yellow elastic tissue, and some other textures, there is distinct evidence of the movement of the formative bioplasm during the formation of the tissue. In some cases, the bioplasm is prevented from moving from place to place in consequence of being imprisoned in a cavity, but it may continue to move actively nevertheless. Thus, in many plant-cells the bioplasm moves round and round the circumference, just within the cell-wall. Sometimes bundles of fibres are formed by the movement of the bioplasm in the interior of a cell after the cell-wall has been formed. The fibres of the cells of the cartilage of the epiglottis are produced in this way, and I have seen the bioplasm gradually tapering so as to form a delicate fibre, which seemed to have been spun off, as it were, from the bioplasm as it moved round and round the cell-cavity.

Of the several primary vital movements I have described, none can be imitated. They are peculiar to living matter, and not one of them has been explained by physical law. No mere physical or chemical attractions, or repulsions, on the part of any material particle at all resemble vital movements. Neither can these be adequately accounted for by attributing them to changes in the environment, for no conceivable changes outside would cause such movements. Nor is there any machinery in bioplasm to explain the movement.

Of the several movements of living matter I believe those which affect the ultimate living particles of bioplasm never cease. That moving of matter from centre, which involves the movement of pabulum in the opposite direction, I believe to be an essential phenomenon of life. The movement of living particles amongst one another, the movements of a portion of a living mass from the rest, the movement of a living mass as a whole may entirely cease, but I cannot conceive the cessation of motion in a vital centre.

In this lecture I have shown that in all parts of all living beings, at every period of life, are numerous masses of structureless living matter. From the lowest forms of life to the highest, this living matter or bioplasm manifests certain phenomena which cannot be accounted for by physics. Among these purely vital phenomena I have included certain movements which have not been accounted for. These movements are vital, and, as I believe, due to a peculiar power, "vitality."

SCROFULOUS PYELITIS.

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SCROFULOUS or tubercular pyelitis is a disease of comparatively rare occurrence; and, as the symptoms which attend its progress are often vague and indefinite, especially in the early part of its course, its diagnosis is frequently difficult. The case which I report at length below is one which, during life, excited much interest among the medical men under whose notice it had fallen, partly, no doubt, from its nature having been surrounded by considerable obscurity. The history is nearly complete, many of the details having been written out for me by the patient himself shortly after he came under my care.

History.—A. G., aged 46, latterly a clerk, but formerly a ship-broker and as such much exposed to changes of weather, married, with a family of ten living children, was first seen by me in consultation in January 1874. I could make out no direct family history of tubercle, but I learned that one or more of his brothers had died of phthisis pulmonalis. In early life, he contracted gonorrhoea, but he never suffered from stricture or venereal sores. His habits were always sober and industrious, and he enjoyed good health until about four years ago, when he received a severe wetting, to which he ascribed the beginning of his illness. This exposure to wet and cold did not seem to have produced any immediate results, for he attended to his business as usual, though not with his wonted vigour. It was some time afterwards, I believe, during the year 1871, that he felt a sudden shooting pain in his left groin; but the exact relation it had, in point of time, to the subsequent hæmorrhages, I am not enabled to say. He appears to have suffered from a pain of a burning or smarting character, over a limited area, in the same region, throughout his whole illness, except occasionally, when it diminished in intensity or disappeared almost entirely under the influence of therapeutic remedies. Micturition also became more frequent, but this symptom does not seem to have given him much concern. On the evening of October 30th, 1871, after running a short distance, he made water; and, to his astonishment and alarm, he discovered that he was passing a large quantity of blood in his urine. He at once sought the advice of a distinguished physician, and was ordered gallic acid and the external application of ice to his loins. Notwithstanding this treatment, blood, almost pure, and to the amount, it is said, of two quarts, continued to come away during the night and greater

part of the next day, when it nearly ceased; but, from that time till his death, the hæmaturia never disappeared entirely except for short intervals.

November 4th. As it was feared that calculi were being formed in the kidneys, bicarbonate of potash was prescribed, and the patient was directed to drink large quantities of linseed-tea.

1872. January 10th. The potash having proved effectual in affording relief, it was repeated in combination with the liquid extract of pareira.

February 6th. The patient now placed himself under the charge of another practitioner of eminence, who prescribed tincture of perchloride of iron, twenty minims, three times a day, and a powder composed of powder of uva ursi twenty grains, and compound ipecacuanha powder five grains, to be taken daily. In addition, he afterwards ordered him an expectorant mixture for the cough, which had annoyed him for some time.

March 5th. After one or two examinations with the sound, it was concluded that there was no stone in the bladder; but, on account of the severity of the symptoms, the existence of a tuberculous ulcer of the bladder was considered highly probable. He was ordered bicarbonate of potash with ipecacuanha wine and tincture of morphia.

April 20th. At this time, the urine had improved somewhat, but the cough had become more severe. During the summer, the patient went to the seaside. Here his general health improved considerably; but the irritability of bladder and the cough still continued, and there was almost invariably a small quantity of blood in his urine.

1873. February 4th. A distinguished local surgeon, under whose care A. G. now came, examined him carefully, but could discover neither stone, enlargement of prostate, nor any tenderness on pressure over either kidney. The diagnosis arrived at was chronic cystitis, with tubercular deposit in the lungs. At this time, his appetite was failing, his cough very troublesome, and his expectoration frequent and copious; there was also constant pain in his bladder, and frequently a brick-like deposit in his urine. He was directed to apply a belladonna plaster, eight inches by six, over his loins, and to take ten minims of dilute nitro-muriatic acid thrice daily.

During the remainder of the year, the patient's condition appears to have become gradually worse, and any improvement effected by medicines was only temporary. On one or two occasions, I believe, he had retention of urine, which had to be relieved by the catheter. At different times during this period he was prescribed aromata sulphuric acid, iodide of potassium, tincture of perchloride of iron, and decoction of pareira. In December, small calcareous particles about the size of mustard-seeds were discovered in the deposit from his urine. They resembled pieces of hardened mortar, and, on analysis, proved to consist chiefly of the triple phosphate (phosphate of ammonia and magnesia), with a small quantity of phosphate of lime. None of these calculi (?) had ever been found before; though, at his physician's request, the patient had regularly looked for them with great care since the first attack of hæmorrhage.

1874. January 3rd. To-day I examined A. G. for the first time. He looked pale and anæmic, with an anxious expression of countenance. For some time past he has had profuse night sweats; his weight at this time was eight stones 10 lbs., his average weight in health being 9 stones 4 lbs. He could not retain his urine longer than a few hours; and, of late, on some occasions, it came away quite freely, but, at others, much straining was required. During the last three weeks, however, he had noticed a change for the worse in this respect; for, although his bladder would occasionally retain urine three hours, or even three hours and a half, yet, on making the slightest exertion in the intervals, such as coughing, rising up, or going to walk, his urine passed away involuntarily. The expulsion of urine had also become more difficult, and, to facilitate the process, he was often forced to sit upon some projecting body, such as the end of a staff, or his heel, to press up the bladder. He spoke of three kinds of pain which annoyed him. The first was a general soreness and sense of weakness in his loins, sacrum, and bladder; the second was a special pain or uneasiness in his left loin, which he likened to the sensation following the application of a mild mustard-poultice; and the third was a peculiar pain or soreness over the left side of his bladder, which, as I have mentioned above, had existed to a greater or less degree from the beginning of his present illness. These three varieties of pain were totally different in character, and might exist separately or together. He stated that his bladder was so morbidly sensitive on the left side some time ago, that if it contained much urine, and he turned on that side in bed, the pain there became so excruciating that he was often obliged to change his position at once; but he did not experience this feeling if his bladder happened to be empty at the time. At present, this pain, though diminished and somewhat modified, annoyed him to only a slight degree after his bladder had been emptied; but, when it became filled again, he was

compelled to empty it at once to obtain relief. At night, his bladder was more irritable than during the day, so that he could not sleep longer than one and a half to two hours consecutively, the accumulated urine giving rise to such pain or dreadful dreams that he was glad to get up. After passing urine, he had not felt any pain at the neck of the bladder or in the glans penis, except on a few occasions; nor had he observed at any time a sudden stoppage to the flow of urine, or any retraction of the testicle. Walking or carriage exercise did not seem to have any influence in increasing the quantity of blood in the urine.

Usually, a little more than the average quantity of urine passed in the twenty-four hours (fifty to seventy ounces); it was acid, of a reddish colour, and specific gravity 1020; there was a thick creamy deposit, which, on standing, formed about one-tenth of the total quantity of urine passed; there was very little albumen in the clear supernatant portion, and this most likely due to the blood and pus mixed with it. The deposit, under the microscope, seemed to consist of pus, mucus, and blood-corpuscles; no tube-casts of the kidney were discovered. On making him pass urine, I noticed that at first it was clear, but near the last it became thick and whitish, and finally consisted of almost pure blood. This difference was well shown if the first and last portions were discharged into two vessels, as Sir H. Thompson has recommended (*Clinical Lectures*, page 11, 1869). The quantity of blood in a particular specimen of urine appeared to be proportioned, as a rule, to the amount of straining at the end of micturition. On passing a catheter, and afterwards a sound, a slight obstacle was met with at the neck of the bladder, as if from enlarged *uvula vesicæ*; but no stone could be detected after the most careful exploration.

January 6th. I used the sound to-day again with the same result as before; but, on moving the point of the instrument over the left side of the bladder, the mucous surface was felt rough and irregular, and depressed into a pouch near the entrance of the ureter, where the interior seemed to be most sensitive. Rectal examination was also made whilst the sound was in the bladder, but only negative results were arrived at either as to the presence of a stone or enlargement of the prostate. His bladder was then "washed out" with tepid water by means of a silver catheter, to which was attached a long India-rubber tube, having a funnel connected with its opposite or free end—an apparatus recommended in Bryant's *Surgery* (page 501). His bladder was by this means found to hold five ounces and a half of liquid. The patient derived much comfort from this procedure. A gum-elastic catheter was next retained in the bladder to remove the urine *guttatim* as it entered, a plan proposed, I believe, by Sir H. Thompson (*op. cit.*, page 179). The urine that thus came away was almost clear and free from blood and deposit. There was no marked tenderness on pressure over either kidney. The bowels were costive of late, with a good deal of tenesmus; and the stools often contained scybalous masses, the passage of which intensified the pain in the bladder. There was tubercle in the apices of both lungs. His cough and sputa had lately been much augmented; and progressive emaciation and loss of strength were too plainly visible. The patient was recommended to remain in bed for the next week at least, and to take a warm hip-bath every other night; his bladder to be injected with tepid water once or twice a day, and a mustard-poultice to be applied over the hypogastric region. He was ordered:

R. *Liquor potassæ*, one drachm and a half; tincture of hyoscyamus, six drachms; infusion of buchu, to eight ounces. M. Half an ounce to be taken three times a day;

And a suppository containing half a grain of hydrochlorate of morphia to be inserted before going to bed.

January 12th. The morphia suppository was not repeated, as it did not produce the desired effect, the patient seeming to have a peculiar idiosyncrasy for opium; all preparations of it, he said, generally giving rise to sleeplessness or uneasy dreams. I prescribed

R. Tincture of hyoscyamus, *succus conii*, of each six drachms; fluid extract of *pareira*, tincture of buchu, *liquor potassæ*, of each one ounce; decoction of *pareira*, to eight ounces. Half an ounce to be taken three times a day; also four grains of compound *ipeacuanha* powder three times a day.

To assuage thirst at night, he was advised to drink linseed-tea, or a solution of the acid tartrate of potash.

January 14th. As nausea and vomiting followed the administration of one or two of the powders, their use was discontinued. There was a manifest improvement in all his symptoms; but the pains in the bladder were still complained of. At Dr. Redfern's suggestion, the skin above the bladder and over the kidneys was painted once or twice a day with tincture of iodine (*B.P.*)

January 17th. The patient now learned to wash out his bladder himself, using the apparatus mentioned above, only substituting a flexible, for the silver, catheter. He washed out his bladder once or twice a

day after passing urine, and from this procedure experienced much relief. He was ordered

R. Tincture of hyoscyamus, one ounce and a half; *liquor potassæ*, one ounce; decoction of *pareira*, to eight ounces; half an ounce three times daily. For the cough, which was very distressing, an expectorant mixture of squills, *ipeacuanha*, and compound tincture of camphor, was prescribed.

January 21st. The urine was nearly clear, and contained little albumen or deposit, the pain in the bladder and loins was greatly relieved, and the cough was less troublesome. The application of tincture of iodine was ordered to be persevered in, and the mixture of hyoscyamus and *pareira* to be renewed and taken two hours after meals. To improve the appetite, I prescribed quinine in small doses, to be administered with or immediately after meals, so as not to interfere with the *pareira* mixture. The urine remained slightly acid, though large quantities of potash had been taken lately.

January 24th. The patient was not so well as on the last occasion. The deposit in the urine had increased.

January 29th. Some improvement was visible to-day, though he complained of indigestion, for which tincture of perchloride of iron with sulphate of quinine was ordered. Up to this date, he had been taking cod-liver oil occasionally, and he believed it relieved his cough.

January 30th. Blood reappeared in the urine, mixed up with the liquid, and in the form of a few clots, most of which were long and narrow, like earth-worms, and the rest short and broad. As the patient remained quietly at home for the last fortnight, he knew of no cause for the return of the hæmorrhage: he remarked that rest or exercise appeared to have no direct influence upon its occurrence; it seemed to come on spontaneously.

February 7th. To enable him to sleep more comfortably at night, and to alleviate the irritability of the bladder, syrup of chloral-hydrate was prescribed in thirty-minim doses, to be increased if necessary. He wore a large Crimean plaster across his loins, from which he experienced much relief to the feeling of weakness in the back.

February 17th. Syrup of chloral-hydrate was given in sixty-minim doses. As balsam of copaiba had been found to act beneficially in chronic inflammation of mucous membranes, I thought it advisable to apply it locally to the interior of the bladder. Accordingly, an injection was prepared, containing balsam of copaiba, decoction of *pareira*, and tincture of opium. The mixture of tincture of perchloride of iron and sulphate of quinine was repeated. The patient went out every fine day for a few hours.

Feb. 19th. As pain was now complained of in the perinæum as well as in the other parts, a mustard-poultice was applied and afforded relief.

February 23rd. The patient stated that, in his experience of different medicines during his present illness, the greatest improvement always attended the use of alkalies. I recommended him to leave off the use of all medicines, and to confine himself to bicarbonate of potash or soda, which he could take in water alone, or with a small quantity of tartaric acid; solution of acid tartrate of potash was ordered to be also drunk occasionally to allay thirst.

February 25th. The urine was nearly neutral, pale, of specific gravity 1010; no deposit or albumen was present; only a few mucus-corpuscles were visible under the microscope, and the amount of blood was diminished. The control over the bladder was greater, and the pain in it less. He still used the injection occasionally, and with apparent benefit. The bowels were costive, but the general health was somewhat better. Notwithstanding this improvement, blood reappeared in a very unexpected manner. I quote from a letter which I received from him on the occasion. "As my bladder emptied itself very frequently this day, and as any time I had occasion to make water it appeared pretty good, Dr. Charles can judge of my surprise, when, in preparing for the washing out this evening, all that is in the cup accompanying this came away at once, completely choking up the instrument. As it is so copious, and appears somewhat different from former discharges, I think it well to send it. Notwithstanding this, my bladder, I thought, had a soothed feeling this day, as if it was getting better." The tea-cup he sent was filled about one-third with clots of blood of different sizes, the majority of them being long and narrow casts, I believe, of the ureter. I ordered one-twelfth of a grain of strychnine in extract of gentian twice or thrice daily.

March 7th. Latterly, although the patient drank a smaller quantity of liquid during the night than formerly, he was obliged to urinate as frequently as ever. The bowels were costive. As his appetite continued to fail, the potash was given over, and the quinine resumed. The injection of copaiba was followed by pain in the bladder and greater deposit in the urine, though at first the patient thought it gave him ease. I ordered an injection of which I had heard Dr. S. Browne speak very highly:

R Tannic acid, one drachm; aqueous extract of opium, six grains; chloral-hydrate, one drachm; water, to eight ounces.

Also syrup of chloral hydrate one drachm at night on going to bed.

March 13th. He had vomiting before, as well as after, meals, and frequent diarrhoea. The pulse, which had been quick for some time, was now 120. He had less pain over the bladder last evening, and only a small deposit in the urine. The injection of tannic acid caused some pain, but the patient thought he had more power over his bladder, and required to urinate less frequently. Even with large doses of chloral hydrate, two or three hours was the maximum period of rest he ever enjoyed. Anorexia increased, cough became worse, expectoration very profuse, but not streaked with blood. I ordered compound kino powder, one drachm, to be divided into twelve powders, and one taken every third or fourth hour till the diarrhoea should cease; a warm bath at bed-time; and mustard-poultice to the epigastrium if vomiting continued.

March 20th. From this time, A. G. gradually sank. Emaciation proceeded apace; the cough was still violent; his appetite was almost completely gone; vomiting and diarrhoea were frequent. The perspirations had ceased since January 4th, and his bladder did not seem to trouble him so much as formerly. He continued, however, to attend to his business for two or three hours almost every day. To assist his digestion, pancreatic emulsion (Savory's) was administered, but it did not appear to do him much good.

April 21st. During the last week, he ate no food, and lay in bed almost unable to move from weakness, complaining of great pain in his bowels and bladder. About 1.30 P.M., he got his bladder washed out with tepid water, and expressed himself greatly eased. Half an-hour afterwards, he died very quietly. [I may mention that, two days before his death, A. G. requested me, for the sake of science, to make a *post mortem* examination of his body, as something, he said, might thereby be learned likely to prove of service to some fellow-sufferer.]

Necropsy, about twenty hours after death.—As only a short time was allowed, my examination was necessarily confined to the urinary organs. The peritoneum, especially that portion over the bladder, was studded with miliary tubercles, and the small intestines were empty and congested, and some of them firmly adherent to the bladder. The kidneys, ureters, and bladder, were removed for further examination. The *right kidney* weighed $6\frac{1}{4}$ ounces, and was large, soft, and flabby. The capsule was whitish and opaque, and could be easily peeled off, leaving a smooth pale surface except at one spot on the anterior surface, where the capsule dragged with it part of the substance of the kidney. On section, two of the middle pyramids, as well as the cortical substance outside them, were seen to be of a pale white colour, standing out in marked contrast to the rest of the substance of the kidney, which was somewhat congested. The mucous membrane of the pelvis was smooth and of a dead white colour, but without any deposit. The *left kidney* weighed $5\frac{1}{4}$ ounces, and was soft and lobulated. The capsule was much thickened, opaque, and very firmly adherent, and the cortical surface very rough and irregular. On section, the pelvis was found immensely dilated, so as to form a large anfractuous cyst, filled with a soft putty-like mass. The degenerate secreting tissue of the kidney surrounded this cyst in a thin layer, and presented a number of deposits of caseous material like that contained in the cyst with which they were continuous. The mucous membrane of the pelvis was of a dull white colour, with villous processes, and of semicartilaginous consistence, and nearly three times its normal thickness, and had a few calcareous crusts adherent to it. The putty-like mass in the pelvis was shown, under the microscope, to consist in great part of round and somewhat shrivelled corpuscles, like those of pus; there were also granular matter in large amount, flattened and columnar epithelial cells, crystals of triple phosphate and uric acid, and fatty granules. The material found in the secreting substance of the kidney presented almost the same appearances. When the putty-like mass had been entirely removed, the kidney weighed only $1\frac{7}{8}$ ounces. The *right ureter* appeared normal. The *left ureter* was dilated, for the upper three inches, to one and a half times its normal diameter, and its walls were very much thickened, so as to feel almost like a portion of vas deferens. There was a lymphatic exudation around it, well supplied with blood-vessels, forming a distinct coat. In its interior, was a thick white material, similar to that in the kidney, but considerably more solid, which extended downwards nearly five inches below the kidney, blocking up the canal entirely; but, beyond this, no obstruction in the ureter was visible. The mucous lining of the upper portion of the ureter was thickened, and covered with small villous processes, that could be scraped off; and, in some parts of it, there were minute depressions resembling those of the mucous membrane of the gall-bladder. A few calcareous crusts were attached to it. The *bladder*. The walls were so thin and soft, that they tore across

on breaking the adhesions between them and the small intestines. The cavity was small, holding only five or six ounces. The inner surface was in some parts irregularly ulcerated and greatly congested, and there was a papillary hypertrophy of the undenuded portions of mucous membrane. The right ureter opened on a vascular papilla, whose width and height were nearly equal and about a quarter of an inch.* The left ureter terminated in the usual way. The *vesiculæ seminales* were dilated, more especially the left; and both were filled with purulent matter, which could be pressed from them into the urethra. The *vasa deferentia*, for the last two inches of their course, were enlarged, their walls thickened and softened, their interior filled with a soft thick tuberculous matter, and their mucous lining covered with villous projections. The common ducts of the *vesiculæ seminales* and *vasa deferentia* were so much shortened and widened, that the ducts of the *vesiculæ* and those of the *vasa deferentia* seemed to open separately into the urethra. The apertures of the *vesiculæ* were large enough to admit a large probe. There was much low inflammatory exudation around the *vesiculæ*, that caused their dissection to be rather difficult. The *prostate* was involved in the disease. The prostatic portion of the urethra was dilated, and the verumontanum, where the seminal ducts debouched, was excavated as if by small abscesses.

REMARKS.—*Résumé of Salient Points in the History and Post Mortem Appearances.*

1. No history of syphilis, but gonorrhoea in early life.
 2. Four years before death, exposure to wet and cold, to which the beginning of the illness was attributed. General health then commenced to show signs of decay; and among the symptoms occasionally present during the following year, were pain in the left groin and frequent micturition.
 3. Sudden and almost painless attack of hæmaturia two years and a half before death; the hæmaturia and the frequency of micturition almost persistent.
 4. No calculi ever discovered in urine, though diligent search made for them. Small mortar-like masses were sometimes found during the last year of the patient's life. These were composed of the triple phosphate with a small proportion of phosphate of lime, and appeared to be hardened portions of a deposit in the pelvis of the kidney which had been passed in the urine.
 5. Pain complained of across the front, the left side, and the base of the bladder, as well as in the loins.
 6. Urine acid, sometimes neutral, but scarcely ever alkaline, even after prolonged use of alkalies; purulent deposit in variable quantity for last year and a half.
 7. Tubercle in lungs, in all probability, for nearly two years before death.
 8. Miliary tubercles on peritoneum.
 9. Walls of pelvis and portion of ureter of left kidney thickened; cavity enlarged, and filled with a putty-like mass of caseous material. Secreting substance of kidney diminished in bulk, and containing caseous matter continuous with that in the pelvis.
 10. Right kidney enlarged and congested; pelvis and ureter nearly normal.
 11. No visible obstruction in either ureter; but the caseous material in upper part of left ureter may have sometimes acted as a plug.
 12. Inflammation, tubercular ulceration, and suppuration of bladder, *vesiculæ seminales*, and *vasa deferentia*.
- Diagnosis.*—In this case, there can be little doubt the disease began in the kidney (pyelitis), and spread downwards to the bladder. But there are several varieties of chronic pyelitis. Sir H. Thompson speaks of three kinds (Holmes's *Surgery*, vol. iv, p. 869): 1, calculous; 2, scrofulous; 3, from obstruction; to which we may add from Roberts's classification (Roberts, *Urinary and Renal Diseases*, p. 451): 4, "from extension upwards of inflammation from the bladder"; 5, "from cold and unknown causes".
- In this case, the pyelitis did not arise from "obstruction" in the ureter, for we have no evidence of this at the beginning of the disease. Neither did it result from "inflammation extending upwards from the bladder", as the earliest symptoms pointed to the kidney. Moreover, the necroscopical examination showed that the morbid process had advanced much further in the kidney than in the bladder. Nor are there any satisfactory reasons for saying it arose from "cold and unknown causes" alone, since "it is very rare that pyelitis is not secondary to some antecedent morbid process or mechanical irritation" (Roberts, *op. cit.*, p. 452), though the exposure to cold may have served as the exciting cause. We have now, therefore, only to determine

* In Mr. Ebenezer Smith's case, "opposite the entrance of the ureter to the bladder, was a highly vascular tumour of the mucous membrane, about one inch long and one-quarter wide". (*Pathological Transactions*, p. 79. 1848.)

whether the case under consideration was one of calculous or of scrofulous pyelitis.

In favour of calculous pyelitis (under which we include irritation produced by the presence of a foreign body in the pelvis or infundibula of the kidney, such as calculi, gravel, cancer, hydatids, or blood-clots), we have:

1. The occurrence of severe hæmaturia at the commencement of the disease, which continued to a less degree to its termination. Severe hæmorrhage is rare in tubercular pyelitis; but cases in which it has occurred have been recorded by Roberts and by Thomas Smith (*St. Bartholomew's Reports*, vol. viii, pp. 100-104).

2. The microscopical and other appearances of the putty-like mass were not those of *well marked* tubercle. But Chambers states that "these large masses (of tubercle), constituting the form of disease called 'scrofulous degeneration', have such a different appearance from the small, hard, shot-like tubercle, that, were they not the consequence of the same diathesis, one could hardly believe in the relation between them" (*Medical Times and Gazette*, 1852, 2nd part, page 403). Dr. McDowall relates a case of tuberculosis of the kidney in which the tubercular matter was of a "dirty white substance.....of the consistence of putty" (*Edinburgh Medical Journal*, vol. xv, p. 1093); and the drawings he gives would almost serve as representations of the kidney under consideration. Besides, a large quantity of pus-corpuses was mixed up with the tubercular elements in the pelvis; hence the deficiency in the characteristic features; and

3. No ulceration of the pelvis or ureter visible; but there were a few ulcers in the bladder.

Against this theory, and in favour of scrofulous pyelitis, there are the following facts.

1. No calculi were discovered in the urine, though small mortar-like masses were present occasionally during the last year of patient's life.

2. No calculi found in pelvis or ureter at necropsy; and no obstruction in the ureter, except such as might have been caused by the putty-like material.

3. Miliary tubercles on the peritoneum, and, it is believed, in lungs also.

4. Caseous material in the bladder, vesiculæ seminales, and vasa deferentia.

It is clear that the weight of evidence is on the side of the latter hypothesis, though, in the present case, it is possible the whole truth may be in neither theory, but in a combination of both. Thus a calculus formed in the pelvis, after setting up pyelitis in a tubercular constitution, may have been broken down, by the continued passage of acid urine over it, into the particles which were found in the urine in December 1873; and the miliary tubercle on the peritoneum and in the lungs, etc., may have been caused by absorption from the caseous matter in the kidney, the result of the pyelitis. Or microscopic calculi may have existed in the *tubuli uriniferi* (Roberts, *op. cit.*, p. 549) at the beginning of the disease, and have given rise to the first attack of hæmaturia, and afterwards to the pyelitis. It should be mentioned, however, that no such calculi were found at the necropsy. I therefore prefer naming the disease in the present case *scrofulous*, rather than *tubercular*, pyelitis, because the term *scrofula* is the more generic of the two, and includes instances in which there is no well marked tubercular manifestation (Aitken's *Medicine*, vol. ii, p. 2; 1872).

I may here appropriately give the signs by which the pyelitis in this case might have been diagnosed from cystitis.

1. Pains in the loins were amongst the earliest symptoms.
2. There was profuse hæmorrhage at the beginning of the ailment.
3. A large quantity of pus, etc., almost always appeared in the urine.
4. The urine remained acid, though alkalies were administered for some time (Roberts, *op. cit.*, p. 134). Exceptional cases, however, occur in which the urine is alkaline (Thos. Smith, *op. cit.*, pp. 100 and 102). In cystitis, the urine is eventually alkaline from ammoniacal decomposition.

5. Long vermicular clots of blood were passed in the urine.
6. At an early period, pelvic and infundibular epithelial cells might possibly have been discovered in the urine.]

The sequence of events in this case, it must be admitted, is rather obscure; but, in all probability, it was somewhat as follows. The patient being of the tubercular diathesis, the exposure to wet and cold acted as the exciting cause of a deposit of tubercle in the secreting substance and in the submucous tissue of the pelvis of the left kidney (tubercular pyelitis). Severe hæmaturia occurred in consequence (or, less likely, from the presence of minute calculi in the *tubuli uriniferi*, or from calculus of the ordinary size in the renal pelvis). The inflammation set up by the tubercle spread down the ureter; and the constant passage of urine, carrying pus and blood, excited cystitis, with subsequent tubercular deposit (Rindfleisch). The vesiculæ seminales

and vasa deferentia were next affected; but it is difficult to say whether the disease in them gave rise to the pain suffered by the patient on the left side of the bladder. There was not much pain, however, complained of when pressure was made upon them from the rectum. Then the ureter, whose calibre had been already diminished by the thickening of its mucous membrane, underwent temporary occlusion from a clot, when *pyonephrosis* was produced, which terminated in desiccation of the pus and other materials, and in the formation of a putty-like mass.

The blood which appeared in the urine at different stages of the disease came from almost all parts of the urinary mucous membrane. At an early period, as well as throughout the whole course of the disease, it was derived from the secreting substance, pelvis, and ureter of the left kidney; and it passed off nearly pure, as in the severe attack of hæmaturia, or formed the vermiform clots in the ureter, which were expelled at a later stage, or was intimately mixed up with the urine. It is possible that blood also came occasionally from the right kidney, as a consequence of congestion produced by the extra work thrown upon it by the growing degeneracy of the left kidney and the blocking up of the duct (Roberts, *op. cit.*, pp. 338 and 339). This hypothesis is supported by the fact that the putty-like mass in the left kidney showed no tinge of blood, though the subsequent flow of urine may have removed any such stain. The unmixed blood at the end of micturition no doubt came from the bladder.

The varieties of pain complained of can be readily explained. The general uneasiness across the bladder was the result of cystitis; the pain in the loins and on the left side of the bladder depended on the irritation of the left kidney by morbid materials (pus, tubercle, etc.), and sometimes on the passage of clots and portions of the putty-like mass along the ureter; and the pain in the perineum (behind the scrotum) was ascribable to the cystitis, and perhaps to the inflammation of the vesiculæ seminales and vasa deferentia.*

The frequency of micturition from the beginning of the ailment was the consequence of inflammation in some portion of the urinary mucous membrane; and the loss of power at last over the contraction of the bladder is to be attributed to the degeneration of its walls from long continued cystitis and from tubercular deposit. Tubercle was deposited in the lungs about two years before death, and on the peritoneum shortly before it.

Treatment.—I have nothing new to offer in the way of treatment. Tonics of various kinds are the most beneficial remedies; and, of other medicines, none produced more favourable changes in the urine in the present instance than bicarbonate of potash in large doses. Under its use, the blood disappeared, and the pus diminished in quantity. It is possible, however, that the benefit may have been to a certain extent more apparent than real; the alkali having acted chemically on the purulent deposit, and changed it into a viscid, glairy, mucus-like mass, so that it was less visible (Beale's *Kidney-Diseases, Urinary Deposits*, etc., p. 363; 1869). Washing out the bladder with plain water always gave relief.

In conclusion, I beg to thank Dr. W. Roberts of Manchester most cordially for his kindness in examining the kidney in this case, and for his valuable opinion upon some of the difficulties connected with the diagnosis. Sir H. Thompson and Mr. Thomas Smith of London also merit my best thanks for their useful suggestions.

A CASE OF CONTRACTION OF THE LOWER EXTREMITIES, WITH MUSCULAR WASTING AND COMMENCING ATROPHY OF THE OPTIC NERVES.

By ELIZABETH GARRETT-ANDERSON, M.D.,
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JANE P., aged 44, single, was admitted into the New Hospital for Women under my care on January 19th, 1875, for contraction of the legs.

The family history gave no trace of serious nervous disease. Her father was always well and strong, and died at 50, of strangulated hernia. Her mother died at 70, of apoplexy. No near relatives have had epilepsy, asthma, or paralysis.

The patient herself has been very delicate and "hysterical" ever since she was 14 years old; at the age of 15, she had an illness described as "brain fever". It was accompanied by severe pain in the head, high

* Professor Verneuil states that the vesiculæ seminales, when inflamed, are hard, voluminous, and painful to the touch, and that incessant painful micturition is one of the most prominent symptoms. (*Clinique: Journal de Médecine et de Chirurgie Pratiques*, pp. 16 and 17. 1874.)