through the medium of the inhibitory fibres, and not by direct action on the cardiac ganglia.

SERIES III and IV.—It is convenient in this brief summary to combine the results obtained in Series III and IV. In each it was attempted to neutralise the ascertained depressant effects of the extract by the exhibition of presumably antagonistic drugs. For the present, I limit myself to the results obtained with atropine. The double series yield results in remarkable consonance with those obtained in the earlier series. In the first place, they afford strong corroborative evidence as to both the general systemic and the special cardiac effects of the extract. But, in the second place, they prove that the combined exhibition of atropine undoubtedly modifies these results in a striking manner. Of this there is evidence in all the experiments, the degree to which such modification is produced varying with the relative quantity of the antagonistic principle. Most perfect antagonism was produced by the combined injection of .55 milligramme of sulphate of atropine with 0.6 cubic centimetres of extract. Under such conditions the general systemic effects—easily produced both in frogs and in mice by 0.6 cubic centimetres of extract—were almost completely absent, while the cardiac rate, which 0.6 cubic centimetres sufficed to depress considerably, remained practically constant. The effects were similar, whether the atropine were exhibited simultaneously with the extract, or at varying intervals before or after. The antagonising influence of atropine is most strikingly demonstrated in those experiments where the injection of the extract preceded that of the atropine by a measured interval of time. In such cases the effects of the extract were first of all well defined, and gradually declined on the addition of the atropine. Similar results, though less striking, were obtained when the atropine preceded the extract. It should be added that, in every instance where counter-experiments were made with atropine, the extract was first tested, with the view of establishing its physiological action.

This experimental record is necessarily too brief, and doubtless is open to much criticism. But the results at my disposal—which I hope to publish in more extended form—appear to me to justify the statement that from the tubercular sputum there is separable one or more products possessed of well-marked toxic properties, these toxic properties being more or less completely opposed by atropine.

The remaining question is, in how far this poisonous principle is dependent on the presence of the bacillus? Might not such toxic effects be produced by extracts obtained from other sputa besides those strictly bacillar? There is, unfortunately, no time to give in full the ground for my statement, but my belief, which rests on experimental basis, is that the presence of the bacilli is causally related to the poisonous product obtained from the sputum. I incline also, for similar reasons, to the belief that there is a relation traceable between the toxicity of the extract and the abundance of the bacillar elements discoverable in the sputum.

On the line of absorption and the therapeutic indications, regarding which I had proposed speaking, I must not dwell; but it may be convenient in closing to tabulate shortly the chief points which have been briefly discussed.

Conclusions.—1. In view of the work of Koch, it is impossible to avoid admitting that a causal relationship exists between the tubercle bacillus and the phthisical process. 2. The mere predication of this relationship is not sufficient in explanation of the clinical facts and the generally fatal termination of such cases. 3. The usually received explanations of the *modus moriendi* in phthisis are insufficient. 4. It appears probable that the lethal influence of the bacillus is due to the production thereby of certain poisonous products. 5. Clinical and experimental evidence appears to indicate that the morbid secretions from the respiratory surfaces afford a good medium for the growth of the tubercle bacillus, and, presumably, for the elaboration of such products. 6. Such a product is separable from the carefully selected and prepared sputum. 7. This product is possessed of well-marked physiological properties, being eminently toxic to frogs, mice, and other animals. 8. The toxic properties of the product are, speaking generally, depressant. 9. More particularly they include a marked depressant influence on the heart. 10. This depressant influence seems to be exerted through the medium of the cardio-inhibitory mechanism. 11. The toxic action of the product is more or less completely opposed by atropine. 12. The amount of the product which may be separated appears to bear a distinct relation to the abundance of the bacillar elements present. 13. Absorption of the poisonous product most probably occurs by way of the lymphatic circulation.

ON CERTAIN NEURALGIAS SIMULATING RENAL CALCULUS.¹

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THE purpose of the present paper is partly to draw attention to certain painful affections of the kidney which may be taken for calculous disease of that organ, and to seek for information from those who may have had a wide experience of such cases as to the distinguishing points that may be best relied on for diagnosis in cases in which doubt exists. As a rule, the diagnosis of renal calculus is easy; a time usually comes, either early or late, in which the calculus endeavours to escape by the ureter, giving rise to severe colic, and causing blood and pus to appear in the urine; to these is usually added a symptom which writers have been accustomed to consider as absolutely symptomatic of renal calculus, namely, retraction of the testicle on the side affected. Though this latter symptom is of undoubted importance, nevertheless, too much dependence must not be placed on it, since the phenomenon will appear quite independently of renal calculus, and is evoked whenever a tenacious mass of any size passes from the pelvis of the kidney down the ureter; thus, it may be observed in cases of hydatid of the kidney, or when tuberculous or scrofulous masses are passed downwards into the bladder. It is also a well-ascertained fact that a stone in the kidney may exist for a considerable time without giving rise to any of these symptoms, except pain, and that in some instances may be quite unimportant, giving rise rather to a feeling of weight and dragging than to actual suffering; whilst the urine may be examined repeatedly with only negative results. Thus, Dr. Murchison (*Diseases of the Liver*, third edition) refers to a case which was under his care, and other physicians, in which for years the painful affection of the right side was referred to hepatic neuralgia and treated as such, till after years of suffering the patient was relieved by the passage of a renal calculus. One can hardly suppose that such an acute clinical observer as Dr. Murchison would have neglected to examine the urine, and had blood or pus been present to have come to a speedy and right conclusion. An interesting illustration of a similar incident was reported in the March number of the *Chicago Review* for this year (1887), in which the patient for eighteen years had suffered from severe lumbar pain and whose urine had been frequently examined, but with negative results, till at last pyelitis was evoked, and then, after eighteen years of doubt, the nature of the case was fully revealed. I have myself (*Morbid Conditions of the Urine*, Churchill, 1882) recorded a case in which a gentleman suffering from severe lumbar pain consulted an eminent surgeon and a distinguished physician. The surgeon told him he was suffering from locomotor ataxy, the physician that the symptoms were due to syphilitic disease of the spinal cord, and placed him on a course of mercury; two years afterwards he passed an oxalate of lime calculus, which completely relieved him of his pains. He assured me that during the whole time of his sufferings his urine continued bright and clear, and that it was frequently examined by his medical attendants, and it was not till the day he passed the calculus that he noticed it thick and bloody.

It would be easy to enumerate other cases in which stone in the kidney existed without being recognised by the usual symptoms, but the converse of these cases, namely, when lumbar pains of long standing have been attributed to renal calculus, are not so numerous, and are certainly more perplexing. Thus, some years since a patient of the late Dr. Murchison, who was thought by him, and by the other physicians who also saw the case, to be suffering from stone in the left kidney, although the urine was repeatedly examined with negative results, and who went on suffering excruciating agonies of paroxysmal pain, died suddenly one night. At the inquest the *post-mortem* examination showed the peritoneum full of blood, which proceeded from the rupture of an aneurysm of one of the smaller mesenteric vessels, but which evidently pressed on some nerve plexus supplying the pelvis of the left kidney. Here, indeed, is an instance in which a correct diagnosis was impossible; but all cases of renal pain are not so obscure, and I have endeavoured to classify them in the following order.

1. Neuroses of the Kidney.—(a) A true neuralgia of the kidney is of very rare occurrence. I cannot say I have ever met with an instance. Delicate women at the menstrual period, and for some time after, suffer from aching pains in the renal region, and these pains by some have been considered neuralgic. But it has been shown that

We are informed that Mrs. H. O'D. Bartholeyns has resigned the Secretaryship of the Middlesex Hospital.

¹ Read in the Section of Medicine at the Annual Meeting of the British Medical Association held in Dublin, August, 1887.

there is an intimate sympathy between the renal organs and the female generative apparatus, and that during menstruation slight enlargement of the kidney occurs. In delicate women this physiological engorgement may become exaggerated, and the distended capsule give rise to pain. Renal neuralgia, it is said, sometimes occurs in malarial subjects—it may be well to note the possibility; but with seven years' experience of tropical diseases at the Seaman's Hospital, where the opportunities of watching the sequelæ of malarial disease are very great, I never met with an instance of renal neuralgia. (b) Reflected neuroses of the kidney, however, are not uncommon. In 1878 the late Dr. Murchison gave me the particulars of a peculiar form of neurosis attack which he designated as a renal storm, and which had frequently occurred in a patient suffering from aortic regurgitation. The attack commenced with excruciating pain over the region of the right kidney, exactly like renal colic, but there was no sickness or retraction of the testicle, and the urine passed after the attack was perfectly normal, nor was there jaundice, or anything to suggest that the pain was due to either renal or biliary calculus. After lasting some hours the pain passed off as suddenly as it came on. With reference to this case I may mention the remarks made by Dr. Habershon (*Diseases of the Liver*, p. 13) with regard to the neuralgic pain sometimes met with in organic disease of the heart, and which is referred to as being situated deeply behind the first part of the duodenum. "It is," he says, "severe, almost like that of gall-stone, but it is without jaundice or other symptoms of calculus; it is not connected with the stomach, for it is not affected by food, but paroxysmal, and sometimes recurs with great regularity." In 1880 a man, aged 47, applied as an out-patient at the London Hospital, solely on account of severe paroxysmal attacks of pain, which, commencing at the angle of the epigastric region, where it joined the right hypochondrium, passed downwards into the right lumbar region. No disease of the liver or kidney could be detected, and the urine was perfectly normal. On examining the chest, however, we found the left ventricle considerably hypertrophied, the result of aortic regurgitation. This case and that of the late Dr. Murchison are probably of a similar character. Reflected nephralgias may occur in connection with inflammatory affections of other organs. Thus, in pneumonia, the pain is often at first more lumbar than dorsal, and I have known an acute practitioner taken in, for he sent for me saying that one of his patients was passing a renal calculus, the symptoms being intense pain in the right lumbar region and albumen in the urine. Shortly after, on examining the patient again, he discovered fine crepitation at the right base, but not before he had given the patient a warm bath and a dose of opium for the relief of the supposed colic. In disease of the bladder the pain may be wholly nephritic. A gentleman sent for me some time since on his arrival in town from Edinburgh, suffering from intense paroxysmal pain in the right kidney; the testicle on the same side was retracted, there was blood and pus in the urine; no irritability of the bladder. About a fortnight after he began to get intermittent discharges of pus, the renal pain still continuing severe and no bladder symptoms. Dr. Murchison, who saw the case with me, agreed that there was pyonephrosis of the right kidney. About a week after this the renal pain suddenly transferred itself to the neck of the bladder; a finger passed into the rectum detected a hard mass lying between the rectum and the bladder. I then asked Mr. John Wood to see the case with me, and he came to the conclusion that an abscess had formed in the cellular tissue between the rectum and bladder, and had burst into the latter. At first the discharge had been intermittent, but was now becoming continuous. The patient did very well, the discharged pus soon ceasing, and the urine clearing up, no symptoms of renal calculus or of renal pain ever again declared themselves. Had this case occurred in the present days of nephrotomy, I am sure that when the case first came under observation operative procedures would have been taken under consideration.

2. *Nephralgias from Disease of Contiguous Parts.*—If we consider the anatomical relationship of the duodenum to the right kidney, we shall not be surprised to find that many morbid conditions of that portion of the intestine may give rise to pain simulating a nephralgia of calculous origin. Thus Mr. Cursham Corner asked me some short time since to see a patient who had many symptoms of renal colic; namely, attacks of paroxysmal pain accompanied by vomiting, great tenderness on pressure over the right renal region, a urine loaded with uric acid and turbid with mucus, but no blood or pus. Mr. Corner had his doubts about the case, but rather inclined to the view of renal calculus, and so at first did I; but, on strict inquiry, we found the attacks of pain had a very constant relation to food, and that the vomit was not so purely reflex as we generally meet with in renal colic, but contained undigested food; then, again, the patient was

losing flesh rapidly. The conclusion we finally arrived at was duodenal ulcer, and though we did not exclude the possibility of a stone being present as well, and advised the usual treatment, we added to this treatment substantial doses of bismuth, and a light farinaceous diet. Under this treatment the patient made a complete recovery, losing his pain a very few days after it was commenced. No suspicion of the existence of calculus was left behind after his recovery.

Another instructive case illustrates this point of the connection of duodenal irritation with nephralgia. About four years ago Dr. Ball brought a patient of his to my house for consultation. This gentleman had suffered for some time from severe paroxysmal pain in the right hypochondrium. He had consulted many medical friends, and the general verdict was visceral neurosis, and I, at first thought, had pretty much the same view. The urine was examined, but it was perfectly normal. Then the idea of biliary colic or retained gall stones without jaundice occurred as a possible solution, and a terebinthin mixture was prescribed. To our astonishment, a few days after, instead of a gall-stone out came a large round worm. The symptoms were greatly relieved, though not completely; probably some degree of chronic ulceration of the duodenum was present as well. But the patient being a medical man could not give himself sufficient rest till he could take a good holiday, when I believe he became entirely free from pain.

Gall-stones retained in the gall-bladder are often taken for stone in the right kidney, and *vice versa*; as a rule, however, the direction of the pain serves as a guide. With gall-stones the pain radiates from the right hypochondrium towards the epigastrium and umbilical region. With right-sided nephralgia the pain comes forward from the lumbar region into the right hypochondrium, and is then reflected downwards towards the right hypogastrium.

Caries of the spine with psoas abscess in the early stage sometimes gives rise to lumbar pain that may be taken for nephralgia, but a careful examination of the spine is sure, sooner or later, to reveal a tender spot along the spinal column, and so lead us to a right conclusion.

3. *Nephralgias from the Disease of the Kidney.*—"The tender kidney," caused probably by some displacement of the organ, with consequently a certain degree of perinephritis attendant on the dislocation, is often a condition extremely difficult to diagnose, and still more to treat. Early in February, 1887, Dr. John Williams sent a young lady to me with many symptoms of renal calculus. She had constant aching pain in the right kidney, sometimes severe paroxysms of pain; the urine was turbid, contained some pus cells, but no blood. The right kidney was exquisitely tender to the touch, and its dimensions, which were enlarged, could be easily mapped out. Her account was as follows. One day, during the menstrual period, she was playing lawn tennis, when she felt a sudden rick in her side, so painful as to make her quit her game; since then she had never felt free from pain. I had no doubt that the kidney had been displaced slightly downwards, with partial rupture of the surrounding cellular tissue during the act of using the racket at lawn tennis, the displacement being aided by two conditions—the naturally enlarged state of the kidney during menstruation; tight lacing, pushing the liver downwards. It was quite two months, with absolute rest on bed and sofa, before she could move without pain, and then required the support of an abdominal belt. This case I at first thought was one of renal calculus, the pus in the urine and the paroxysmal pain being misleading. I have seen two similar cases at the hospital; both occurred after working at a mangle during the menstrual period.

Dr. Samuel West, in a communication to the JOURNAL in 1885, drew attention to the frequency and importance of hæmaturia occurring in patients suffering from granular kidney, and observed upon the fact that writers on urinary pathology had neglected to describe a symptom of such importance. So important is it to recognise the fact that hæmaturia does occur in these cases that Dr. West says that in one the operation of nephrotomy was going to be performed under the supposition that the hæmaturia was caused by calculus, when Dr. West saw the case and proved the true nature of the hæmorrhage. Other diseases of the kidney, giving rise to a semblance of renal colic from time to time during their progress naturally occur to us; thus the passage of an hydatid vesicle, a mass of tubercle or cancer, gives rise to a colic often indistinguishable from calculous colic till the offending mass comes under observation.

4. *Nephralgias due to Functional Derangements of the Urine.*—Dr. Prout some years ago drew the following graphic picture: a middle-aged individual, who has lived an easy and somewhat luxurious life, after some slight disorder of the bowels or exposure to cold, begins to complain of uneasiness in the region of the kidneys, which gradually

increases and extends forwards and downwards to the groin and testicle. The stomach now frequently sympathises, and there is either absolute nausea or at least inability to take food. The tongue is much furred; there is thirst; the pulse is full, strong, and usually accelerated. There is a tendency to drowsiness and headache. In conjunction with these symptoms the patient complains of a constant desire to pass his urine, which is scanty, highly coloured, extremely acid, and often loaded with bile. Under these circumstances the urinary symptoms sometimes increase to a great degree of severity, only small quantities of urine being excreted at a time, and the colicky symptoms strongly resembling those of renal calculus, being decidedly pronounced—and yet under careful treatment—when the medical attendant and the patient have come to the conclusion that the symptoms are due to renal calculus, and to renal calculus alone; they clear up and give no further trouble.

A patient exhibiting similar symptoms came under my care last summer. Early in March Dr. Allt, of Clapham, advised a gentleman, aged 47, to consult me, as it was feared that premonitory symptoms of diabetes were making their appearance, that is, the amount of urinary water was increased and the specific gravity considerably above the average, though no sugar was present. The patient had lost flesh, and his appetite was capricious. He had formerly led an active life, riding many miles daily, but since he had left the country he had taken to driving in a closed carriage, took little or no walking exercise, whilst his social popularity being great, he was in demand for dinner parties and other functions that led him in the way of more eating and drinking than was good for a man of his habit and constitution, and which was also against his natural inclination, which was for plain and simple food. During the two years he had been in London his health had certainly failed him, and the attack in March was undoubtedly premonitory of something more serious. I prescribed mineral acids and Carlsbad salts, and advised a less nitrogenised diet than he had been taking. Under this treatment he seemed to be doing well, when one day he took a long drive outside a coach to St. Albans and back. The day happened to be cold, with a north-east wind. On his return he felt chilly, with general *malaise* accompanied by severe lumbar pain; the next day he took a Turkish bath, in which he happened unfortunately to slip; this seemed to increase the pain in the back, which gradually localised itself in the left kidney. When I saw him the next day in consultation with Dr. Allt, he had a quick pulse, a foul tongue, obstinate constipation, constant nausea, often actual retching, scanty, highly coloured, acid urine, with intense renal pain on the left side shooting down into the left inguinal region. For some days the pains increased in severity and the symptoms were decidedly aggravated, and the late Dr. Wilson Fox was added to our consultation. He held strongly for the view of renal calculus, and though I was rather biased that way myself, still, remembering Prout's description, I had hopes that with due purgation and a light non-nitrogenous diet, the symptoms would pass off and leave no trace of mischief behind. Time proved the correctness of the surmise, and a fortnight after, the patient made a good recovery; and though he occasionally suffers from dyspeptic attacks, still the renal symptoms have entirely subsided.

There is again another form of nephralgia which often gives rise to the suspicion of renal calculus, connected with functional derangement of the urine, which is the converse of the above. In this class of cases the patient, instead of being stout and plethoric, is usually thin and somewhat emaciated; he complains of a sensation of soreness, heat, or chilliness about the spine, loins, or sacrum; in some instances much increased by pressure, and accompanied by shooting pains and sense of heat or flushing extending to various parts of the body, sometimes by an occasional sensation of tinnitus aurium, also with various nervous affections in different parts of the body, as pain and soreness in the epigastric region, along the course of the nerves of the arm, thigh, etc. These symptoms are generally accompanied by great disturbance of the assimilating functions, and a condition of urine leading to the deposition of oxalate of lime and excessive elimination of phosphoric acid. Prout, speaking of these cases, says their termination is often critical, and the crisis unfavourable. I have at present a case of this kind under observation; the pains in the renal region (the right) have now lasted three years, and though resembling in many respects the pains of renal colic, still the urine, with the exception of the deposition of oxalate of lime, gives a negative result. The patient continues to lose weight, though the dyspepsia is not marked, and there is no organic mischief to account for it. The case has been seen by other physicians, who have from time to time given different opinions—rheumatism, gout, aneurysm, etc. The last time the patient was in town Sir Andrew Clark saw him with me. Sir Andrew Clark was doubtful whether the symptoms pointed decidedly to renal

calculus, as the urine gave such a negative result, but he agreed that the case was one resembling the description given by Prout, and that the nephralgia was due to the irritation of the urinary passages by the passage of crystals of oxalate of lime. Treatment in accordance with this view has been adopted, but I hear the patient still continues to lose weight and to suffer from renal pain; and the case, I fear, is likely to terminate both critically and unfavourably.

CASES ILLUSTRATING THE ANTISEPTIC AND ANTIPYRETIC TREATMENT OF PHTHISIS.¹

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It is only in quite recent times that there could be said to exist any rational treatment of phthisis founded upon scientific knowledge; and the past few years have witnessed a new departure in the rational treatment of phthisis consequent upon the rapid strides made in the new science of bacteriology and in all that relates to the share and influence of micro-organisms in disease. New modes of treatment have sprung up whose principles rest on experimental evidence and scientific deduction therefrom, and now much attention is being bestowed on the use of antiseptics in the treatment of phthisis. Already the results of this mode of treatment justify most favourable expectation, and promise much benefit to the common humanity we work for.

I propose to relate some of my experiences whilst using in acute phthisis remedies now tolerably common, yet still the subject of experiment and discussion—antiseptics and antipyretics, to wit—and whilst using them under circumstances better adapted to continuous trial and careful observation than can generally be compassed in private practice. And any thoughts and suggestions and practical points that I may give as the outcome of my experiences relate not only to these two cases, but are drawn from many other cases and a much wider observation.

CASE 1. *Acute Pneumonia of Left Lung, passing rapidly into Acute Tubercular Phthisis; Almost Complete Repair by Fibroid Substitution; Bacilli, Abundant during the Acute Stages, Disappearing as Recovery Progressed; Complete Recovery Almost Assured, when Sudden Profuse Hemoptysis Caused Death; Duration of Case, Ten Months; Treatment by Kairin, Quinine, and Iodoform.*—E. B., aged 20, a domestic servant, after definite exposure to severe cold, was seized with acute pneumonia on the day following the exposure, and was admitted to the infirmary three days later, on March 15th, 1884. The patient had been previously in good health; she was somewhat subject to cold and cough, but had never been laid up with any illness. On admission the patient was found to be well nourished, but rather anæmic. Further was noted: flushed face; herpes on lips; profuse sweating; a short hacking cough; temperature, 104°; pulse, 124; respirations, 44; viscid sputa; at the left base and up to the spine of the scapula physical signs of consolidation, with fine crepitation.

The day after admission the temperature rose to 105°, and the use of antipyretics was commenced. Notwithstanding the daily use of antipyretics, continued for a period of four weeks, the temperature rose daily (sometimes twice in the twenty-four hours) to a point between 104° and 105.4°. At first kairin was used in ten-grain doses, and it was always given when the temperature had reached 104° or over. After each dose the temperature fell rapidly; observations made every quarter of an hour showed that the fall was continuous for about two hours, the total fall being from three to five degrees. There was a striking constancy in the effects produced by a given dose of kairin, whether the dose was five, ten, or fifteen grains; on no occasion was more than fifteen grains given. A dose of ten grains gave always the best results; fifteen grains did no more than five grains, and neither did so much as ten grains. The stationary period varied, but at most it lasted only a few hours; the longest time recorded was ten hours. The subsequent rise of temperature was usually as rapid as the decline. Each dose of kairin was followed, within half an hour, by profuse sweating and symptoms of depression; and when two doses were given in close succession (the interval being three and a half hours) marked cyanosis and collapse occurred. Kairin was exhibited twice daily for ten days. At the end of this time, the fourteenth day of the disease, the maximum temperature was still 105° or thereabouts. Meanwhile, the sputa had ceased to be viscid and rusty, the cough was looser, the crepitation at the left base had become coarse. Then the sputa became viscid and rusty

¹ Read before the Bath and Bristol Branch of the British Medical Association.