went away immediately after de-

livery. At her fourth pregnancy, precisely the same symptoms occurred, and left her as before. On her fifth pregnancy, at the same period, about the fourth month, she again had anasarca of the lower extremities, and some swelling of the backs of the hands; but all these symptoms of dropsy disappeared on her prematurely giving birth to her last child, which occurred at the eighth month. The child did not survive. She continued free from dropsical symptoms for ten months; but five weeks before admission, after exposure to bad weather and also to the wet of the laundry in which she worked, the swelling again returned, rapidly progressed, and increased to her present condition. She is now five months gone with child. At the commencement of this last attack she noticed that her water was the colour of blood, and she retained but little at a time. There were no signs of heart-disease, and the sounds of respiration were feeble, with the addition of mucous murmurs in the large tubes.

As the bowels were sluggish, she took the compound jalap powder each morning, and the infusion of digitalis and bitartrate of potash three times a day. The amount of urine increased, but the dropsical condition nevertheless continued on the increase, and so great had the tension of the skin of the lower extremities become, that punctures became necessary, from which she derived some temporary relief. The dropsy, however, did not subside; the breathing again became distressed, from the œdematous state of the pulmonary parenchyma.

The urinary sediment at four days' interval, March 31st, April 4th, and April 7th, is represented in Pl. IX, figs. 2, 3, 4. The urine was highly albuminous, and the sediment thrown down when at rest had the same flocculent aspect and exhibited very similar microscopical appearances on these several occasions: great variety of epithelial structures; pus-cells, epithelium from the straight tubes, from the calyces and pelvis, as well as from the bladder and meatus. Several very granular casts were visible, a few transparent ones, the former containing a few free nuclei, several compound granule-cells, and here and there some colour-

less granular flakes. As the punctures brought but little relief to the tension of the lower extremities, two incisions through the areolar tissue down to the fascia were made with a lancet above each inner ankle, and with the effect of bringing away a considerable quantity of water. Nevertheless the dropsical state of the upper part of the body was unrelieved. The œdematous state of the lungs was shown in the short and frequent respirations, occasional cough, but without any physical signs within the chest of bronchitis or pneumonia. The compound jalap powder produced but little effect in acting on the bowels, and notwithstanding the risk of bringing on premature labour, it was decided to give a small dose of elaterium. It was very evident, from the increase of the dropsical effusions in the chest and abdomen, that nothing but some hydrogogue cathartic could prevent the patient succumbing to the effusion of water into the parenchyma of the lungs.

She took a quarter of a grain, and it produced two watery dejections, with some relief to the breathing. The same day premature labour came on, and she was delivered of a six-months' fœtus. Any anxiety arising from the belief that the effects of the elaterium had its share in bringing on abortion, was removed by the certainty that the child had been dead for two or three days previously, and this was corroborated by the statement of the patient, that she had ceased to feel its movements for from three to four days.

Mr. Newcomb assured me that the fœtus had a livid, drowned appearance; and the placenta was macerated, sodden, and very friable. Had the gravid uterus any share in producing the dropsy, we should have expected that many of the more urgent symptoms would have abated after the removal of the contents of the womb. But convinced, from the microscopic character of the urinary sediment, that one form of morbus Brightii was the cause of the dropsy, I was scarcely surprised that each succeeding hour added to the gravity of the symptoms, and although the incisions through the cuticle above each ankle had reduced the tension of the lower extremities in a very satisfactory manner, yet the dropsical accumulation in the chest and

abdomen remained undiminished. The respirations became short and husky, a semi-comatose state followed, and she died in the morning of April 11th.

The body was removed by the relations immediately after death. Being Irish, they exhibited their characteristic prejudices against a post-mortem examination. The character, however, of the urinary sediment left no doubt on my mind as to the nature of the renal disease which caused the dropsy. In the absence of post-mortem evidence, it would be idle to speculate on what particular variety of kidney gave rise to these symptoms. The character of the urinary sediment, when first examined, led me at once to pronounce the case as hopeless. I had no hesitation in saying that the dropsy would not disappear after the delivery, and I ventured to express my fears that abortion would in all probability take place, and a fatal termination speedily follow.

A microscopic examination of the urinary sediment in any similar case will enable the physician at once to determine whether the dropsy be dependent on pregnancy, or the more formidable conditions of renal disorganization.

The sediment in this case is remarkable for the great variety of epithelial structures which it presented.

CHAPTER XIII.

INFLUENCE OF REMEDIES, PARTICULARLY FERRUGINOUS, ON THE PROGRESS OF MORBUS BRIGHTII.

It has been already shown, in Cases XIII, XIV, and XV, that there are forms of renal disease, with dropsy and albuminous urine, which are under favorable circumstances, amenable to a particular plan of treatment. In these cases, however, the epithelial cells, after the stage of hyperæmia, exhibit but faint traces of decay or abortive development. The casts rapidly lose their granular appearance, compound granule-cells appear from time to time, even exudation or pus-corpuscles may appear in the casts, but there is no evidence of any fatty deterioration of cell-growth, no clusters of nuclei, or but few, nor any evidence of that rapid disintegration of glandular epithelium which is never absent in fatal cases. It may be said of these tractable cases, that the subsidence of the disease and the convalescence of the patient are as much the consequence of the mildness of the attack as of the remedies employed. Against such reasoning may be opposed the results of observations made on chronic cases of greater severity, in which the urinary sediment has exhibited characters of advancing cell-disorganization, but which, under treatment, have gradually abated, and for a time, at least, satisfactory evidence has been obtained that an improved cell-formation is re-established; or, if this be not sufficiently susceptible of proof, that the disorganizing process at least had been arrested. The evidence on which

this inference rests, consists in the diminution in the sediment of the oily casts, the less frequency of the disintegrated compound cells, and the re-appearance of epithelial cells, slightly granular, but not fatty, and differing but little in character from the standard cell. Moreover, these changes in the urinary sediment correspond with a diminution or rather disappearance of the dropsy, with decrease in the proportion of albumen in the urine, as well as an increase in the specific gravity of the urine and an abundant excretion of uric acid. Chronic cases of morbus Brightii, it is well known, are remarkable for the exacerbations of the dropsical and other symptoms to which they are subject; so that in the course of twelve or eighteen months the dropsy ebbs and flows, increases and decreases, apparently in the most capricious manner, the cause of these exacerbations being with difficulty traced to any well-marked source. During this period, however, even if the urine become less albuminous, the sediment remains unchanged in character, and the microscope unequivocally demonstrates that the disease is slowly and insidiously advancing, notwithstanding the apparent improvement manifested in the general condition of the patient. These observations have reference to those cases which are not under any special mode of treatment, but in which the disappearance of the dropsy has, perhaps, satisfied the patient that his disease was cured.

But cases have come under my observation where patients suffering from chronic morbus Brightii have been kept under the influence of chalybeate remedies for many weeks, nay, months, with the effect of producing most satisfactory change in the appearance of the urinary sediment, as well as in the general health of the patient. In some cases this improvement has been but temporary; in others it has been more permanent, or has extended over a longer period. Though it must be admitted, that if once this form of renal degeneration be established, there is always great fear that the disease will ultimately return; yet, on the other hand, when a class of remedies appear to operate fundamentally on the disorganizing process, great encouragement is offered for the more successful treat-

ment of these disorders, if their nature be recognised sufficiently early, and the influence of such agents brought to bear before the degenerative tendencies have acquired a force beyond the power of restraint.

The following case has been selected to illustrate the influence of steel in arresting the progress of renal degeneration, because, from the very unfavorable appearances in the urinary sediment when first examined, little hope was entertained of any susceptibility to improvement. I have considered, that if in such unpromising cases a certain amount of benefit can be obtained by persevering in an uninterrupted plan of treatment by iron, there are many cases, milder in their character, and less unfavorable in the extent to which the renal disorder has reached, which may be, and are permanently cured by similar means.

Case XXV.—Robert Richardson, æt. 34, a carman. The symptoms of this patient, on admission into King William's Ward, in May, 1858, were those characteristic of renal dropsy. An œdematous state of the eyelids and face, anasarca of the backs of the hands, extending to the elbows, and of the ankles and feet, reaching to the thighs. There was some scrotal infiltration, but the abdomen was free from fluid. The respirations were natural. The breath-sounds were unimpaired. The pulse was 76. The tongue clean; appetite unimpaired. There was no febrile disturbance. Micturition was frequent. The urine was deficient in quantity, specific gravity 1·020, cloudy, and was highly albuminous. The patient complained principally of lumbar pain. The man's employment, as a carman, exposed him to great vicissitudes of weather. He had enjoyed good health up to last autumn. At this period he began to suffer from flying erratic pains in his limbs, which he attributed to sleeping in his wet things. For several weeks he appears not to have paid any attention to these warnings, for it was not till near Christmas of last year, the rheumatic pains becoming worse and accompanied by vomiting, followed the next morning by diffuse dropsical swelling of the face, hands, and lower extre-

mities, when he sought medical relief, which he received at Chertsey.

After some weeks he got better; but his dropsical symptoms again returning, he came up to London. The aspect of the patient had not the pallor usual in morbus Brightii, but there was a certain florid appearance given to the cheeks by a coarse capillary injection not often seen at this comparatively early period of life. The urine set at rest threw down a somewhat abundant flocculent deposit. This urinary sediment was examined the day after admission. The casts were very numerous, very transparent, and loaded with free nuclei. There were also a great many very large compound granule-cells, more numerous than I ever before witnessed. There were a few small very granular and oily casts. One of the most transparent of the casts, and which contained but few nuclei, had a very large compound granule-cell in its centre, the diameter of the cast being increased round its circumference. (Pl. IX, fig. 5.) There could be no hesitation in forming an unfavorable opinion on such microscopic appearances, yet experience teaches that even in these cases something may be done to arrest the headlong progress of renal degeneration.

The first object to be effected in these cases is to reduce the hydræmia; in other words, to lessen the watery state of the blood. Until that is accomplished, the reparative powers are inert, and chalybeate medicines are no avail. He was purged actively, and had the hot air and warm baths, with the best effect, and he was placed on a nutritious diet, so that within a week from admission he was able to take the tincture of the sesquichloride of iron. He took it in a form which is both agreeable and efficacious, in combination with the liquor ammoniæ acetatis and acetic acid. I have reason to think that this combination is more effective than when the sesquichloride is given with water only. The liquor ammoniæ acetatis must be first rendered acid before the tincture is added, otherwise the ammonia chloride of iron is precipitated, which is

with difficulty redissolved by the excess of acetic acid. The following formula is used:

℞ Liq. Ammoniæ Acetatis, ʒj.
Acidi Acetici diluti, ♏xx.
Tinct. Ferri Sesquichloridi, ♏x.
Aquæ, ℥j.
Misce: fiat haustus.

The amount of urine passed in the twenty-four hours slightly increased, but there was no apparent diminution in the proportion of albumen present.

Four days after taking this preparation the sediment was again examined. The casts were as before, transparent, accompanied by many free nuclei. There were several very oily casts. But there were also several rhomboidal crystals of uric acid, and many more granular epithelial cells than on the first examination. On the 14th of May the urine was literally loaded with crystals of uric acid, formed within an hour of the water being passed; there were several casts, more granular than on previous occasions, with here and there an epithelial cell, deviating but little from the character of health. He complained, however, of much lumbar pain, and great irritation about the urinary passages, and frequency of micturition. The anasarca of the extremities had disappeared, but the face was slightly puffed in the morning, and there was œdema of the back and loins. He was dry cupped, with relief to these symptoms. The urine for some days containing a large excess of uric acid, the acid acetate of ammonia was discontinued. The sesquichloride was continued, in conjunction with ten minims of the tincture of digitalis. On May 24th the patient was much improved. The urine contained less albumen, and the sediment was not so abundant; there were fewer oily casts, and more than one epithelial cell of the spheroidal variety was seen, with its well-defined nucleus. There were many large compound granule-cells, and many hyaline casts, with free nuclei.

The result of the great increase in the proportion of uric acid was a continuation of the lumbar pain already noticed, and fre-

quent calls to pass water. On the 31st of May these symptoms were suddenly relieved by his passing two small pieces of uric acid grit, or gravel.

Fig. 7 represents the appearance of the sediment on June 1st. A few epithelial cells are characteristic of healthy cells, but several oily casts were still present. But there were no disintegrated cells, or any evidence of a continuous advance in the direction of fatty degeneration of the epithelial cells. On the contrary, these appearances continuing for some days in succession, might be accepted as satisfactory evidence of an arrest—if only temporary—of the degenerating tendency. The condition of the patient corresponded in every respect with this apparent retardation of the disease. There was no anasarca present. The urine increased in quantity; was about forty ounces in the twenty-four hours. The albumen had notably decreased. The appetite was good, the sleep sound, and all the emunctories working favorably.

During the succeeding three weeks, the patient continued in the same satisfactory condition of improvement. On the 17th June, the urinary sediment exhibited the characters represented at Fig. 8. There had been a marked diminution in the oily and fatty casts. Disintegrated cells were still present; and from these I have been always led to form an unfavorable opinion. But in this case they appear retrograde, or in diminishing frequency. The value of frequent examinations of the urinary sediment, and their comparison one with the other, is thus satisfactorily demonstrated. In no other way could the real value of these several appearances be estimated. Abstractedly, and guided by the conditions of fatal cases, the microscopic character of the sediment in this case at first justified a very unfavorable prognosis.

The dropsy in many cases will subside, but without any corresponding improvement in the state of the cell-structure thrown off from the renal tubes. In such cases, experience tells us to be prepared for a return of the worst features of the disease. In the case under consideration, there certainly appeared to be an arrest of the degenerative processes. Hopes

may be entertained that the improvement will be more permanent than is usually seen in chronic cases of morbus Brightii and encouragement is afforded, and expectation held out, tha these cases are not always so intractable as they are generall conceived. There is much analogy between the improvemen which takes place in these cases of renal degeneration, unde the influence of a nutritious diet and chalybeate remedies, an that which is witnessed in several other intractable diseases. How often is the progress of phthisis arrested for a time, the expectoration decreasing, the patient increasing in flesh and strength, under the benign influence of a judiciously regulated diet and steel? In scrofulous disorders, particularly of the joints, the moment nutritive material begins to be appropriated and healthy assimilation takes place, which rarely happens without the aid of some preparation of iron, the aspect and condition of the patient immediately assumes a manifest change for the better. So in these chronic cases of renal degeneration, so soon as the watery state of the blood has been removed, every effort should be made to overcome its impoverished condition; for the moment the blood improves in quality, then, and only then, is degeneration of cell-structure arrested, and the progress of the disease checked. Depletory and lowering measures should be employed only in the early stage of inflammatory engorgement of the kidneys, and their extent and continuance should be cautiously regulated by the evidence of inflammatory or febrile disturbance which may be present. Many cases are rendered hopelessly incurable by the patient being kept under the influence of antimonials long after the necessity for such valuable remedies has passed away. Low diet and antimonial diluents will not supply blood-forming material; and our aim and object in these cases should be to bring the blood up to that state of healthy vigour which is absolutely essential to the function of cell genesis. This patient left the hospital at the end of June, free from every trace of dropsy; the urine, however, was slightly albuminous, and the sediment consisted of hyaline casts, with very few isolated nuclei. There were a few compound granule-

cells, and some epithelium, from the size of the cells derived apparently from the straight tubes. This case certainly cannot be considered cured; but looking to the state of the patient when he first came under observation, and the manifest alteration for the better in the character of the urinary sediment, with the subsidence of all dropsical symptoms and the diminution of the albumen in the urine, I cannot but think that great encouragement is held out for a more successful treatment of some of these cases than is generally entertained.

In reference to the subject of treatment of dropsy connected with disease of the kidney, there is a class of remedies which, in hepatic and cardiac dropsy, may be administered with great benefit and effect, but which cannot, even in the smallest doses, be administered in renal dropsy, without the most prejudicial results. This class is the mercurial. There is a strange inexplicable susceptibility to the influence of mercury in whatever form in this state of the constitution. A single dose of calomel given in combination as a purgative will sometimes produce severe ptyalism. The repetition of small doses of the mildest preparations of this metal, with the object either of diminishing inflammatory action, or of promoting absorption or removal of the dropsical fluid, or of operating as an alterative, is almost invariably followed by severe constitutional effects, which generally hasten forward the fatal termination. No satisfactory explanation of this universal susceptibility to the specific influence of mercury in renal dropsy has yet been offered. As in other branches of our art, at present, we must be content to accept the bare fact for our guide. From no point of view does the advantage, nay, the imperative necessity, of a correct diagnosis as to the cause of the dropsy become so obvious as from this, in which the principle and method of treatment has to be considered. For that which experience proves to be beneficial in other forms of dropsy, she teaches to be undeniably injurious in this. Young practitioners, thus cautioned, will strive the more eagerly to determine whether the dropsy be hepatic, cardiac, or renal, for on the accuracy of the diagnosis will the success of their treatment depend.

PLATE IX.

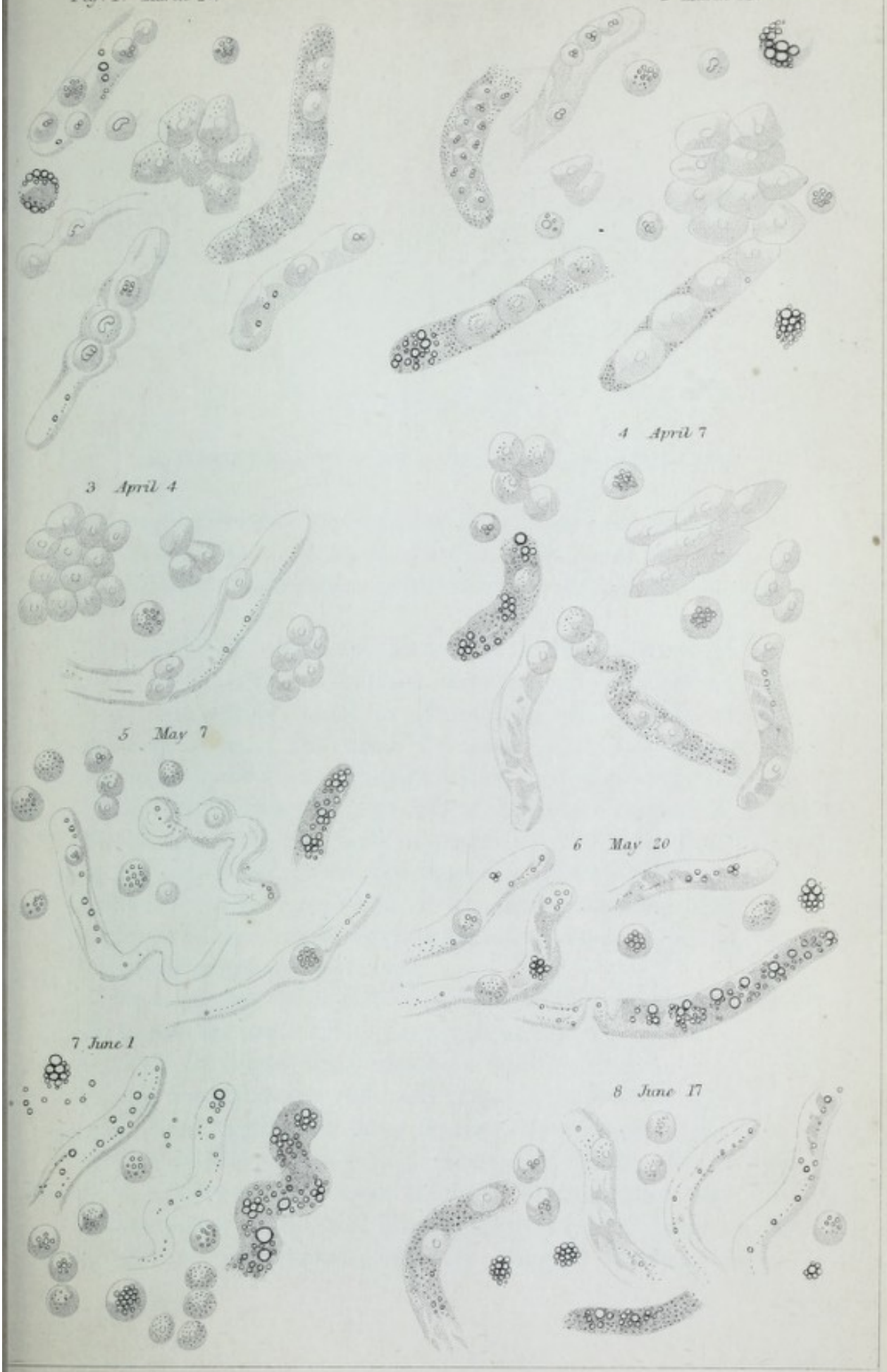
RICHARDSON.

Fig. 5.—May 7th. A few pus- or exudation-corpuscles; large granular compound corpuscles; casts very hyaline, with many free nuclei; a very oily and granular cast.

,, 6.—May 20th. Casts very hyaline, containing free nuclei; botryoidal clusters of nuclei, and epithelial cells granular and abortive; one cast very granular and fatty.

,, 7.—June 1st. Same appearance as the last, except that a few epithelial cells are seen, approaching the character of standard epithelium; very fatty casts are still present.

,, 8.—June 17th. The fatty casts were not so numerous or so oily; several disintegrated compound cells. The healthier looking epithelial cells are more abundant; these improved appearances corresponding with subsidence of the dropsy, and a diminution of the albumen in the urine.



R. Basham ad. nat. del.

W. Greatbach sculp.

CHAPTER XIV.

ALBUMINURIA WITHOUT TUBE-CASTS.—NON-TUBULAR.

General anasarca—Flaky deposit of pus-cells coherent in masses, with epithelium from the calyces, pelvis, and ureters of the kidneys—Membranous débris stained with hæmatin.

Case XXVI.—This case is worthy of notice, from the sediment of the urine presenting some exceptional conditions to what are usually found in albuminous urine associated with general dropsy. The urine for many weeks had been highly albuminous, of a comparatively high specific gravity—1026 to 1030; micturition had been frequent, and the amount of urine voided each time was small in quantity. There had been more or less lumbar pain, and the anasarca, though not very great, had involved the legs, backs of the hands; and there had been puffiness of the eyelids and face for a few hours in the morning, subsiding as the day advanced.

These are all characteristic symptoms of renal dropsy. The urine had the usual albuminous character, except that, on one occasion only, have tube-casts been seen in the sediment. The deposit has uniformly consisted of pus-cells, isolated as well as aggregated together in flaky masses. More or less of the epithelium of the calyces, pelvis, ureters, and bladder, had latterly been associated with these coherent flakes of pus-cells. The microscope alone revealed these conditions; for, to the unaided eye, the urine presented none of the features of purulent urine.

Set at rest, there was seen but a faint, flocculent, cloudy deposit, in which were a few membranous-looking flakes. The microscope resolved these into aggregations of epithelium and pus-cells.

The patient whose urine exhibited these characters is John Smith, æt. 46, a man of large and powerful frame, of an aspect not unhealthy; by occupation a navigator, for which work his strong, muscular build ably fitted him. He was admitted on the 13th January. The tongue was slightly coated, the skin cool, the pulse small, but not frequent. The bowels were reported as regular, the appetite undisturbed, but the sleep broken by the frequency of micturition. The urine was scanty, high coloured, and of specific gravity 1030, and was highly albuminous. The patient complained of giddiness, muscæ volitantes, and headache. He suffered also from paroxysms of lumbar pain. The ankles were anasarcous, extending nearly to the knees, the backs of the hands were œdematous, and the eyelids were stiff and swollen in the morning. About ten months previously he had been under the care of one of my colleagues for similar symptoms. He returned to the country, and drank largely of infusions of herbs, apparently, from his description, of the *Spartium scoparium*. He was in a workhouse infirmary, where he was cupped. Finding his symptoms returning, he came back to London, and applied for admission. He confesses to have been a hard drinker, and careless of all consequences. It has been his habit to sleep his potations off as readily in a wet ditch as in the shelter of a cottage. It was after one of these "bouts" that he first became ill. Till then he had never had a day's illness, and must have been a good sample of that iron-constitutioned race, well known as the "*English navvy.*" The urine was examined microscopically; the sediment consisted of pus-cells, coherent together in large fields, a few large granule-cells were apparent, and membranous flakes stained with hæmatin. One or two very delicate flattened films studded with nuclei was also present. (Pl. VIII, fig. 12.) He was ordered the compound jalap powder, and two days afterwards, as there was much uneasiness felt in the

lumbar region, he was cupped to twelve ounces. As the urinary sediment presented only these pus-cells and membranous orange-coloured flakes and fields of cohering corpuscles, an examination was made to ascertain if the patient suffered either gleet or stricture, but he was quite free from these complaints.

On the 28th of January, with pus-cells, both free and coherent, were again seen two or three exceedingly delicate and transparent ribbon-like films; they were distinctly flattened; a few bright nuclei were seen attached. Some large spherical cells, granular, or with a single nucleus, were also present.

On February the 4th, in addition to the groups of exudation- or pus-corpuscles, several flakes of fibrine, stained of a bright orange red, together with some large granular cells, were also noted. (Pl. VIII, fig. 13.)

From February 8th to the 15th, and even to the middle of March, the urinary sediment underwent but little change. (See fig. 14.)

On the 21st of January he was ordered the sesquichloride of iron. The anasarca had disappeared everywhere except in the right ankle. But little alteration took place in the amount of albumen or in the microscopic condition of the urine till the 23d of February, when a considerable diminution in the apparent amount of albumen was noticed. He had continued the sesquichloride with the cream of tartar purgative occasionally. In the beginning of March the troublesome frequency of micturition began to abate; all the functions, but that of the kidneys, were regular, and but for the albumen in the urine and the sediment, he might have been pronounced convalescent. He was at this time, March 17th, ordered the gallic acid in place of the sesquichloride.

In a few days micturition became less frequent, and the anasarca of the ankles disappeared, and the proportion of albumen became palpably less, and a change took place in the urinary sediment. Up to this period pus-cells, cohering so as to form flakes visible to the eye, isolated pus-cells, and fields of vesical epithelium, with here and there some orange-stained

granular coagula, were the objects seen by the aid of the microscope. There now became apparent, in addition, the vesical pavement-epithelium, many of the oval epithelial cells from the pelvis and calyces of the kidneys, which are much less in size than the vesical epithelial cells, and have always more or less of a well-defined oval shape. (Fig. 14.) There were also seen some of the smaller and more quadrangular epithelial cells from the straight uriniferous tubes. But no tube-casts could be found. In an examination of the urine made on the 23d of March, the cells, which had hitherto with acetic acid displayed their compound trefoil-looking nucleus, now exhibited a single nucleus, or assumed more the appearance of cells filled with granular matter; in fact, they lost the chief characteristics of the pus- or exudation-corpuscle, and began to assume more the character of what some would call the simple mucous corpuscle. In fact, the cells seemed to be losing their purulent character and returning to that of the aborted or defective epithelial cell. Many epithelial cells from the calyces and pelvis were also seen. They were easily recognised by their oval shape and being half the size of the pavement vesical epithelium. Some large compound granule-cells were also present.

The membranous flakes, stained of a bright orange colour from the hæmatin of the blood, had quite disappeared, and a careful examination of many samples of urine on the 23d and 24th of March failed to detect any. Could their absence and the altered character of the sediment be in any way traced to the action of the gallic acid? These amorphous orange-coloured flocculent shreds, associated with pus-cells detached or aggregated into groups, have, I believe, a very significant meaning, and afford the means of detecting a form of disease in the renal structures not hitherto sufficiently distinguished.

Acetic acid exercises no influence on these flocculent shreds stained with hæmatin. These amorphous fibrinous shreds, of a deep orange-red colour, accompanying pus-cells and exudation-corpuscles, are seen in that form of inflammation of mucous membranes known as the croupous. They are present in the

diphtheritic sore throat. I have seen them in abundance in the sputa of a mild case of pneumonia. In severe cases they are marked by the red, rusty colour of the sputa. I have seen them also in the dejections of a dysenteric patient—in that stage in which the mucous surface is the seat of a membranous exudation.

I am inclined to think that the appearance of these membranous shreds stained with hæmatin, when associated with pus- and exudation-corpuscles in the urine, may be accepted as evidence of a form of inflammation in the renal tubes, as well as in the straight tubes of Bellini, and probably affecting also the mucous membrane of the calyces, which is strictly allied to, if not identical with, the croupous. The inflammatory process is certainly different in its effects from that which takes place in those cases of albuminous urine where tube-casts are present.

General anasarca and highly albuminous urine are present in both forms; but in this, now under consideration, the inflammatory engorgement leads to an exudation of a pseudo-membranous deposit, in which pus-cells and exudation-corpuscles are ultimately generated, and with membranous débris stained with hæmatin are thrown off from the tubes and washed away by the urinary stream. The sediment in these cases presents appearances microscopically similar to what are seen in the exudative products of ordinary diphtheritic inflammation of the throat, or of inflammatory croup in children. An appeal to post-mortem results is necessary to place the question beyond the limits of conjecture. These cases, however, do not usually terminate fatally at this stage. By reference to the plates it will be seen that these amorphous flakes stained with hæmatin are present in most of the hæmorrhagic conditions of the kidney. They are seen also in the sediment in cases of calculous and tubercular pyelitis, associated with pus-cells.

It might appear, therefore, that their significance was but trifling, and that no special value could be placed on what was common to several apparently different states of the kidney. A closer examination into the several conditions which cause their appearance will, I think, remove these doubts. In hæmor-

rhagic states of the kidney the microscopic appearances are sufficiently expressive.

Tube-casts, with blood-discs and epithelial cells, characterise the early stage of morbus Brightii, and those membranous coagula result from the coagulation of the fibrine in amorphous masses. In calculous pyelitis, in addition to the pus-corpuscles, flakes of lymph are thrown off stained of this orange-red colour. In tubercular pyelitis and nephritis they also arise from effused lymph thrown off from ulcerating surfaces in the cavity of the kidney. It must be recollected that in these forms of renal disease the urine is distinctly purulent, depositing when at rest a marked precipitate of yellow cream-like corpuscles. The patient, however, has no dropsical symptoms; and the urine has none of the usual characters of this excretion in morbus Brightii or albuminuria. But in the class of cases under consideration the symptoms of the patient are those of renal dropsy, and the character of the urine is that which is usually seen in morbus Brightii, except that no tube-casts are ordinarily found in the sediment: this is the exceptional condition—the sediment is a flocculent cloud, in which membranous-looking shreds are visible to the unaided eye. These are seen to consist of aggregations of pus-cells, held together in a flaky form; many pus-cells are isolated and free, and mixed with them are these amorphous fibrinous masses stained with hæmatin. This state of the urine is, I think, significant of an inflammatory process different from that which is going on when tube-casts are present; it is allied to the croupous form of inflammation of other portions of mucous membrane. Eventually it may lead to fatal disorganization. But the renal dropsy in these cases is more tractable, and more easily subdued, and the conditions of the patient are more hopeful. The renal disorder, although obstinate, ultimately yields to treatment; and with care, a return of the disease may be avoided, and we may fairly calculate that dropsy and albuminous urine, with this kind of sediment, does not present the same threatening and unfavorable prognosis which albuminous urine with tube-casts generally suggests.

The constitution of this patient continued to improve, and he left the hospital on the 30th of March. There was no anasarca when he left, and his general health and bodily vigour he declared to be as good as ever. But the urine was nevertheless albuminous, and the flocculent sediment consisted of isolated cells, but the greater part had but a single nucleus; only here and there one with a trefoiled nucleus and retaining the character of the ordinary pus-cell. A greater abundance of oval epithelial cells, such as belong to the calyces and pelvis of the kidney, was noticed. No tube-casts could be found, and the fibrinous flakes stained with hæmatin had quite disappeared. He left the hospital free from all symptoms of dropsy, but the urine was slightly albuminous, and deposited a faint cloud composed of isolated epithelial cells. (Plate VIII, fig. 15.)

PLATE VIII.

SMITH.

Fig. 12.—January 20th. Several large compound cells; some amorphous granular flakes stained with hæmatin. Pus-cells in clusters; two very transparent hyaline films.

„ 13.—Feb. 10th. Urine presenting nearly the same appearance. Compound granule-cells, clusters of pus- or exudation-cells, and groups of vesical epithelium. Some amorphous granular flakes.

„ 14.—March 23d. Pus-corpuscles in clusters, and healthy epithelial cells from the pelvis of the kidney, ureters, and bladder. A broken-up glomerulus.

„ 15.—March 29th. The pus-cells no longer appear in groups or clusters; there are a few isolated granule-cells and many healthy epithelial cells. The sediment since the middle of March was quite free from the membranous shreds stained with hæmatin. They disappeared after the patient had taken gallic acid for a week.

CHAPTER XV.

ALBUMINOUS, SANGUINOLENT, AND PURULENT URINE, UNCONNECTED WITH DROPSY.

ALBUMINOUS urine, with a peculiar and characteristic sediment, is significant of a special form of disease of the kidneys. But the urine may be albuminous, may be sanguinolent, may be purulent, and yet not symptomatic of morbus Brightii; for these states of the urine, apart from the tube-casts, are common to many disorders of the renal organs. In the one case a greater or less amount of general dropsy is always present; in the other, these morbid conditions of the urine are independent of any such symptom.

I propose to illustrate by a few typical cases these albuminous, sanguinolent, or purulent states of the urine, unconnected with morbus Brightii.

I do not think it necessary to do more than to mention the diseases in which the urine is simply albuminous from some temporary disturbance of the renal function, as it is totally unconnected with any organic change in the structural elements of these organs; no dropsical symptoms ever co-exist.

In pneumonia, albumen in small quantities is found in the urine, apparently having some connexion with the disappearance of the chlorides; for, as they diminish or disappear from the urine, albumen in small amount may usually be detected. As the chlorides reappear, the albumen is no longer present.

In pleurisy, as well as in pericarditis and peritonitis, albumen has occasionally, but by no means constantly, been detected in the urine. So also in erysipelas it has occasionally been found. In typhus and typhoid fevers, in variola and in measles, albumen has frequently been found present. Its presence in the secondary febrile disturbance of scarlatina has already been noticed. In the reactionary stage of cholera, the urine first passed always contains albumen. The urine found in the bladder after death is, I believe, universally albuminous; this may be a post-mortem effect from passive transudation of serum.

In phthisis the urine is occasionally albuminous, but it has already been shown that this arises from true degeneration of the renal structures and the development of one form of morbus Brightii.

No satisfactory explanation of the cause of the urine becoming temporarily albuminous in the above-named diseases has hitherto been offered. It is a functional disturbance, depending, in all probability, on diffuse capillary blood stasis, by which the functions of all organs are more or less impeded or deranged, a condition common to all fevers and inflammations.

M. Robin's hypothesis, read before the Academy of Medicine in Paris in 1851, accounts for the presence of albumen in the urine by the theory that, in health, albumen is an excrementitious product in the blood, and that it is decomposed in the process of respiration, and the nitrogenized residue of this combustion, urea and uric acid, are excreted by the kidneys. He considers, therefore, that whatever interferes with the conversion of albumen into carbonic acid and water, urea and uric acid, causes its appearance in the renal secretion. And thus the presence of albumen in the urine is explained in several diseases of the pulmonary apparatus. But the objection to this hypothesis is that albumen temporarily appears in the urine in many diseases in which the respiratory process is not impeded; and, on the other hand, is absent in many diseases of the lungs and heart, in which the oxygenation of the blood is palpably incomplete.

In erysipelas, typhus, and typhoid fevers, cholera, variola, and

measles, albumen is occasionally present; but, in these febrile diseases, there is not that disturbance to the process of respiration which could justify the admission of M. Robin's theory to account for the presence of albumen. While in emphysema, in cyanosis from patent foramen ovale, in mitral disease of the heart, in each of which the respiratory function is but imperfectly performed, albumen does not appear in the urine, unless the kidneys become the seat of structural change. Albumen is not present in the urine in every case of phthisis. When it is, a microscopic examination will prove that organic changes have already commenced in the cell-structure of the renal tubes.

At present, then, we must be content to accept the fact, without being able to solve the cause, that albumen is temporarily present in the urine in certain febrile and inflammatory diseases; and that being unaccompanied by dropsy, or any exudation from the uriniferous tubes, it may be regarded as a functional disturbance of the renal excretion, unconnected with any organic change of structure, of little importance as a symptom, and which will disappear with the disease with which it has been associated. But while we may regard albumen in the urine in these diseases as in no way significant of structural disease of the kidneys, yet it is far otherwise with the appearance of blood or pus in this excretion.

ALBUMINOUS AND PURULENT URINE UNCONNECTED WITH DROPSY.

Hæmaturia unconnected with morbus Brightii.

The appearance of blood in the urine is always a source of anxiety and alarm to the patient, and if not rightly interpreted may become a source of serious error in treatment. Its importance as a symptom must depend on the part of the urinary apparatus from which it is derived. Its significance, even when coming from the kidneys, is momentous or otherwise, according to the character of the accompanying symptoms. It may

indicate temporary conditions of disease, to be easily removed by judicious measures; or it may afford unequivocal evidence of incurable organic mischief. Hæmaturia may occur in the course of many different diseases. It may be symptomatic of various diseases of the kidney: 1. Simple inflammation or nephritis. 2. The early stage of Bright's disease, particularly scarlatinal dropsy. 3. Calculous pyelitis, including under this form gouty inflammation. 4. Tubercular pyelitis. 5. Cancer of the kidney. Or the hæmorrhage, proceeding from the kidneys, may not imply any organic disease of these organs, being symptomatic only of a general hæmorrhagic condition, in which the kidneys participate with other organs; such is the hæmaturia in purpura and scurvy. It occurs also in some febrile disorders, as variola and typhus, and it is sometimes prevalent in pyæmia. Moreover, the blood may be derived from the bladder, prostate, or urethra, quite independent of the kidneys. Again, hæmaturia has been noticed, occasionally occurring in women, as vicarious of the menstrual flux, an example of which was lately under Mr. Guthrie, in Percy ward, in a woman suffering from abscess in the mamma. In this case the catamenia had been absent during the previous three months; but for several consecutive days at the menstrual period, blood was passed with the urine. There was no increased frequency of micturition, nor any pain or irritability about the urinary passages. The urine, examined under the microscope, presented blood discs, amorphous fibrine highly stained with hæmaturia, and a few epithelial corpuscles, apparently from the pelvis of the kidney and ureters. Rayer mentions instances of this vicarious hæmaturia.

There is yet another form of hæmaturia, which appears to be unconnected with any of the preceding morbid conditions, and the only exciting cause which can be detected is mental agitation. If, in particular constitutions, there be this singular idiosyncrasy, that mental inquietude or excitement can bring on attacks of hæmaturia, temporary in their duration, innocent in their sequel, and unconnected with organic mischief in the kidney, it must be manifestly of importance to ascertain if pos-

sible the symptoms by which such an unexceptionable and rare form of hæmaturia can be distinguished from the more serious cases arising from calculous or other organic disease.

Case XXVII.—The case of Edward B—, in Burdett ward, appears to me to illustrate this rare form of hæmaturia, the recurrence of the attack being invariably connected with mental disquietude. He is a shoemaker, forty-three years of age, of spare habit of body. He states that he is a teetotaller, and has been so for years; that about nine years since he first noticed his urine discoloured with blood; its appearance was unaccompanied by any pain or constitutional disturbance; it alarmed him, and he sought advice. He was ordered change of air, and cessation from his very sedentary employment. He states that he was relieved for the time, but that three years afterwards he suffered another attack. On this occasion, he recollects that it was preceded by a sense of weight and pain in the loins. He was treated at Charing-cross Hospital, and on subsequent occasions at other hospitals, always with relief; the continuance of the blood in his urine seldom exceeding ten or fourteen days. During the last twelve months the hæmaturia has become more frequent, and he has had two attacks in the course of the last six months. On admission, he complained of pain in the loins, and the urine was highly charged with blood. He is free from all other symptoms of disease: the chest is natural; heart-sounds natural; the abdomen is flat, soft, and elastic; there is no fulness in the lumbar spaces, and no tenderness on deep-made pressure; the region of the liver does not exceed its natural limits. The appetite is good, the tongue clean, the bowels natural. Micturition is not more frequent than natural, nor is there any difficulty or pain. The urine is of a dark-red colour, but is free from visible clots; allowed to rest, it deposits abundance of blood-discs. He was ordered to be cupped to ten ounces from the loins; to take five grains of gallic acid every four hours, and half a drachm of the compound jalap powder every alternate morning, and a warm bath each alternate evening. The urine was examined by the microscope; numerous

blood-corpuscles were visible, and many fibrinous casts entangling blood-discs in their substance. These fibrinous coagula had the appearance of having been moulded in the uriniferous tubes, and washed therefrom by the escape of the urine; their size suggested their formation in the straight tubes of Bellini. Ten days after admission, the urine was quite free from all vestiges of blood to the unassisted eye; it presented a faint albuminous cloud by heat and nitric acid, and, allowed to rest, it deposited a flocculent precipitate, which, by the microscope, was resolved into amorphous fibrinous masses, slightly stained with hæmatin; a few blood-discs were seen, but no other microscopic objects. The patient was free from all traces of lumbar pain, and he thought that his bodily strength was increasing. Three weeks after admission, he presented the same favorable condition: no trace of blood nor albumen in the urine; the same flocculent deposit of minute amorphous coagula stained with hæmatin; but no casts of the tubes, nor any blood-discs. The medicines were discontinued. On the fifth week of admission he complained of a return of the lumbar pain, but there was no alteration in the natural appearance of the urine, except that crystals of oxalate of lime were observed interspersed amongst the minute amorphous coagula above noticed. He was discharged in the month of August, 1855, and from time to time he has attended to report his freedom from any return of hæmaturia; but at the last visit he complained of great increase of pain in the left lumbar region, extending upwards to the shoulder of the same side. In October he brought a sample of his urine, and it was again blood-red, and possessed the same characters as when it was first examined; but it was unaccompanied by any constitutional disturbance, and he stated that he had no difficulty in passing his urine, nor was there any undue frequency of micturition, nor any local symptoms different from those when an in-patient. He added an important fact: that these recurrences of bloody urine were always caused by some vexatious mental excitement. The man, it appears, is quiet, sober, and industrious, and, upon principle, totally abstains from all fermented drinks. His wife has no liking for water,

but possesses the common prejudice in favour of alcohol, and, whenever she can command the means, indulges to excess; her demeanour towards her husband at these times is somewhat at variance with her marriage vows, and, to avoid annoyance, our patient states that he has endeavoured to effect a voluntary separation; that while he is left to himself, undisturbed, his malady disappears; but the moment he is subjected to visits from an inebriated woman, the hæmaturia instantly returns. He has noticed this sequence to be so uniform, that he firmly believes that the vexation and trouble to which he is occasionally exposed are the sole causes of his disease. I am inclined to think the man's inference not so far wrong or unintelligible as it may at first be considered. It may be readily granted that neither anatomically nor physiologically is the connexion between renal hæmorrhage and mental emotion very apparent. It is true, that certain mental emotions are known to excite, more or less, the renal function; but the cases are extremely rare in which a morbid state like hæmorrhage can be traced to a similar exciting cause.

The records of medicine, however, are not without such cases. Rayer, in his work 'Maladies des Reins,' in treating of renal hæmorrhage, mentions a case of hæmaturia (tome iii, p. 359), brought on apparently by no other cause than mental excitement: "survenu presque immédiatement après en violent accés de colére." The accompanying symptoms were severe hypogastric pain, with heat and pain in the course of the ureters, and sensation of weight and aching in the region of the kidneys. He was quickly relieved by rest, warm baths, diet, and mucilaginous drinks. I saw a gentleman last spring, seventy years of age, who suffered from occasional attacks of hæmaturia, traceable to no other cause than mental excitement. There were no gouty symptoms or the least tendency thereto. He was a remarkably healthy, vigorous country gentleman. He consulted the most distinguished physician of our day, whose name is inseparably connected with renal pathology, and his opinion, the patient informed me, was in conformity with the views now expressed.

This man, Blower, has several times, since he first came under my notice, presented himself with a return of his complaint. The hæmaturia, in June, 1856, lasted only three days. On the fifth day the urine was free from all trace of blood or albumen. Trouble and excitement preceded the attack. Six weeks afterwards he had another attack; and so dependent does the hæmaturia appear to be on mental excitement, that on this occasion a trivial dispute with his employer about the scale of remuneration for work was the exciting cause. On each of these attacks the symptoms exhibit the same peculiarity; a sense of weight and pain about the loins, but unaccompanied by any constitutional disturbance, by greater frequency of micturition, or inconvenience or difficulty in that act. It is thus, by the exclusion of all the symptoms of irritation characteristic of renal calculus, or of gouty inflammation; it is by the absence of all constitutional disturbance, whether febrile or dropsical; it is from the temporary character of the attack, the urine in a few days becoming free from blood, and from all morbid sediment, except a few scattered blood-discs, that we are led to exclude as the cause of the hæmaturia all those organic diseases in which hæmorrhage occurs as a prominent and leading symptom, and to attribute the hæmaturia to the operation of mental excitement.

I confess that but for the authority of such an observer as Rayer, or the support which this view received from the opinion of the eminent physician quoted above, that I had great difficulty in forming a satisfactory diagnosis of the cause of the hæmaturia. It is only by a patient observation of the sum of the symptoms exhibited by this patient over a period of more than eighteen months, and finding on each recurrence of the attack the strictly temporary state of the urine, the constant relation of this hæmorrhage to mental emotion, that I at last came to the conclusion that the case might be fairly classed with those which Rayer has mentioned as hæmorrhages renales essentielles (sporadique), and that the exciting cause of the hæmaturia must be attributed to the rare and exceptionable influence of mental excitement. I have been

very desirous of keeping this patient under observation, with a view of testing the soundness of the opinion entertained up to this date.

This patient came again under my observation in May, 1857. He stated that it was more than six months since he last suffered an attack of hæmaturia; that during that period he had experienced many things to fret and worry him—quarrels with his wife, his brother gone to a mad-house; but, strange to say, these anxieties did not affect him so as to bring on bloody urine, as formerly.

The present attack was of three days' duration; and he stated that, for the first time, he felt some weight and uneasiness across the loins, with a settled fixed pain in the left hip, extending to the position of the anterior crest of the hip-bone. There was no numbness or pain in the leg, no retraction of the testicle, no frequency of micturition; he held his water through the night. The tongue was clean, appetite unimpaired, and the general health undisturbed; aspect of the patient healthy.

The urine was blood-coloured, albuminous, not deficient in quantity.

Under the microscope nothing but scattered blood-discs could be discovered.

On May the 18th, the urine had nearly lost its cherry tinge. The pain in the loins had abated. He derived apparently much benefit, so far as the subsidence of the hæmaturia, from the sesquichloride of iron.

During the summer and autumn he suffered several attacks, each passing off in three to four days, the urine becoming, he states, quite healthy in appearance. I have not, hitherto, been able to get the man to bring his urine for examination in these intervals of calm. On the 3d of December, he stated to me that now the urine becomes mixed with blood after much bodily exertion; and that when the urine is not bloody, it is turbid—he said, milky—and throws down a sediment. On the 4th of December, he brought me some urine passed that morning. It was slightly turbid, a flocculent cloud was thrown down by

subsidence, the clear portion was doubtfully hazy by heat and nitric acid. The sediment, when examined, was composed of pelvic epithelium, large, compound granule-cells, the smaller sized exudation-corpuscles (mucous pus-corpuscles), and a very abundant formation of oxalate of lime crystals (octohedra). I have rarely found them in greater abundance. (Pl. X, fig. 11.) The patient distinctly stated that the only inconvenience he felt was the pain in his loins, but not one sympathetic symptom, usually present in renal calculus, could be detected. The presence, however, of these inflammatory corpuscles in the urine is evidence of some irritation in the kidneys, and the hæmaturia may hereafter be traced to some local source of mischief; but if this should ultimately be proved, the case presents very exceptional features. For more than two years the hæmaturia has been unaccompanied by any sympathetic symptoms, or by the slightest derangement of the health. Even now the aspect of the patient is most favorable; his looks are healthy, active, and undisturbed, and the lumbar pain passes away so soon as the blood disappears from the urine.

CHAPTER XVI.

PURULENT URINE.

Calculous Pyelitis.

The value of the information yielded by the microscopic appearances of the urine depends altogether on the care and accuracy with which these are applied to the symptoms and condition of the patient. When the special character of these deposits is correctly interpreted, the information becomes an essential aid to diagnosis, and consequently affords the surest basis for treatment. The cause and nature of a dropsical state of the system are at once recognised, when in albuminous urine there are found fibrinous, granular, or hyaline casts, with either blood-corpuscles, epithelial cells, free nuclei, granule-cells, or fatty matter associated with them. The pathology of dropsy with such concomitants differs from that form of dropsy in which the urine is non-albuminous and free from all deposit. Cardiac and hepatic dropsy are instances of local and general dropsy without the kidneys being necessarily implicated. On the other hand, cases occur in which the urine is albuminous, throws down an abundant sediment, and yet there is no dropsy. But the sediment here consists of pus-corpuscles, scattered blood-corpuscles, amorphous fibrinous coagula more or less stained, but no casts of the tubes. If in such cases there be great irritability of the urinary organs, frequent micturition, with pain referred to the neck of the bladder, perinæum, or

penis, a suspicion is at once excited of disease of the kidneys, but very different in character from that which is predicted where the albuminous urine is associated with dropsy, and where the sediment consists of tube-casts and disintegrated or abortive cells.

The presence of pus-corpuscles in the urine is, however, not sufficient evidence of renal disease. In gonorrhœa, or catarrh of the bladder, or gouty inflammation, pus-cells would find their way into the urine. In stricture, or chronic gleet, membranous, fibrinous débris, often entangling minute clots of blood, are often seen in the urine; and yet no suspicion of renal disease from such appearances would be justifiable. It is only by a careful comparison of the sedimentary matters in the urine with the general symptoms of the patient that we arrive at a correct diagnosis.

Inflammation of the pelvis of the kidney, excited by the irritation of a calculus, is a source of purulent urine, and the preceding remarks will be illustrated by reference to the following cases of chronic pyelitis.

The symptoms most characteristic of pyelitis are, rigors, with lumbar pains, sometimes dull and continuous, sometimes pungent and darting; often extended to, and becoming fixed at the crest of the ilium, or prolonged to the outside of the thigh, with numbness, or some altered sensation in the course of the external crural cutaneous nerve. There may be retraction of the testicle of the same side in the male; there is frequent micturition, and great irritation of the urinary organs. The patient complains of pain in the perinæum, or in the neck of the bladder, or feels a darting pungent sensation along the urethra, fixing itself in the glans penis, till temporarily relieved by passing urine. The quantity passed each time is exceedingly small, a few drops, or at most half an ounce, and the urgency of passing these small quantities recurs at very short intervals of time. The pain in the bladder, perinæum, or penis, is always temporarily relieved by micturition, and there is no difficulty or obstacle to the free flow of urine. In stone in the bladder, or stricture, these symptoms would materially differ. The urine

in chronic calculous nephritis, when first passed, is cloudy, or perhaps milky, but when set at rest quickly separating into two portions, an upper, clear, natural-looking urine, containing albumen, and a lower, distinct, precipitate-looking sediment, more or less of yellow colour, consisting of pus-corpuscles, amorphous membranous shreds or flocculi, with scattered minute blood-coagula, according to the stage of the disorder.

Amorphous or crystalline uric acid, or other earthy grit, may be present. Hæmaturia often—always, I believe—occurs at the outset, and it often returns during the progress of the disease, in sufficient quantities to cause discoloration of the urine.

If the disease have existed a certain time, there may be fulness of the lumbar region from enlargement of the kidney of the affected side; for it may happen that a concretion of urate of ammonia and soda becomes permanently fixed in the pelvis of the kidney, a partial obstruction to the flow of urine from the pelvis into the ureter follows, and an encysted or sacculated kidney is formed by the dilating influence of the retained and accumulating urine. If, on the other hand, the calculus descends into the bladder, a train of symptoms of what may be called nephritic colci supervenes, which clearly indicates the descent of the concretion into the bladder.

The following case was admitted into Burdett ward in the summer of 1855.

Case XXVIII.—William Messenger, æt. 34, a groom, a native of Suffolk, first began to complain in the spring of that year of a sharp pungent pain in the right lumbar region, which extended downwards in the direction of the bladder. At this time he was troubled with constant desire to pass water, and he noticed sandy grit in the chamber vessel. The pain and distress were always greatest before passing urine, and relieved by that act. His chief symptoms related to the pain in the perinæum and bladder, the frequent micturition, and the want of continuous sleep. The urine when passed was milky in appearance, and soon threw down, when at rest, a copious precipitate

of pus-corpuscles. (Pl. X, fig. 1.) Membranous shreds entangling a minute speck of blood were seen among the purulent deposit. The patient had frequently noticed similar appearances. The sediment, in addition to the pus-corpuscles, exhibited a few blood-discs, with numerous amorphous shreds of fibrine stained with hæmatin. There was much lumbar pain, and great increase of distress before micturition. Cupping relieved these symptoms, and he was ordered linseed-tea and tincture of henbane, which also seemed to mitigate the symptoms; he also experienced relief, he thought, from the warm bath, which he used each night before bedtime. The diagnosis of the case rested on a comparison of the chemical and microscopic characters of the urine with the symptoms and sufferings of the patient; and there was sufficient evidence to establish the opinion that it was a case of chronic pyelitis, originating in a calculus impacted in the kidney. The troubled, turbid, milky urine, containing albumen and pus, clearly indicated some morbid irritation in the urinary apparatus, and the pain and uneasiness in the perinæum and bladder, and the frequency of micturition, justified the limitation of our inquiry to this region.

But we have to interpret from these symptoms the part of the urinary apparatus which is the seat of the disease, for these conditions, in some respects, are common to many different disorders; yet if they be carefully analysed, and a just comparison established between the one and the other, we shall ultimately arrive at a correct diagnosis of the disease. Turbid troubled urine, with painful and frequent micturition, may occur in stricture, gleet, or gonorrhœa; but, in the two latter, the character of the pain during the passage of the urine, and the appearance of discharge at the orifice of the urethra, not to say the stains on the linen of the patient, would make the case sufficiently clear. In stricture, in addition to a turbid urine, when gleet is present, there may be membranous shreds, and even minute coagula, such as have been noticed in the urine of the patient under consideration. But, in such a case, the pain and distress are felt during micturition, not before; the urine passes with difficulty, or in drops, or in a diminished stream,

and an exploration of the urethra proves the impediment to the free passage of the urine. In calculus of the bladder similar conditions of the urine might exist, and much pain be experienced in the bladder, perinæum, and penis; but the pain in such cases is most aggravated after micturition; as the bladder fills the pain diminishes; just the reverse happens in the painful and irritable bladder of renal disease. Moreover, an exploration of the bladder establishes the presence of a stone. In the case before us, the patient refers the commencement of the pain to the region of the kidney, and describes the pain as if descending thence in the direction of the bladder, and becoming pungent and stabbing in the perinæum, and occasionally extending itself to the extremity of the glans penis. These distressing sensations are always relieved by micturition, and there is a temporary lull till the urine collects again, even in small quantity. This fact is of much importance in the diagnosis of renal disease, and, taken in conjunction with the history of the case, with the albumen, and amount of the purulent sediment in the urine, and the peculiar character of the lumbar and regional pain, constitutes very fair evidence of inflammatory action in the pelvis of the kidney.

In cases of inflammation of the bladder, cystitis, or catarrh of the bladder, and limited to that cavity, the character and quality of the urine differ much from what is excreted in renal disease. The urine is contaminated by the inflammatory exudation from the vesical mucous membrane; pus-cells, and the so-called exudation-corpuscles, are present in abundance; but the pus-corpuscles do not subside as a distinct and well-defined precipitate; they are entangled in a ropy magma, in which numerous crystals of the triple phosphate are visible; this viscidity and these crystals being rapidly developed by the agency of the alkaline urine always voided in inflammation of the bladder. This character of the urine will suffice to distinguish vesical from renal inflammation.

The ready separation of a turbid or milky urine into two parts, a clear supernatant portion containing albumen, derived from the liquor puris, and a sedimentary portion of pus-cor-

puscles, distinctly precipitated, voided by a patient who suffered from severe pain, either in the kidney, aggravated by pressure or motion, or in the bladder, perinæum, or penis, relieved temporarily by micturition; and in whose urine gravel or blood, or both, had been previously, or at some antecedent period, present; constitute a collection of symptoms in which little hesitation can be felt in referring them to chronic inflammation of the pelvis of the kidney.

After the patient had been in the hospital a fortnight, the quietude, the diet, the effect of warm baths, opium, and local depletion, seemed to have produced a certain beneficial effect. Micturition was less frequent, the pain was less urgent, and the bladder consequently retained the urine in a larger quantity. This interval also enabled us to observe the further indications of this disease. The pain in the region of the right kidney, or rather in the right lumbar region, was modified or aggravated according to certain positions. Thus he was easy, comparatively, while he was laid flat on his back, but the pain commenced when he turned on either side, and continued so long as he remained in that position. In lumbago there is severe pain in the loins; this pain is aggravated by motion, rising in bed, or turning from one side to the other; but it subsides so soon as the body is at rest, in whatever position that may be. It is stated in the ward-book, that in the third week of his treatment the urine on one occasion was observed to be quite clear, free from albumen, free from any notable deposit or sediment, and presenting only a few scattered pus-corpuscles when examined by the microscope; but that the next day, after an aggravation of symptoms, the urine became turbulent and purulent to a degree equal to what it had been previously. This state of things justifies still further the diagnosis, and aids us in the opinion that only one kidney is affected. It happens, in these cases, not unfrequently, that a temporary suppression, or rather retention, of the purulent secretion from the pelvis of the kidney, is caused by the obstacle impacted in the outlet, either receiving some fresh addition to its bulk, or by some temporary pressure made on the contents of the kidney closes up the small aperture in the head

of the ureter, through which the purulent fluid from the kidney passes into the bladder. It follows, the other kidney being free from disease, that the urine secreted will present no morbid conditions. This is the right interpretation of such specious symptoms, which rarely endure for more than a few hours; and the advice of Rayer, writing on this form of disease, is fully confirmed, that we should never be satisfied with an examination of urine passed at one single interval of the day, but in all such cases specimens should be seen of each act of micturition. Further depletion was not thought desirable, and the patient, in the fourth week, was placed on the sesquichloride of iron. His symptoms remained much the same—occasionally severe paroxysms of perineal pain, with much irritability of the bladder, and abundant purulent deposit in the urine, and then a few days of comparative freedom from renal distress. At this period, he complained on one occasion, early in the morning, of an attack of more than usual severity, commencing with a violent throbbing in the right lumbar region, with a piercing darting pain in the perinæum; and after some little trouble in passing the last part of a small quantity of urine, he found a membranous film protruding from the orifice of the urethra, which he only partially succeeded in drawing out. He described it as like jelly. In the course of the day, a further portion was passed. During the remainder of his stay in the hospital, this symptom did not recur. This gelatinous kind of exudation has been noticed in analogous cases.

In the treatment of these cases our chief reliance must be placed on the palliative agency of opium. If it be a case of calculous pyelitis—that is, chronic inflammation of the pelvis of the kidney arising from the irritation of a calculus impacted therein, it is quite obvious that so long as the irritating agent remains, so long will the symptoms of chronic inflammation continue. We have no remedies that can either dissolve or remove such a concretion, and the progress of the case must ultimately depend on the form and composition of the calculus, some of which escape into the bladder, with symptoms characteristic of their descent through the ureter, and, if their

diameter be but small, may be excreted through the urethra; this is more likely to happen in the female. This small concretion now before me excited renal inflammation, and gave rise to purulent urine; violent colic pains suddenly arose; there was most urgent retching and vomiting, and the concretion reached the bladder. A few days after the subsidence of these symptoms, the patient's urine suddenly stopped, and after a few distressing and painful efforts of straining was ejected with violence, and a hard substance fell into the vessel. Fortunately the patient was in his bed-room, and the calculus was preserved. It does not exceed a pea in size, is very jagged on the surface, and glistens from the deposit of crystals of triple phosphate on its circumference, but its composition internally is oxalate of lime. This happened seven years ago, and the patient has never had any renal symptoms since. These numerous concretions and earthly *débris* are also from the kidney; they were passed eight years since with symptoms of pyelitis. These are the most favorable terminations to renal calculus. In other cases the calculus, having escaped the kidney, lodges in the bladder, and gives rise to the usual symptoms, relief from which can only be obtained by the assistance of a skilful surgeon. But in by far the more numerous cases of calculous pyelitis, the concretion grows by the apposition of fresh matter, becomes impacted in the head of the ureter, does not completely occlude the outlet, but becomes branched and irregular in shape by the constant deposit of phosphatic matter derived from the action of alkaline purulent fluid on the urine, still secreted by the intact part of the kidney; the fluid retained in the pelvis of the kidney is constantly exerting a dilating influence, and in the progress of the case a renal tumour is felt, distinctly fluctuating; and if the history and symptoms of such a case be carefully collated, the diagnosis is not difficult. This preparation of a branched and ragged calculus impacted in the pelvis of the kidney, with a sacculated condition of the organ, illustrates these remarks. (Hospital Museum Preparation, Series vii, 1, 2.) It must be clear that medicinal remedies can exert no curative influence in such a case. To palliate and relieve must be the limit of our aid.

In the case which has formed the subject of these remarks, we may consider that perfect quietude, the warm-bath, cupping on the loins in the early period, and opiates, were the agents through which partial relief was obtained. The buchu, the sesquichloride of iron, and the nitro-muriatic acid, although severally administered, cannot be said to have done anything for the relief of the patient. He was made an out-patient six weeks after admission, and on October 2nd, ten weeks from the period of his discharge, his urine remained the same, and his symptoms were unchanged, so far as the report of his wife can enable us to judge.

In the management of such cases, while we acknowledge how little beyond palliation medicinal remedies can effect, it must not be forgotten, that a well-regulated diet, and a regimen regulated by the probable chemical character of the concretion, may, and often does enable the patient to reach a fair average period of life. If the patient exhibit any marked characters of the uric acid diathesis, alkalies, particularly the bicarbonate of potash in lemon-juice—or, where the means of the patient permit, a visit to some alkaline mineral spring, such as Vichy, is attended with benefit.

I have reason to think, that what was formerly considered as the oxalic acid diathesis, is but a modification of that constitutional disorder which exhibits itself in the excretion of uric acid, and its compounds in abundance. I have in another part of this work expressed my reasons for this opinion.

This patient has been under my observation from the period of leaving the hospital, in the summer of 1855, to the date of these sheets going through the press. His sufferings are great, yet he keeps up a fair appearance of health. He is able freely to move about, but not sufficiently strong to do laborious work.

In October, 1855, the urine remained without any alteration of character; it was simply purulent urine. He spoke of some peculiar sensations of coldness in the scrotum, and extending down the inside of the thighs, such as no external warmth would relieve. These alterations in the local condition of common sensation are very various in these cases.

He continued to derive relief from half drachm doses of the Liquor Opii Sedativus. I did not see the patient again till August, 1856. The pain had become less urgent—not so continuous, occurring in paroxyms. He took cod-liver oil, with opiates, when necessary, and in October, 1856, I was gratified to find a very manifest improvement in him: he had gained both strength and flesh. The frequency of micturition, with the attendant pain, had diminished so much, that he was not called upon to rise more than twice in the night. The urine was still milky, and contained pus-cells. In April, 1857, he suffered a fresh attack of hæmaturia. The urine was cloudy and dark coloured, and being left at rest, separated into a clear reddish upper part, and a deposit, the surface of which was of red corpuscles, the lower of pus-cells. It seemed by this arrangement as if the greater density of the pus-cell had caused their subsidence first—thus allowing the smaller and lighter blood-corpuscle to rest upon them as an upper layer. The microscopic appearance of this urine is represented at Pl. X, fig. 3, several membranous shreds of an orange colour were present, oxalate of lime crystals, pus-cells, granular cells, blood-corpuscles, scattered over the field, some free nuclei highly resplendent, some uric acid grit, and a few large compound granule-cells.

After this attack his former symptoms returned with unabated intensity. Micturition was as frequent as ten to twelve times in the night; every half hour; getting no sleep, and opium apparently losing its influence. However, it soon became apparent that larger doses of the anodyne succeeded in obtaining relief. In February, 1858, he stated to me that his symptoms had remained without much alteration for many weeks past. He suffered very much the same kind of pain as when in the hospital. The urine had the same purulent character, but was free from oxalate of lime; no blood-corpuscles were seen; large compound granule-cells and pus-corpuscles, with free nuclei, were the microscopic objects, Pl. X, fig. 4. The increased proportion of granule-cells may be considered a favorable indication.

So long as the disease is confined to one kidney, the patient

may live for years, suffering from occasional aggravation of pain, till the calculus either becomes completely encysted, or by blocking up the canal of the ureter at its commencement in the infundibulum of the pelvis, the kidney slowly but at length becomes sacculated and pouched. The Museum contains some very characteristic specimens of this process. Preparations, Series vii, i—iv.

April 3, 1858. This patient had suffered for the last two days an attack of hæmaturia, without any great aggravation of his symptoms. The sample of urine brought was blood-coloured, and he stated that yesterday (Good Friday) he passed one of those blood-clots formerly mentioned, which remaining plugged for a time at the orifice of the urethra—caused some painful straining before it was ejected. The character of the sediment at this period was that of recent hæmaturia. (Pl. X, fig. 5.)

CHAPTER XVII.

Excess of uric acid (gravel)—inducing obscure symptoms of pyelitis—with hæmaturia—and faintly albuminous urine.

Urine containing excess of uric acid, which is rapidly and abundantly precipitated on cooling—in any of the crystalline forms which this acid assumes—will sometimes excite so great a degree of renal irritation, that grave doubts may be entertained whether the patient is not suffering from calculous nephritis, and which doubts a microscopic examination of the urine will satisfactorily remove. The uric acid crystallizes from the urine so abundantly, in these cases, that a deposit of what is called *red sand,* rapidly forms at the bottom and sides of the vessel, and is always accompanied by epithelium in abundance from all the urinary passages. So that such urine affords examples of epithelial cells from the bladder, ureters, and pelvis of the kidney. Epithelium from the tubuli uriniferæ do not occur. When the amount of renal irritation is very great, large compound granule-cells are not unfrequent, and in very severe cases, where the symptoms differ in nothing but in intensity and duration from those of calculous nephritis, a few scattered pus-cells and granule-cells usually accompanying pus, may for a time be visible. But these soon disappear, and the urine contains only healthy formed epithelium in daily diminishing proportion; which, as the uric acid decreases, becomes no greater in amount than in healthy urine. The symptoms, in these cases, differ very much in intensity, even in character.

Sometimes lumbar pain, with slight amount of irritation in the urinary passages, and dyspeptic derangements, are the chief signs. But not unfrequently the symptoms become more directly expressive of renal irritation. There is frequency of micturition, heavy, pungent, pain in the loins, extending to the neck of the bladder, and even to the extremity of the penis. A steady, fixed pain may localise itself in the crest of the ilium, and there may be even pain extending down the thigh. Such cases may terminate in calculous nephritis; but, by judicious treatment, this grave disease may be averted. The gouty habit of body is mostly disposed to such attacks; but the disorder may result from the sudden arrest of the cutaneous functions, accompanied by febrile disturbance. These cases the more readily yield to treatment of warm baths, diaphoretics, and alkaline citrates. An attack of gravel, in the gouty habit of body, should always be viewed as salutary; for it is an effort, and a successful one, to eliminate by the urine the *materies morbi* of the gouty diathesis. But an attack of gravel may occur in individuals in whom the gouty disposition is not strongly pronounced, and its origin may be traced to the special influence of certain articles of food, but more particularly of drink. Cyder, to those unaccustomed to it, will produce excess of uric acid, or at any rate will so acidify the urine as to cause the ready precipitation, on cooling, of these crystals. Home-made wines, new and half-fermented beer, abundance of acid fruits, will severally, in certain constitutions, lead to similar results. As age advances the disposition to the formation of uric acid in excess increases, and the influence of any of these exciting causes is the more readily felt.

Case XXIX.—A lady, sixty-six years of age, of healthy aspect, resident in the country, married, and the mother of a family grown up, had for two or three years suffered from distressing frequency of micturition, as many as five or six times during the night, with constant lumbar pain, and a distressing pungent feeling downwards in the direction of the ureter to the neck of the bladder. These painful sensations increased in

intensity till she passed a small quantity of water, when temporary relief was obtained. All these symptoms were present when I saw her. She stated that she had more than once seen what she conceived to have been blood in her water.

The pain was referred entirely to the left lumbar region, and extended downwards towards the bladder. There was also a fixed sense of uneasiness rather than pain at the crest of the ilium, and proceeding in the direction of the external crural cutaneous nerve. There was a sense of numbness in the exterior half of the thigh of the left side. She had frequently, during the last few years, suffered from what appeared to have been true gastralgia—*heartburn;* but at the present time the digestive organs did not appear out of order. She suffered no increase of pain in walking, nor did the jarring or jolting of a carriage in any way augment the pain in the loins. She has frequently noticed great quantities of red sand in the water. All the other functions seemed healthy. There was no history of gout in the family; nor were there any gouty indications, except the character of the dyspeptic symptoms.

The urine which was brought for examination was of a bright orange colour; of a strong acid reaction; of a specific gravity of 1021: it threw down a plentiful flocculent cloud, occupying about one third of the tube in which it was set at rest: and the sides were coated with numerous crystalline grains of uric acid. Microscopic examination exhibited numerous crystals of uric acid; some lozenge-shaped; some columnar, or cylindrical; large fields of the pavement variety of epithelium studded with lozenge-shaped crystals of uric acid. (Pl. X, fig. 6.) There were also groups of epithelial cells from the pelvis of the kidney, and a few scattered compound granule-cells, and one or two isolated ones looking like pus-cells, or exudation-corpuscles. In each drop of urine examined the crystals of uric acid were more numerous than the organic structures.

I could not trace this excess of uric acid to any satisfactory cause. That it had given rise to the symptoms of renal irritation above described, there could be little doubt.

The patient had constantly resided in the country; enjoyed uninterrupted good health; had lived throughout her life in the same locality.

Her husband was engaged in agriculture, while she superintended the domestic affairs of the farm. Her diet and mode of life was not different from that enjoyed by the rural gentry. The son told me they brewed their own beer, and his mother was very fond of it new, and in the half-fermented state. This was the only dietetic error to which the malady could be attributed.

The bicarbonate of potass, in half drachm doses, with a dessert-spoonful of lemon-juice, was taken three times a day, and an anodyne draught at bed-time.

Two days after a second examination of the urine was made; the appearances did not materially differ from those seen on the first occasion. The flocculent deposit was much less, and the epithelium diminished, and only here and there a large compound granule-cell. The decrease of these was accepted as a sign that inflammatory conditions were subsiding rather than increasing. A fortnight afterwards the urine which was sent up was free from any deposit of uric acid, and the only structures visible were a few groups of the pavement-epithelium of the bladder, and a few scattered and isolated, from the urethra. The frequency of micturition had disappeared; the distressing lumbar pain was mitigated; and by the end of a month I was informed of her freedom from any of the preceding symptoms.

In cases of gravel, as distinguished from calculous pyelitis, the presence of the normal epithelial cells of the pelvis of the kidney and ureters, may always be considered favorable, as indicating that suppurative action has not commenced.

PLATE X.

Calculous Pyelitis.

Fig. 1.—January 1855. Pus-cells; flakes of amorphous fibrine; blood-corpuscles; groups of granular exudation-corpuscles; free nuclei.

„ 2.—October 1855. Pus-cells; compound inflammatory cells; large granular cells; uric acid grit, amorphous.

„ 3.—April 1857. Pus-cells; large granular cells; flakes of amorphous fibrine entangling blood-discs; crystals of oxalate of lime; uric acid grit; blood-discs; free nuclei.

„ 4.—February 1858. Pus-cells and large granular corpuscles.

„ 5.—April 1858. Blood-corpuscles and large exudation-cells.

„ 6.—Case XXIX. Epithelium from pelvis and ureters; granular corpuscles; crystals of uric acid; uric acid grit, amorphous.

„ 7.—Same urine two days later.

Tubercular Pyelitis.

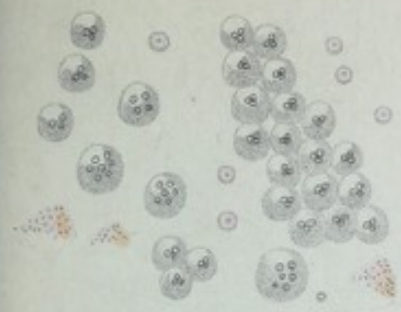
„ 8.—Pus-cells; compound inflammation-corpuscles; free nuclei; granular matter diffused over the field; amorphous fibrinous flakes; epithelial scales from the bladder; a few crystals of uric acid.

„ 9.—Pus-cells; compound inflammation-corpuscles; amorphous fibrinous flakes, and crystals of triple phosphate.

„ 10.—Case XXVII. Blood-discs. Amorphous fibrinous flakes. Epithelial cells from the pelvis of the kidney; vesical epithelium and large compound granule-cells.

„ 11.—Pus-cells. Compound inflammation-corpuscles. Epithelial cells from the bladder. Crystals of oxalate of lime.

Fig. 1. June 1855



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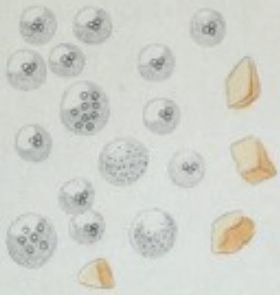

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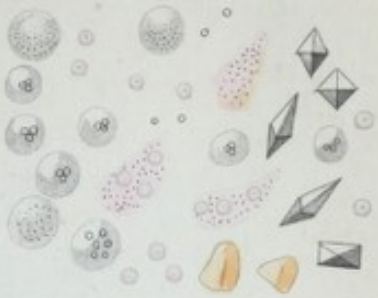

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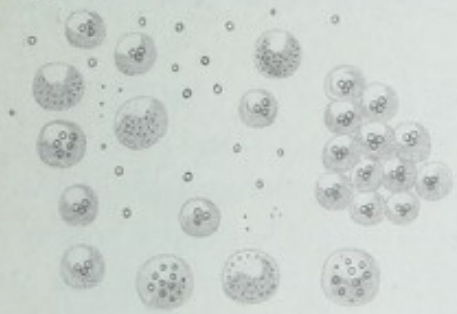

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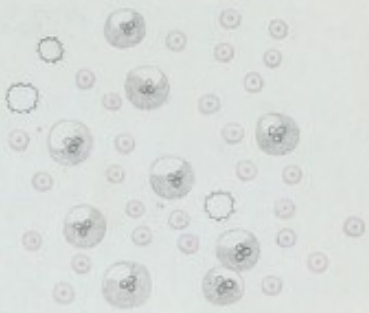

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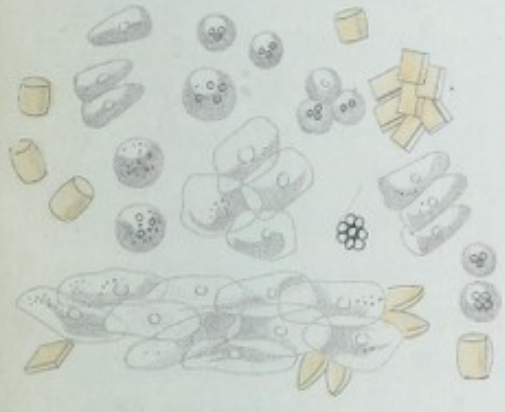

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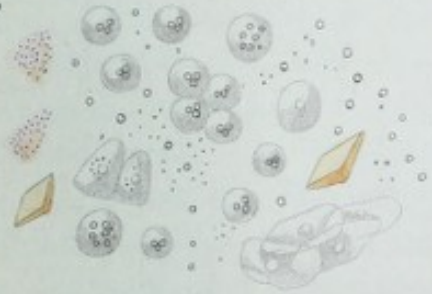

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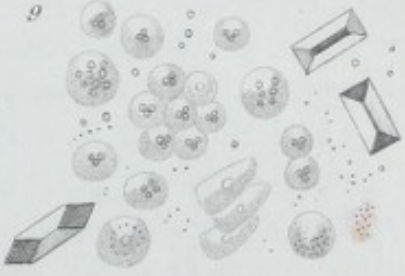

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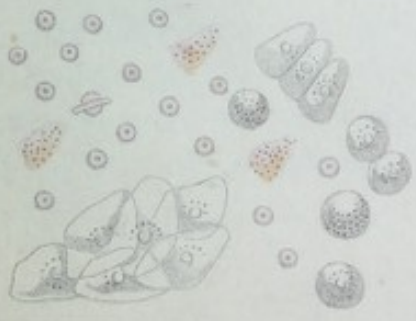

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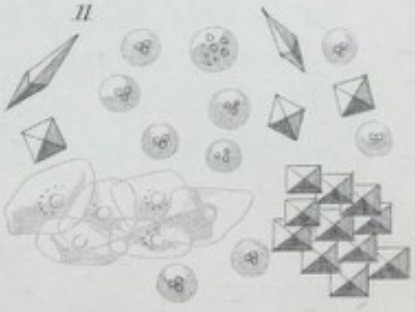

Purulent Urine.

Calculous Pyelitis: hæmaturia, followed by nephritic colic, vomiting, and purulent urine.

Case XXX. M. J—, æt. 32, the mother of one child, of a delicate frame of body, and in whom lactation had ceased two months; the catamenia having appeared twice; suffered from great uneasiness and pain across the loins, there being also a dull, aching sensation referred to the crest of the ilium of the left side. Two days from the commencement of these sensations, and suffering some febrile disturbance, she passed some considerable quantity of blood with her water. There had been no vaginal discharge, nor was there any appearance of blood, except when she passed urine. The hæmaturia continued for four or five days, when the urine gradually lost the appearance of blood; and before it finally disappeared, a sandy, gritty deposit was noticed in the chamber-vessel. About the seventh day from the commencement of the hæmaturia, violent griping pains came on, passing across the abdomen, and descending towards the pelvis, and accompanied by distressing retching, and vomiting. She had been judiciously treated by Mr. Hunt, of Tachbrook-street, who, however, felt some doubt about the nature of the case. The countenance at this time was anxious and expressive of pain and exhaustion; the tongue was pale and furred; the temperature of the skin cool; the pulse small and jerking; the vomiting had been incessant, and the irritability of the stomach such that nothing was retained; the paroxysms of pain were frequent. The abdomen was soft and natural; but there was much tenderness complained of along the margin of the ribs and in the epigastric region on the least pressure, but this was evidently the soreness in the parietes, arising from the uninterrupted vomiting and irritability of the

stomach. The right iliac and lumbar regions bore pressure without eliciting any increase of pain, nor was there any fulness or distension; but when pressure was made in the left iliac space and in the lumbar region of the same side, not only was a greater fulness perceptible than was natural, but the patient experienced an augmentation of pain, and of a character of which she was not previously conscious; every increase of pressure caused a darting, pungent, stab-like sensation extending to the pubis. The enlarged and congested kidney could be distinctly traced, although the examination necessarily induced much suffering to the patient. There had been frequent attacks of colic during the night, with constant vomiting; the bowels had been relieved, but unless urine passed with the dejections, none had been made for the last ten hours. It did not appear that previously to this micturition had been more frequent than natural, or that there had been any irritability of the bladder. Leeches had previously been applied to the abdomen, and calomel and opium had been given; but it is to be supposed that the pills were not retained.

Taking all these symptoms into consideration, although there was no urine to assist the diagnosis, an opinion was given, which it was expected that secretion would confirm, that this was a case of renal disease, from the presence of a calculus in the kidney of the left side. The paroxysmal griping pains were those of nephritic colic, excited by the descent of calculous matter through, and consequent irritation of, the ureter of that side. The incessant vomiting is a constant accompaniment to such irritation. The antecedent condition of hæmaturia afforded additional evidence in favour of this opinion. It wanted only the urine to render this certain. The condition of the patient, expressed by the countenance, pulse, and tongue, forbad any further depletion. To allay the pain, and moderate the irritability of the stomach was the urgent present indication. Accordingly, Battley's solution, in half-drachm doses, every six hours, was directed to be taken; warm and hot fomentations to be applied to the abdomen and loins; iced soda-water to be sipped at intervals, to which might be added

a teaspoonful of French brandy. So soon as the stomach could retain anything, the simplest forms of nourishment were suggested; and when medicine could be retained, amylaceous and other demulcents, in conjunction with moderate doses of hyoscyamus. A more extended plan of treatment could not be laid down till the character of the urine had been ascertained.

The opiate produced almost immediate relief; the irritability of the stomach, soon after the second dose, had decreased so much that some slight nutriment was retained; and free micturition had been established, so that a sample was obtained for examination. It was faintly acid, specific gravity 1022; it was cloudy, of a light-fawn colour, and did not become clear when allowed to rest, but nevertheless it deposited a well-marked yellowish sediment. The upper portion, heated in a tube, became quite clear at a temperature of 80°; and then, before reaching the boiling point, again became cloudy; nitric acid being added, a granular precipitate, indicating the presence of albumen, was produced. The fluid also assumed a dark-bluish green colour, which, as it cooled, became changed to a reddish orange. These characters indicated, first, the presence of urates in excess, easily soluble at the temperature of the body; secondly, the presence of albumen, which might be the associate either of blood or pus in the urine; and thirdly, a peculiar condition of the urinary pigment, by which the addition of nitric acid causes the fluid to assume a bluish colour. This abnormal pigmentary condition is often observed in the albuminous urine of those suffering from Bright's disease of the kidney; but it is by no means confined to the urine of that form of disease.

Examined under the microscope, numerous objects were presented to the eye. 1. Urate of ammonia in its usual granular form. 2. Vesical epithelium. 3. A few blood-discs. 4. Numerous large exudation-corpuscles, mixed with pus-cells in abundance. 5. Amorphous masses of fibrine stained with hæmatin, with many tubular coagula, free however from any entangled epithelium, and from their size, in all probability,

formed in the straight uriniferous tubes of the cones. 6. Many irregular-shaped crystalline masses, highly refractive, and of an orange-yellow colour, exhibiting the character of amorphous uric acid; a few of them approximated to the lozenge and cylinder-shaped crystal of this acid. Grit was found in the sediment sufficient to impart a sense of roughness when rubbed between the fingers.

Here, then, was abundant evidence that the diagnosis had been correct; and that the hæmaturia in the early stage of the illness had been derived from the kidney. Amorphous fibrinous masses, as well as tubular coagula, moulded in the larger uriniferous tubes, proved unequivocally the source from whence the blood had been derived. The pus-corpuscles, and the albumen in the urine derived from the liquor puris, testified to the suppurative process perhaps about commencing; and the crystalline masses seen in the field of the microscope, as well as the sandy deposit amongst the purulent sediment, led to the conclusion that a calculous concretion within the kidney was giving rise to all these symptoms. The case was very expressive of the series of symptoms successively developed by the irritation of earthy matter formed and lodged within the cavity of the kidney.

CHAPTER XVIII.

TUBERCLE OF THE KIDNEY.

Chronic pyelitis—Tubercle in the kidneys, bladder and prostate—fistulous opening between the bladder and rectum.

NOTWITHSTANDING the success with which the urine has been studied, in relation to the diagnosis of most affections of the kidney; there are, nevertheless, diseases, rare in their occurrence, which will, and perhaps ever must, present almost insurmountable obstacles to a correct diagnosis.

Tubercle in the kidneys is a disease of this character: it is of comparative infrequency. If the record of such a case does not assist in clearing away the difficulties of correctly estimating the presence of tubercle, it will, however, exhibit the group of symptoms, together with the complications which may arise and become associated with this form of disease of the kidneys. The difficulties of diagnosis in these cases is not so much in reference to the locality or organ affected, as it is to the nature of the disease. The existence of pyelitis, as well as the sacculated and enlarged condition of the right kidney, were clearly made out during life; but these were supposed to depend on calculous disease. There was nothing in the urine which could justify the suspicion of tubercle as the cause. Organic granular matter insoluble in hydro-chloric or acetic acids, associated with pus in the urine, has been thought characteristic of tubercle in the

kidney: but more or less of this granular material is always present with pus-cells in abundance.

Case XXXI.—J. W.—, aged twenty-nine, a carpenter, was transferred from the care of Mr. Charles Guthrie, and admitted into Burdett ward, on the 18th of May, 1855. He came under the care of that gentleman, suffering from irritable bladder, and doubtful symptoms of calculus. He was examined by Mr. C. Guthrie, Mr. Holt, and Mr. Brooke, and they were unanimously of opinion that there was no stone in the bladder, nor stricture, nor disease of the prostate. While under surgical treatment, samples of his urine were twice sent to me for examination. On the first occasion, the urine was faintly acid, slightly albuminous, natural in colour, and depositing, when set at rest, a faint flocculent cloud; there were also small membranous shreds, one or two of which contained a minute coagula of blood. Under the microscope, there were seen the large pavement epithelial cells in abundance; many blood-corpuscles; some fibrinous coagula, quite amorphous, but stained of a reddish yellow; and a few of the smaller, spherical, glandular, epithelium. The bottom of the glass vessel in which the urine had remained contained a few membranous shreds, which felt gritty, and which readily dissolved in dilute hydrochloric acid. The patient described his symptoms as of about some seven weeks' duration; he could not account for their origin, but described them as commencing with severe lumbar pain, of a sharp, pungent character, followed by frequent desire to pass urine, and inability to retain but a small quantity. This was followed by severe paroxysms of pain, referred to the perinæum and canal of the urethra. The irritability of the bladder increased; he passed urine every hour, day and night; he had never passed blood, but he had seen very minute threads of coagulated blood. The house-surgeon stated that he had once noticed the urine of a dark chocolate colour; and a few days before he was transferred, it became opaque and milky. As the pain became more urgent and distressing his bodily strength failed, and he rapidly lost flesh. While under Mr. C. Guthrie's

care, he had been cupped *in perineo;* he had taken also diuretics, with liquor potassæ; opium and ether had also been given; but from none of these remedies did he experience any relief. On being received into Burdett ward, the following were the chief symptoms recorded in the ward-book: there was great physical exhaustion and debility, much emaciation, and a careworn, anxious expression of countenance. The pulse was small and weak, the respiration natural, the tongue slightly coated, torpid bowels, deficient appetite, craving thirst, and profuse and exhausting perspirations. The patient complained of urgent pain, referred to the hypogastric region of the abdomen, and accompanied by darting, stabbing paroxysms in the perinæum. This pain, the patient states, is temporarily relieved by micturition, that for a few minutes afterwards he is comparatively easy, but that the uneasy sensation then commences, and continues augmenting in intensity till the distress becomes most urgent, and is again temporarily suspended by voiding the small amount of fluid collected in the bladder, which seldom exceeds one or two ounces. The pain is not increased by walking or exercise, he has never known the urine to stop suddenly, and he is quite clear that the only interval of ease that he experiences is immediately after micturition. He has for many weeks suffered from a constant fixed pain in the small of the back, to the right of the spine, and referred to the posterior crest of the ilium. There is a greater degree of fulness in the right lumbar region than in the left, and pressure made on the former, by grasping this region with the right hand, the thumb resting on the lumbar muscles, and making pressure on the abdominal wall with the fingers, excites an increased amount of pain. An obscure sense of limited fluctuation is also elicited out of the same region. These conditions are absent on the left side.

The urine passed last night was milky and opaque, which character the patient now states he has noticed during the last week. On being set aside it separated into two portions: an upper, slightly clouded, but otherwise natural-looking urinary fluid; and a lower, distinctly separated precipitate of yellow

pus-corpuscles. The upper portion is not ropy, but pours off naturally, is faintly acid, and a copious precipitate of albumen is obtained by heat and nitric acid. Examined by the microscope the lower part was composed entirely of pus-corpuscles, with granular walls, and with addition of acetic acid the nuclei became distinctly visible. Some granular matter observed in another sample was readily dissolved by dilute hydrochloric acid. The supernatent portion before the glass exhibited large spheroidal epithelial cells, with many scattered pus-corpuscles. (Pl. x, figs. 8, 9.)

The opinion expressed after these facts had been elicited was that the patient was suffering from pyelitis of the right kidney, due in all probability to the impaction of a calculus in the ureter, or its lodgment in the head of that outlet from the pelvis; that the right kidney was enlarged and sacculated from this cause; and that the irritation of this concretion had set up inflammation of the mucous membrane lining the pelvis and extending probably to the calyces; and that the products of this inflammation (only partially retained by the body lodged in the head of the ureter, for the irregular shape of these concretions does not completely close the canal), on the one hand, passed as it were, *stillatim*, into the bladder; while, on the other, it was continually exercising a dilating or expanding pressure from within outwards, causing the kidney to become distended, and ultimately sacculated, with the entire loss of its tubular structure.

The uvæ ursi was first administered, with a grain of morphia, night and morning; but, in a few days, the morphia appearing to fail in its anodyne effects, Battley's solution was substituted, and for a short time with apparent relief; for on the 29th of May, the ward-book states that the pain was neither so urgent or distressing, nor the desire to pass urine so frequent. The quantity passed each time, however, did not exceed two ounces; and the whole quantity during the twenty-four hours at this time amounted to not more than sixteen ounces. The character of the urine continued the same; a dense, well-defined purulent deposit, and a supernatant, now perfectly clear por-

tion, faintly acid and albuminous. Emaciation continued; there were profuse perspirations; much thirst, and the tongue becoming brown and dry; pulse very small and weak.

On the 2d of June, he took quinine and sulphuric acid, the anodyne being continued; the former of these remedies seemed to check the perspiration.

On the 12th of June, there was some apparent improvement in the general condition of the patient. The thirst was less, the perspiration less, and the tongue, although red, was moist, and the patient had slept better. The urine passed in the latter part of the day emitted a very offensive odour, and was for the first time alkaline and contained a much larger proportion of purulent deposit; the upper portion was, however, clear and not ropy, and abundantly albuminous. There followed so much exhaustion on the next day that he was placed on ten ounces of port wine. Micturition became more difficult than at any previous period of the disease. The opium continued to procure slight mitigation of the symptoms.

On the 14th, there was much exhaustion, pallor of the countenance, and the urine passed involuntarily from him; the quantity could not be estimated, nor the character ascertained. On the evening of this day, the nurse reported that he was suffering from loose watery diarrhœa.

On the 16th, the ward-book stated that although much more exhausted, yet the patient stated that he felt easier, and that the pain referred always to the neck of the bladder and perinæum had subsided. An opinion was expressed that in all probability a communication had become somewhere established between the enlarged and sacculated kidney and the intestines, by which the contents of the renal organ had been discharged, and relief for a time obtained. The condition of the patient was such that no examination of the loins and abdomen could be efficiently made. He lingered for two more days. The watery discharge from the bowels continued, and a turbid fluid escaped now and then in small quantities from the urinary passage. He died on the 18th of June.

Post-mortem examination, eighteen hours after death.—The

body was much emaciated. On opening the chest, the lungs only partially collapsed; a few scattered bands of old organized lymph united the pleuræ in both cavities. Both lungs were the seat of tubercular deposit in the form of small gray granules, not exceeding a pin's head in size, nowhere in a stage of softening, nor were they in any spot aggregated together, but were diffuse, distinct, and surrounded by elastic permeable lung substance; the bronchial mucous membrane was natural in appearance throughout. The heart was soft and flaccid, with two white opalescent patches on its surface; the interior cavities and the valves were free from any morbid appearance. The cavity of the abdomen: the peritoneal surface of the intestines presented no inflammatory appearance, except in one spot, where a fold of small intestine, lying in contact with the fundus of the bladder, was covered with some recently-effused lymph, and surrounded by a margin of injected vessels. The colon was traced from the cæcum, and on raising it the right kidney was observed much enlarged, of a somewhat quadrangular shape, apparently sacculated, and fluctuating distinctly to the touch, from contained fluid. The large intestine was traced to the rectum, but no morbid condition was noticed; but the rectum, at a spot corresponding to the posterior and inferior third of the bladder, and a little to the left of the median line, was firmly united to, and a fistulous communication at this point had become established between the bladder and the intestine, and by this channel the contents of the bladder had, since the commencement of the fluid dejections, been voided by the rectum. The mucous membrane of the bladder was of a dark slate colour, the upper half presenting the usual corrugations, but below the fistulous opening, and surrounding it, were numerous granular deposits, presenting the character of tubercle; the prostate was also the seat of a granular deposit. The effused lymph thrown out on one fold of the small intestines lying in proximity to the bladder was not more than a finger's breadth in extent, and had been developed by contiguity to the fistulous opening between the bladder and rectum. Within the bladder, the edges of the fistulous passage had a ragged

and gangrenous appearance, and immediately beneath, and filling the portion of the bladder inferior to the fistula, was a mass of fibrinous matter, gelatinous in character and adherent, though not firmly, to the mucous membrane; there was much amorphous and gritty matter diffused through it, and in the most inferior part fragments of earthy, gritty matter, composed of triple phosphate and urate of ammonia. The two kidneys differed very materially from each other. The right was much enlarged; it distinctly fluctuated; and was as if sacculated. The left, though somewhat larger than natural, preserved its form, and presented no evidence of disease. The capsule of the right kidney was firm and dense, and was with some difficulty dissected from the cortical surface. When this was accomplished, the surface was found studded with white tubercular spots, each surrounded by a faint-red areola. On a section being made, a considerable quantity, about ten ounces, of a purulent fluid, of a yellow colour and creamy consistence, escaped, and displayed the interior of the kidney as a large sac, each of the calyces representing a small cup-shaped cavity, constituting the walls of the dilated kidney. These smaller cavities, as well as the pelvis of the kidney, were covered with a rough ragged fibrinous deposit. The ureter was much thickened, and throughout its extent was cord-like, its canal much narrowed, and its lining membrane of a slaty colour. There was not complete occlusion of its passage, for a small probe could be passed into the pelvis of the kidney, and, before the sac was laid open, the purulent fluid from the interior could be expressed from it. All trace of the tubular portion of the kidney had disappeared. The cortical part, when examined under the microscope, exhibited only a fibrous material, with diffused granular and fatty matter. The urethra presented no evidence of disease. The mesenteric glands were enlarged, and were the seat of tubercle. The liver was natural in size and weight, but somewhat soft and greasy, and the hepatic cells were more loaded with fat than in health. A few scattered tubercles were present in the spleen.

The significant symptoms at the period this case first came

under observation, may be conveniently placed in three groups—

I.—The sensations of the patient in reference to the function of micturition, its frequency, and the subsidence of the pain after voiding the urine.

II.—The proofs obtained by examination of the bladder and urinary passages that there was neither stricture, calculus in the bladder, nor prostatic disease.

III.—The microscopic and chemical examination of the urine, and the physical examination of the regions of the kidneys.

I. Frequency of micturition, arising from or associated with pain at the neck of the bladder, or perinæum, or extremity of the glans penis, is a condition common to many disorders of the urinary organs, and is present in a greater or less degree in stricture of the urethra, calculus in the bladder, disease of the prostate, general irritability of the bladder, and in some special forms of disease of the kidney. A surgical examination of the canal of the urethra, or an exploration of the bladder, may be necessary to determine the presence of one or other of the three first-named conditions. But the symptom of most practical importance in connexion with this part of the subject is the relation which the pain and uneasiness experienced by the patient bears to the function of micturition, or the act of emptying the bladder. While painful and frequent micturition is common to all the above-named disorders, yet the period during which the greatest aggravation or the greatest relief occurs, materially differs in each. Thus, in stricture the pain and distress is greatest during the effort, or during the act of voiding the urine. In stone in the bladder the pain is greatest after micturition, or when the bladder is empty. In disease of the prostate, the pain is continuous, and not relieved by micturition. While in those cases of pyelitis, particularly calculous pyelitis, in which irritability of the bladder exists—for it is not present in all cases—the pain, distress, and uneasiness, is quickly and immediately relieved by micturition, however small the

quantity passed; and in this respect these cases exhibit conditions and symptoms analogous to what is observed in ordinary irritability of the bladder and urinary organs, where there is pain and frequency of micturition; but the morbid conditions are readily distinguishable by a microscopic and chemical examination of the urine. In the case under consideration, this symptom was very expressive; the patient spoke distinctly of the pain and distress acquiring intensity as the urine accumulated, though only to the extent of an ounce or two; that he experienced no difficulty in passing urine, and that the relief after micturition was complete. At the time he first came under notice this period of relief extended to an hour or two; latterly, the interval of ease became more and more limited, and towards the last, although the patient made no special complaint, yet it can hardly be doubted that the suffering was continuous, and allayed only by the anodyne influence of opium. This aggravation of the symptoms must be attributed to the tubercular deposit in the prostate and the bladder.

II. Before the patient left the surgeons' ward, he had been carefully examined by Mr. Holt, Mr. Charles Guthrie, and Mr. Brooke, who were unanimous in their opinion that there was neither stricture, calculus, nor prostatic disease.

III. *The State of the Urine.*—The urine at the earliest period at which it was submitted to me for examination, was faintly albuminous, and contained numerous shreds, or fibrinous flocculi, some of which contained a minute clot of blood, visible to the naked eye; latterly, some of these fibrinous coagula contained gritty matter. This flocculent deposit presented, under the microscope, the characters of coagulated fibrine, stained with colouring matter (Pl. X, fig. 8); there were also scattered pus-corpuscles, and numerous large-sized spheroidal epithelial cells, some of which, by apposition, presented a polygonal aspect, having the usual character of epithelium from the pelvis of the kidney. The urine soon after became milky, and deposited a precipitate of pus-corpuscles; the upper portion of the urine remaining clear and natural in colour, but highly albuminous. The pain on deep pressure being made in

the right lumbar region, and the greater fulness and obscure fluctuation of this part, completed the evidence in favour of the diagnosis that was formed. The presence of tubercle was not suspected; and it may be interesting at this point to inquire whether there are any and what means of distinguishing tubercle of the kidney during life? and another question also may be raised here, although perhaps it may not be capable of easy solution—viz., what relation did the tubercular deposit in the kidney bear to the earthy phosphatic concretion found in the pelvis of the kidney, and partially obstructing the ureter?

Let us examine these two questions separately. Are there any and what means of determining the presence of tubercle in the kidney during life? This question, I fear, at present must be answered in the negative. Rayer says: "Je ne connais aucun caractère dans la sécrétion urinaire, ni aucun autre moyen, à l'aide duquel on puisse diagnostiquer le depôt de la matière tuberculeuse dans les substances renales." He mentions circumstances under which it may be less difficult to determine the presence of tubercle; but supposing the tubercular deposit not to extend beyond the kidney, and not to affect the bladder or urinary passages, there is no condition of the urine, or other symptoms, by which tubercle of these organs can be correctly determined. It has been thought that the presence of an amorphous granular matter in the urine, insoluble in dilute hydrochloric or acetic acids, accompanying the pus-cells, may be accepted as a distinguishing feature of a tuberculous kidney in a state of ulceration. But this is a point of some difficulty to determine. In this case there was at times much amorphous granular matter seen under the microscope, accompanying the pus-corpuscles, but this was easily dissolved in either of the above-named acids; and as it was found associated with the gritty matter embedded in the fibrinous coagula, it was at once recognised as amorphous earthy phosphate. Where the opposite kidney is not diseased, urate of ammonia is oftentimes present, and would not dissolve in these acids, and might, to a superficial observer, be mistaken for organic amorphous matter: it would be readily removed

by distilled water at a temperature of 90°. But these do not constitute all the difficulties in the way of correctly estimating this amorphous granular matter. Whatever causes the disintegration of any of the pus-cells would diffuse over the field an amorphous matter which would possess all the requisite chemical qualities of insolubility in acids, and yet it would not be necessarily characteristic of tubercle. I conclude, then, that in the present state of our knowledge, there is no condition of the urine which can be accepted as a diagnostic sign of tubercular ulceration of the kidney.

The second question—What relation did the tubercular deposit in the kidney bear to the earthy phosphatic concretion found in the pelvis of the kidney, and partially obstructing the ureter?—is one involving a conjecture as to the priority of either of these conditions: Did the earthy concretion first impede the function of the organ, and did the consecutive pyelitis induce the deposit of tubercle in the kidney? or was the tubercular disease, by embarrassing the excretory function of the kidney, the cause of such changes in the urine, before it could find its way to the bladder, that the formation of the earthy phosphates, in the pelvis of the kidney, was the result? Guided by the earlier symptoms of the case, the inference must be that calculous pyelitis existed before tubercular ulceration was established; but whether before tubercle was deposited cannot be determined. The symptoms of calculous pyelitis were sufficiently marked, even before any notable amount of pus appeared in the urine. Lumbar pain, difficult, painful, and scanty micturition, minute blood-clots with membranous flocculi in the urine, resolved by the microscope into fibrinous shreds, blood-corpuscles, epithelial cells from the pelvis of the kidney, and minute crystals of phosphatic concretions, forcibly indicated this disease; and it was not till some weeks afterwards, that the large and abundant deposit of pus in the urine indicated that a process of ulceration was established. The post-mortem examination proved that this was connected with the tubercular deposit. The primary source of irritation, then, would appear to have been the calculous concretion which

partially obstructed the mouth of the ureter. Under ordinary circumstances, with the other kidney unaffected, this condition might have continued for years. I have had one case of the kind under observation for the last nine years; and I have a preparation of a sacculated kidney with the calculus impacted in the head of the ureter, the duration of the symptoms during life being spread over an interval of nearly seventeen years; so that the rapid and fatal issue of this case must be attributed to the process of ulceration set up in the substance of the kidney, occurring in an individual in whom there existed, as the result proved, an overwhelming tubercular diathesis. This tubercular dyscrasia was forcibly exemplified by the wide sphere over which this product was deposited, existing in a crude state in the lungs, spleen, mesenteric glands, and prostate, and in an active state of ulceration in the kidney and bladder.

Rayer ('Traité des Maladies des Reins,' vol. iii, p. 643 et seq.) has recorded several cases of tubercular deposit in the bladder accompanying tubercle of the kidney; but the peculiar feature of this present case consists, not so much in the presence of tubercle in the bladder, or its wide diffusion in other organs of the body, as in the tubercular ulceration in the bladder, and the fistulous communication which was established between the bladder and the intestine. Cases in which fistulous communication has taken place between sacculated kidneys with obstructed ureters and the large or small intestines, although rare, are not without example. Rayer mentions several. Two such cases have occurred under my own observation. In one remarkable case, a large encysted and sacculated right kidney opened a passage for its contents into the contiguous ascending colon, and a temporary cure was effected by what was supposed to be a violent diarrhœa. But I am unacquainted with any analogous case of a fistulous opening between the bladder and rectum caused by tubercular ulceration in the mucous membrane of the former.

Upon a careful consideration of the contents and condition of the bladder, I think it will not be difficult, to a certain extent, to account for the amount of obstruction to the escape

of the contents of the bladder through the urethra, which must have pre-existed, and operated as the direct cause of this fistulous ulceration. Up to the last week of his life, the patient never experienced any difficulty in passing urine; the frequency of micturition was not accompanied by any conditions that indicated obstruction or difficulty; and at the post-mortem examination, although tubercles were observed in the prostate, yet these were granular and inactive, and the gland was not enlarged to an extent sufficient to form any impediment to the free passage of the contents of the bladder. Within six days of the patient's death, it was observed that he no longer passed his urine voluntarily, and it was reported in the ward-book that what little was passed seemed to dribble away from the urethra; on the next day, the diarrhœa, as it was reported, suddenly set in, and it was at once conjectured that a communication had somewhere been effected between the kidney and intestines; but the opening had taken place between the bladder and rectum, and not between an obstructed and sacculated kidney. So long as the urinary passages are free, such ulcerative communications are little likely to be formed. There was no stricture of the urethra; there was no prostatic disease sufficient to cause retention of the contents of the bladder. How, then, did the bladder fill, and through what cause were its contents forced to an outlet by the lower bowel? At the bottom of the bladder, adherent to the mucous surface, and filling the space between the ureter of the right side and the opening of the urethra, was found a gelatinous coagulum, of a true jelly-like consistence and colour, and in the lower part of which some earthy, gritty matter was found. This gelatinous exudation constituted, I believe, the proximate cause of the obstruction to the escape of the contents of the bladder, and the consequent retention led to the fistulous communication with the rectum. I think this opinion is corroborated by the observations of Sir Benjamin Brodie. In his work on 'Diseases of the Urinary Organs,' (p. 134), he mentions a case in which a mass of lymph, of the consistence and appearance of jelly, was found in the urine. The patient suffered from frequent

micturition, and had a deposit of pus in his urine, and on the occasion when this gelatinous matter passed, he suffered from symptoms which were thought to indicate the passage of a renal calculus. The pain suddenly ceased with the escape of this jelly-like fibrine, but the patient subsequently died, and Sir Benjamin Brodie concluded that the immediate cause of this patient's death had been retention of one of these fibrinous masses.

Nothing can be more calculated effectually to obstruct the escape of urine by the natural passage than one of these gelatinous masses filling the lower part of the bladder. Tubercle, already deposited in the tissues of the bladder, offered a condition in which the ulcerative process might most readily commence, and a fistulous opening be quickly established. An exudation of plastic lymph on the surface of the bladder, as well as on the intestine, surrounding the ulceration, effectually preserved the peritoneal cavity from any infiltration of the contents of the bladder.

In these cases, we cannot permit ourselves to hope that the result of treatment can be other than palliative. When the suppurative process in the kidney arises from tubercular ulceration, its exhausting effects rapidly reduce the vital powers, and neither nutritive substances, cod-liver oil, nor other medicinal agents, can be expected to arrest the fatal process. Of the remedial means most productive of benefit, opium in the form of Battley's solution, or the preparations of morphia, yield the most satisfactory results.

The microscopic appearance of the urine has been figured on two occasions, with the object of showing that in tubercular pyelitis the purulent urine does not differ from, nor present any characteristics at variance with what is constantly observed in calculous pyelitis. There were, perhaps more free nuclei, and diffuse granular matter in the field than in ordinary cases of purulent urine; but these characters were not sufficiently pronounced to justify by their presence the diagnosis of tubercle in the kidney.

TUBERCULAR NEPHRITIS.

Tubercular pyelitis of Rayer.—Tubercle of the kidney.

I have already alluded to the difficulty of the diagnosis of tubercular nephritis. I have on a former occasion shown that the urine in these cases is simply purulent, and that in the sediment there seems nothing which can be accepted as pathognomonic of tubercle, nor is there any symptom or group of symptoms during life, which can with any degree of certainty be accepted as diagnostic of this form of renal disease; although attention to the progress of the symptoms, and the undiminished amount of pus in the urine may remove some of the difficulty.

The symptoms are plainly derived from the kidney. There is frequency of micturition, a scanty amount of urine voided each time. There is urgent pain, referred to the hypogastric region, increasing in intensity till micturition is performed, and then disappearing, and gradually acquiring force till the painful sense is again relieved by passing a small quantity of urine. There are other sympathetic conditions; a sense of pain and aching in the crest of the ilium, or numbness in the direction of the external crural cutaneous nerve. There is lumbar pain, and there may be lumbar fulness, even a tumour, detected.

The urine is opaque and milky when passed; and at rest soon separates into an upper more or less clear portion, and a well defined precipitate of a whitish or yellowish white deposit of corpuscles. The upper clear portion is albuminous, and a drop examined by the microscope will usually exhibit a few isolated pus cells that remain suspended. The sediment, more or less abundant, according to the extent of disease, consists entirely of pus-corpuscles; if liquor-potassæ be added, the sediment is rendered viscid and ropy. If the urine has been

recently passed, no crystalline objects are seen, but in the course of a very few hours, particularly if the proportion of the liquor puris be sufficient to render the urine passed neutral, or faintly alkaline, then crystals of the triple phosphate may be present. All these conditions, both the subjective and objective, may be present in equal force in calculous nephritis, as well as in tubercular nephritis.

There is, however, one distinctive and well marked feature which characterises tubercle of the kidney, and that is its rapid and fatal progress. From the commencement of the liquefaction of the tubercular deposit, and the consequent ulcerative process, there is no mitigation of symptoms, no amelioration of suffering, no diminution in the purulent sediment in the urine; there is rather a daily increase. Emaciation proceeds, exhaustion rapidly follows, and within a few months of the first manifestation of the renal disorder the patient sinks and dies. This is not the character of calculous disease of the kidney; there are marked intermissions of suffering, paroxysms of pain followed by intervals of comparative quiet. The quality of the urine varies much; the portion passed at one period of the day may differ from that passed at another. It may contain little or no pus one day, and the next its presence is unequivocal. Hæmaturia is of frequent recurrence, not abundantly, but in small quantity. The patient may, and often does, retain a certain amount of flesh and strength, and may even be able to engage in some of the lighter duties of life. The calculus may ultimately become encysted, and removed from the power of further mischief, or it may descend into the bladder. Such cases extend over a period of years, and are not incompatible with an average duration of life. How different in these respects, then, is calculous from tubercular nephritis.

If a patient, then, has purulent urine associated with the symptoms already described; if the sufferings of that patient are continuous and uninterrupted but by opiates; if the urine daily exhibits the same undeviating purulency; if the urine of each micturition preserves the same character; if there be a progressive and unchecked emaciation, and rapid advance to fatal

exhaustion, I should, upon the sum of these symptoms, conjecture that the disease was tubercle, and not calculus, of the kidney. The diagnosis, it is admitted, would rest on a slender basis, but these are in my experience the chief and, I believe, only distinctive features between tubercular and calculous nephritis.

Let us see how they are exemplified in the following case.

Case XXXII.—Hannah Wheeler, æt. 27, single, in service, was admitted February 29th, 1858.

In the countenance of this patient, there was something singularly and forcibly expressive of suffering, and her aspect suggested at once some deep-seated disorder. Her tongue was much coated, and it frequently became dry; there was much thirst; the skin was harsh and dry; her appetite was deficient; her bowels not disordered; the pulse was of moderate strength and average frequency. Her sleep was very restless, being disturbed by the frequency of micturition, being unable to retain her water for more than half an hour at a time. The urine passed was of a milky, opaque appearance. She suffered also much pain across the loins. She stated that she had been ill for about five months, that she had previously enjoyed tolerably good health. She attributed her illness to sitting last autumn on the wet grass, soon after which she began to notice the frequency with which she required to make water, and the scalding kind of pain which accompanied the act. She could not call to mind that she had ever noticed blood in the water. From her attention first being drawn to its appearance, it presented the same character as at the present time. She stated that the pain she suffers is constant, and nothing has relieved it.

It seemed to come from her back, and to extend to the crest of the ilium, more particularly on the left side; that it would reach in the direction of the neck of the bladder, and cause so much aching and distress that she could attend to nothing. Some temporary relief would follow micturition, only to return again with the same intensity half an hour afterwards. These symptoms have continued to increase for the last three months. She had applied to various medical

men, but without relief. Some suspected diabetes! some stone in the bladder; she had been sounded, and nothing found in the bladder.

An examination of the lumbar region failed to detect any increased fulness on either side, but deep seated pressure—by grasping the flank with the hand, and making pressure with the thumb—caused much increase of pain, and a sense of stabbing in the direction of the pubis. There was no numbness, or any altered sensibility in the external cutaneous nerves of the thigh, on either side. The chest was examined, and the function of respiration was healthy. The stomach had never been disordered; she had never had any attack of vomiting or nausea. On the day after her admission, the urine passed the previous twenty-four hours measured about two pints. She had not during that interval passed more than an ounce each time, and she had passed water more than twenty times.

The urine, set at rest in a tall glass, separated into two portions, an upper clear orange coloured urine, and a well-marked sediment of pus-corpuscles. The upper part was faintly acid, and was albuminous by test. The lower part, on the addition of Liquor potassæ, became converted into a viscid, ropy fluid, and examined by the microscope, displayed nothing but pus-corpuscles. No crystalline forms were visible. A good deal of free granular matter was dispersed over the field, which was unaffected by dilute acetic or hydrochloric acids.

There could be no doubt that the pus was derived from the kidneys. The whole category of symptoms unequivocally fixed the diagnosis as purulent nephritis. There was no symptom in her case to justify the suspicion of calculus of the bladder. Purulent urine does not necessarily imply calculus; and those surgeons who examined her for stone could have attended but little to the character of the urine, or the other well-marked symptoms of her case. From such symptoms I had no hesitation in pronouncing the case to be one of purulent nephritis. The kidneys were the seat of ulceration, and an abundant supply of pus was derived therefrom. But what was the cause? There are not many diseases of the kidney in which so large a secre-

tion of pus occurs. In calculous pyelitis the amount is sometimes large. In tubercular pyelitis it is even greater. In cancer of the kidney the urine becomes purulent. The age of the patient, the history and progress of the case, and the absence of the cancerous cachexia, excluded the idea of cancer of the kidney. The disease then should be either calculous pyelitis, or tubercular disease of the kidney.

The patient had never suffered from any of those early symptoms which usually determine calculous disease. But her account of herself was necessarily imperfect; and little reliance, perhaps, should be placed on answers given to leading questions by patients of this class of life. They have no desire to mislead; but in the majority of cases they have not attended to the points which the physician is most desirous of knowing. At this juncture I inclined to the belief that the case was one of calculous irritation—and it was not till some days after that, from the rapid exhaustion and increased amount of pus in the urine, that I leaned to the fear that it was tubercular disease. The principle of treatment is the same in both—it is to allay—for all we can do is to mitigate—the sufferings of the patient, and diminish by opiates the distressing frequency of micturition and general irritability of the urinary apparatus. She was ordered the Liquor Opii sedativus, in small doses, to be frequently repeated, and it was given in the decoction of Uvæ ursi. But this failing to lessen the pain and distress, larger doses at longer intervals were found more advantageous.

On March 5th she was evidently relieved by the influence of the narcotic, and she expressed herself as having felt more ease, and had been able to sleep longer than for many weeks. The urine, however, continued highly purulent; and notwithstanding the apparent relief the patient experienced, it was clear that her powers were yielding to the drain of such a large purulent secretory surface. No alteration took place in her symptoms, and she died March 9th; symptoms of fatal exhaustion coming on suddenly and unexpectedly.

It was with great difficulty that a post-mortem examination was obtained, and then only with a promise that the kidneys

alone should be examined. Both kidneys had a boggy, sacculated feel; they were lobulated, and from the cut extremities of both ureters pus dropped freely. The left kidney, unopened, weighed seven and a half ounces—the right, four ounces and a half. On removing the capsule of the left kidney one or two small yellow deposits, about the size of a lentil seed, were seen imbedded in the capsular covering. The surface of both kidneys was smooth and somewhat pale, and had many similar yellow spots imbedded in the cortex. A few of these deposits, larger than the others, raised the surface slightly. On a section being made, both kidneys were found sacculated, and contained a quantity of pus. The ureters were not obstructed, but their diameters did not appear so large as ordinarily, from a general thickening of the wall of the tube. The left kidney was in a more advanced stage of disease than the right. In both, the quantity of tubercular deposit dispersed through the organ was very great. In those spots in which the ulcerative process had not commenced, the deposit had a yellowish white appearance, giving the parenchyma of the kidney the appearance of being studded with yellow granules. Some of the larger of them were surrounded by an inflammatory margin—and the softening and ulcerative process seemed to commence in the centre. In the left kidney there was one large cup-shaped ulcerative cavity, or renal vomica—its margin composed of a whitish structure, denser than the surrounding parenchyma. The pus-secreting surface of this, as well as of the smaller cavities, was tuberculated in a marked manner. The mucous membrane of the pelvis of both kidneys was remarkably scabrous, and had also numerous tuberculated elevations studded over it. These characters are seen in a drawing in my possession made while the preparation was perfectly fresh.

The yellow deposit in the capsule was of a cheesy consistence, and when examined with the microscope consisted entirely of fine molecular granules, and some larger fat-granules; not a trace of cell-structure was visible. The yellow tubercle in the cortex of the kidney had a similar appearance. The renal structure in the interval of these deposits exhibited

the usual tubular arrangement of healthy kidneys, the epithelial cells, both in appearance and position, being quite natural. The softening tubercle was, to a certain extent, remarkable for the absence of the usual proportions of fat- and oil-granules; and, with the exception of large granule-cells (Gluges) and pus-corpuscles, no special condition was observed. Each small deposit of tubercle was surrounded by a marked halo of redness. In those in which the process of softening was in its commencement, this inflammatory areola was most marked. When microscopically examined, it appeared as a fine fibroid deposit, something of the character of recently coagulated lymph, an interlacing of fibres in every direction. The progress of tubercular ulceration in the kidney would thus appear to be subject to the same law which has been observed in tubercular ulceration of the lungs. The tubercular deposit, during the process of liquefaction, sets up a certain degree of local irritation; an exudation of lymph follows. While the tubercular disposition lasts, this becomes the seat of fresh tubercular deposit; this in its turn softens, extends the area of inflammatory exudation, and thus expanding from within outwards, the ulcerating surface enlarges, limited only by the boundaries of the organ, the life of the patient, or, in such rare cases in which the tubercular ulceration is arrested, by the cessation of the disposition to the formation and deposit of fresh tubercle.

The progress of the symptoms in this poor girl's case was such as might justify the diagnosis of tubercle. Her symptoms were continuous and unmitigated. The urine always exhibited the same purulent character; the urine of one micturition did not differ from that of another. There was no hæmaturia; and exhaustion and emaciation were rapid and fatal. These are slender differences in the character of symptoms on which to rest a diagnosis, but I believe they are the only ones which exist between calculus and tubercle of the kidney, and when present in a marked manner, would justify a diagnosis of the latter more formidable malady.

THE END.