CLINICAL LECTURE

ON

SOME URINARY CALCULI AND URINES.

*Delivered at St. Thomas's Hospital.*By WILLIAM M. ORD, M.D. Lond., F.R.C.P.,
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GENTLEMEN,—The last clinical lecture I delivered to you on the subject of Urines and Urinary Calculi brought me, on its publication (BRITISH MEDICAL JOURNAL, June 2nd and 9th, 1877, several interesting commentaries and illustrative specimens; and I will begin to-day by advertising to these.

1. *Carbonate of Lime Calculi.*—I had stated in my lecture that calculi having this composition were very rare, so rare that they were not represented in the Museum of the Royal College of Surgeons. Dr. Bird of York wrote to correct me on this point: and I have to acknowledge that I had overlooked the supplementary catalogue, in which a carbonate of lime calculus was described and its composition recorded by my friend Mr. Taylor. The specimen was, with others, presented by Dr. Bird to the College of Surgeons, and is a very fine one. I cannot altogether regret my mistake, for it has put me in communication with Dr. Bird, and has led him to give me an opportunity of examining another most interesting calculus, about which I shall have a word to say presently. Thanking Dr. Bird for his courtesy, I pass on to another carbonate calculus, described by Dr. Spencer Smyth of Forest Hill, in the BRITISH MEDICAL JOURNAL of June 30th, 1877, and said to have been voided by a lady a few days after her confinement. Dr. Smyth was good enough to send it to me for further examination.

The calculus, which is before you, is elongated and irregularly four-sided; in length, $1\frac{1}{8}$ inches; in greatest breadth, $\frac{1}{8}$ inch; it is perfectly white and powdery on the surface, and is of light specific gravity. A portion heated on platinum fuses without blackening, and without giving off any smoke or odour, leaving a small clear glassy deliquescent residue, readily soluble in water. The solution is strongly alkaline, and gives no precipitate with phosphate of soda, or ammonia, or carbonate of ammonia, or oxalate of ammonia. No uric acid reaction is obtained. A fragment placed on a slide, moistened with distilled water, and examined under the microscope, dissolves rapidly and completely, disengaging air-bubbles. The water is examined to ensure its freedom from acidity. The solution effervesces briskly with acids, and no subsequent precipitate of uric acid is formed. The substance of the calculus during the process of solution is transparent, and composed of small aggregated and mutually compressed spheroidal masses, having a radiate crystalline arrangement. A watery solution of the uncalined substance gives no precipitate with phosphate of soda, or with ammonia or oxalate of ammonia. On the introduction of the substance into the flame of a Bunsen burner, it gives a yellow tint to the flame. In the spectroscopic, only the sodium line is seen. No ammonia is set free by caustic alkali. The diagnosis is that the so-called calculus consists of carbonate of soda, or more probably of a crystal of common washing soda, which has absorbed carbonic acid from the air and become bicarbonate. It is evidently not an urinary product at all, but must have found its way accidentally or by some trickery into the position that suggested the idea of its being passed from the bladder. On coming to this conclusion, I wrote to Dr. Spencer Smyth, who, in reply, handsomely gave me permission to do what I pleased with the specimen, adding that the nurse distinctly stated that the patient voided it into the urinal with a large quantity of urine; and, as Dr. Smyth further suggested that I might, after a complete revision of my analysis, mention the case in one of my *cliniques*, I take advantage of his kind and frank permission. The occurrence is a very curious one, and well illustrates the sort of deception against which we have to be on our guard in examining urines and deposits.

2. *Spontaneous Disruption of Calculi.*—Soon after the publication of my last lecture, I received two parcels of fragments of disrupted calculi, closely resembling those described by me. They were sent by Mr. Lockhart of Blackheath and by Mr. G. Buckstone Browne respectively.

Mr. Lockhart sent me twelve fragments, which he regarded as portions of three or four calculi. They had been passed as they were sent to me, and as I now exhibit them, at different times, between two and three years ago, by a gentleman of the age of fifty-six, who experienced great pain during their passage, but not before or after. The urine at

the time was copious, limpid, free from deposits, from albumen, and from sugar. Before his death, which was caused by bronchitis about a year ago, he manifested symptoms of vesical calculus; but his fatal illness occurred before a contemplated exploration of the bladder was effected. Mr. Lockhart has kindly allowed me to make use of the specimens, but proposes to make them, or part of them, over to the Museum of the Royal College of Surgeons afterwards.

The fragments were, as has been said, twelve in number, but one has been used for examination. They are all evidently fragments—segmental fragments—of hollow spheroidal calculi, and appeared to Mr. Lockhart, as they appear to me, to have been produced by the disruption of two or more calculi. This has evidently occurred within the bladder, since six of the calculi are covered unconformably, to use a geological term, with a thin white powdery layer of urate of ammonia, covering a yellowish-grey mass with concentric layers; and the remainder are yellowish-red, with the edges of fractures rounded and smoothed as though by mutual friction. They are composed of uric acid, combined with ammonia, and mixed with a little oxalate of lime. When a fragment was powdered and treated with boiling water, it yielded a very acid solution, from which, on cooling, large narrow lancet-headed plates were thrown down. These, as I have shown elsewhere as a result of direct experiment, are forms produced where a little ammonia is present in combination with great excess of uric acid. Ammonia is set free by caustic alkali. There are no organic forms to be found in the watery solution after standing, or after complete solution in liquor potassæ. The structure is fibrous crystalline. The fact that one portion of the fragments is coated by neutral ammoniac urate shows that, as in the case mentioned before, a difference in the reaction of the lime existed after the disruption of the calculi from that which existed before. That is to say, an acid was exchanged for a neutral or alkaline reaction. And here I am glad to find Mr. Lockhart agreeing with me, that the missing nucleus underwent expansion or swelling, and so burst its envelope into fragments.

On July 13th, 1877, I received from Mr. G. Buckstone Browne a box of calculus fragments, described in a note by Mr. Browne accompanying them "as evidently the results of the spontaneous fracture of several moderate-sized calculi, and curiously water-worn and polished". A few facts as to history were also communicated by Mr. Browne, as follows: "H. H., aged 63. 1870. Movements began to cause pain.—1873. Sounded by Mr. Quain. Nothing found.—1874. Sounded by Mr. Quain. Nothing found.—1875 (April). Began to pass little pieces of calculi.—1876. Sounded by Sir Henry Thompson. 'Numerous rather largish calculi.'—No operation was performed, the patient being too ill. 'Died of uræmia August 12th.'"

The fragments were thirty-two in number, large and small, and were to all appearance portions of rather large pisiform calculi. Some, as you see, have a sharp-edged fracture, having perhaps been broken since emission; others correspond to Mr. Browne's suggestive description, and are "water-worn and polished". Most are uniformly fawn-coloured and free from superficial deposit; but six, in which the edges are little, if at all, worn down, are coated with a thin and not quite complete film of white matter, are slightly whitewashed. They consist of almost pure uric acid, with not even a small admixture of ammonia; for, when powdered and boiled in distilled water, they yield a very acid solution, from which the oblong plates of pure uric acid are thrown down on cooling. I show you some of the plates. If any ammonia had been present, these would have had lancet ends instead of square. Here, too, are the affirmative results of the murexide tests for uric acid. When a piece of the mass is broken and examined under the microscope, the structure is found to be fibrous crystalline, in concentric layers, with the fibres radiating from the original centre of the calculus. The coating on the six mentioned is granular under the microscope, and readily dissolves in water with a little heating. It is probably urate of ammonia.

If you will compare the two sets of fragments now exhibited with those described in my former lecture, which are here placed alongside of them, you will, I think, have no hesitation in recognising a strong family likeness between the three. All are segmental fragments of pisiform calculi, composed of either uric acid or acid urate of ammonia; in all, the nucleus is wanting; in many specimens of all three groups, indications are afforded—in the presence of an investing unconformable layer of more alkaline material—of a change in the reaction of the urine immediately after, if not at the very time of, disruption. Where this coating is wanting, there are unmistakable proofs of denudation by attrition, and it is only where these proofs exist that the coating is wanting. I maintain, therefore, that the fresh specimens support the idea which I advanced upon examination of the first: that in a changed state of urine the nucleus had become swollen, and acted as a bursting charge in a shell.

3. *Intestinal Calculus from Horse.*—The last specimens to which I will refer, as coming to me in consequence of the publication of my last lecture, is one which was sent to me by Dr. Bird of York. It is, indeed, only one-half of the original calculus, which must have been of the size of a billiard-ball, and almost as much polished on its grey-white surface. The section shows a singularly perfect and minute concentric lamination; the circles might have been traced with compasses from the smallest to the largest. The colour varies from a dull bluish-grey to a nearly white tint, the nucleus being darker than the crust. The substance is exceedingly hard, about that of slate. Chemically it consists of a mixture of much phosphate of lime, with a smaller quantity of triple phosphate and much organic matter. It gives off no urinous odour on heating, nor does it contain uric acid or oxalate. The earthy matter is readily dissolved by hydrochloric acid and without effervescence, and the solution yields indications of the above salts only.

The appearance of fragments under the microscope is not at all like that of ordinary calculi. The substance is homogeneous, clear, of a very pale yellowish or grey colour, with numerous fine points of dark colour disseminated through it. The fracture is rather conchoidal, like that of prepared starch, than crystalline, and there are neither spheres nor crystals imbedded. It dissolves under the action of hydrochloric acid, leaving a granular but transparent mucus-like material, in which no structure can be detected. But here and there, and particularly in the nucleus, little rifts are found containing vegetable matter, mainly in the form of spiral fibres, much darkened, and apparently impregnated with the earthy matrix. The calculus is stated to have been passed by the horse, and the groom believes it was "dropped" from the anus in defecation. As it contains no characteristic urinary matters, and does contain vegetable matters, it no doubt is an intestinal concretion, such as is not uncommonly found in the large intestine of herbivora. But it is singular in showing no vegetable hairs or bristles, and no animal hairs, both of which are usually found abundantly in some part or other of such formations.

4. *Fæcal Contamination of Urine.*—The urine before you has a history of much clinical interest. It was passed by a patient who, for six months preceding, had symptoms of ulceration of the lower bowel, without any obstruction. The alvine evacuations had been often entirely composed of mucus more or less stained with blood, and the true fæcal constituents had been scybalous. The microscope had not detected in the discharges any direct evidence of malignant disease; but, at the same time, fragments had been found composed of massed nuclear bodies bound together by faintly fibrillated tissue, which had a suspicious appearance. One day recently, the patient complained of difficulty in expelling the urine, which offered, as he said, much the same kind of obstacle as if the neck of the bladder were filled with cotton-wool. The urine was dirty-looking, and had a copious dingy precipitate, which looked like pus. Some, being submitted to microscopic examination, proved to contain fæcal matters in some quantity. That is to say, although no fæcal odour was recognised, the microscope showed abundance of partly digested striped muscular fibres, vegetable tissue and starch, and little oval and globular masses irregularly tinged with brown and yellow, such as are found in diarrhoeal stools. I wrote at once to the patient, asking him to send me a fresh specimen, and to take care that no fæcal intrusions should occur outside the body. But, curiously enough, a letter from him to me crossed mine to him, setting forth a new symptom. That morning, while making a strong effort to void the last ounce or so of urine, he had experienced a sensation, half painful, half pleasant, in the neck of the bladder, with pain shooting to the end of the penis. As the strain was maintained, he distinctly heard a noise in the urethra, which was best compared to a wheezing, alternating with little bubblings. It was clearly such a noise as would be produced by gas or air mixed with the urine. Later in the day, I received a specimen of urine which had been collected with scrupulous care in a clean vessel. This had a faint acid odour, not urinous, but like that of fermentation. It was acid, slightly albuminous, and rather pale in colour. A large pus-like sediment collected at the bottom of the bottle after an hour's rest. In this, besides blood, pus, and mucus, there were abundant evidences of fæcal contamination, such as I have already mentioned. In addition, there were a great many black crystalline bodies, either fragments or whole prisms, with pointed ends. Some of these were quite black, others of a brownish black, and these last were partially translucent. Such crystals were quite new to me as urinary deposits. At first, I thought they might be altered blood-pigment. But they agreed with this neither in form nor reaction; they were not affected by acetic acid, by chloride of sodium, or by chloroform; they were soluble, however, in strong hydrochloric acid. They did not resemble any crystals known to be found in melanotic tumours. The conclusion was, that they were part of the intrusion from the bowel. The fæces being examined, yielded

mucus, pus, and blood, with such *débris* as has been noted, and, with these, an extraordinary abundance of the crystals. The solution of the difficulty was now approached. Subnitrate of bismuth formed a part of the patient's medicine; the actual powder in use by him was examined and found to consist of crystals exactly resembling the black crystals in form and size, but not in colour, being colourless and transparent. But the addition of sulphide of ammonium converted them into exact counterparts of the black urinary crystals.

The whole story illustrates the importance of making microscopical examination of even such deposits from the urine which have no other than the ordinary appearance presented by pus and mucus. You will ask me as to the bearing of this upon the case.

The patient has no obvious tumour, nor any obstruction of the bowels. The abdomen is of average size. At the left side of the vesical region there is some resistance felt by the hand on pressing the abdominal muscles, and there is deep-seated tenderness; but nothing more can be felt through the abdominal walls, or *per anum*. Occasionally, tumours can be felt along the course of the sigmoid flexure; but these come and go, and vary in size and shape. They are scybala, and appear as such in the evacuations, when they are not seen to be "figured". The urine is easily retained, and is not voided *per anum* at all, and the fæcal element found in it is such as would pass through a very small opening. The most obvious contamination occurs after straining or spasm. I conclude, therefore, that the communication between the intestine and the urinary tract is very small; that it is, probably, not in the bladder, but rather in the ureter—with which idea the position of the deep-seated tenderness agrees, and that the opening is somewhat valvular, allowing escape from the intestinal to the urinary tract, but not in the reverse direction. It is rather such an opening as would be caused by simple than by cancerous ulceration; and I feel hopeful that, after all, malignant disease may not exist.

Communications of this kind are, as far as I am aware, not common in men. In women, however, fæcal contamination of the urine within the urinary passages, or through the vagina, is far more common, particularly as a consequence of lacerations in parturition. Of such cases I have seen several, but this is the first I have seen in a man.

5. *Uric Acid Crystals: Modification by Presence of Sugar.*—The last specimen for to-day is this slide, which I place under the microscope. You will recognise at once an abundance of crystals of uric acid. But I wish to draw your attention to the particular form of the crystals. They are very large, very beautifully clear and transparent, and they are very much flattened. They approach, indeed, the shape of large flat chisel-ended plates, and agree remarkably with the engraving I pass round. The engraving is from a paper of mine in the *St. Thomas's Hospital Reports* for 1871, and exhibits the form assumed by uric acid in sugary urine. On seeing these crystals in the deposits of some urine sent to me this morning, I had little doubt but that sugar was present. Here is some of the urine, and I apply Fehling's test. You see what a full sugar reaction is obtained. The urine is of specific gravity 1030, and contains no albumen. It was passed by a gouty patient at the age of sixty-nine. In old gouty cases, glycosuria is not uncommon. Prout wrote nearly forty years ago, that "a saccharine condition of the urine is much more common in dyspeptic and gouty individuals than is supposed"; and Gairdner has pointed out the existence of recurring glycosuria in gout. I have seen many cases of the kind in old people, and, my experience is, that glycosuria occurring in advanced age in gouty persons is not the terrible symptom which it is often held to be. In this case, the glycosuria has occurred on the subsidence of an attack of gout in the feet. In several cases, I have seen a glycosuria of much persistence, but not associated with any great excess of urine, disappear completely on the outbreak of gouty inflammation of the great toe or elsewhere. And I have supposed it to be just a question of the direction of an active hyperæmia. Just as an active hyperæmia will oscillate between one of the mucous membranes and the skin, so does a similar condition oscillate between the joints and liver. Physiology teaches us that the main, if not the only essential, factor in the production of diabetes is active hyperæmia—arterial hyperæmia—of the liver. Glycosuria, therefore, may, in some cases, be a part of retrocedent, or so-called "latent", gout. Such glycosuria often goes on for years, and, without producing symptoms that would *primò facie* draw attention to its existence. In the present case, there is neither wasting, thirst, red tongue, polyuria, nor preputial irritation. One patient under my observation had this form of glycosuria for as long as fifteen years, and died at the ripe age of seventy-six. Another died at seventy-seven after ten years of the same. Neither could be said at the last to die of diabetes, but both died of gradual decay without wasting. We are honoured to day by the presence of Dr. Kraus of Carlsbad. He will, of course, have a much larger expe-

rience than most London physicians can have of diabetes, inasmuch as the waters of Carlsbad are justly held to be of great value in the treatment of that malady. Two years ago, I was talking with him on the alternation of gouty inflammation with glycosuria. I do not think he quite agreed with me then; but he tells me that, having since directed his attention to the alternation, he has several times observed it, and accepts the clinical fact. I must again remind you that the practical recognition of the fact was first made by Dr. Gairdner. The modification of the form of uric acid by the presence of sugar is also a fact worthy of careful notice.

THE GENOESE RIVIERA IN SPRING: SWISS MOUNTAIN STATIONS IN JUNE.

By J. HENRY BENNET, M.D.

BEING now a free agent in summer, once winter labours are over at Mentone, as I have retired from practice in England, I intended this year to have spent May and June in the island of Crete. The war, however, rendered this plan inexecutable; so I remained at Mentone until June 13th, and since then have been examining and studying the Swiss mountain summer stations at the east extremity of the lake of Geneva.

Although I have spent nineteen winters at Mentone, I had never before remained there during May, my annual explorations of the Mediterranean, and the obligations of London practice, having hitherto obliged me to leave in April. My estimate of the climate in May was therefore founded on the reports of others, not on personal experience. A careful study this spring of the temperature and meteorological conditions existing at Mentone in May, combined with previous experience of the Mediterranean generally in that month, has led me to the following conclusion. The fear of extreme heat in May in this, as in all other regions of the Mediterranean, which leads winter health-emigrants from the North to make a precipitate return north in April, or at latest early in May, is not substantiated by facts. This fear is founded on the often summer warmth of February, March, and April, but ignores the systemic cold north-easterly winds which usually prevail in Europe in April and May, and which are felt all over the Mediterranean.

This last May, the nightly minimum temperature at Mentone varied between 56 deg. and 60 deg. Fahr. It was never once above 60 deg. The daily maximum varied between 60 deg. and 70 deg., and was never above. These data corresponded to the calculations of M. Brea, which give 63 deg. as the medium temperature of the month. The heat was not at all unpleasant, being merely that of midsummer in the south of England, whilst the vegetation (trees, shrubs, and flowers,) was that of July in southern England. We were glad to look for shade in midday, to don summer clothing, and felt as we feel in England in a fine warm July. The wind was generally south-west, and clouds formed every afternoon on our higher mountains (four thousand feet), but there were only a few showers, and the rain-laden clouds passed over us to discharge their moisture in Switzerland, where it rained nearly all March, April, and May. The weather on the whole was most enjoyable for all who were well or merely ailing, as is midsummer with us. At the same time, I think that chest-invalids and all whose care requires rather a cool bracing atmosphere than a warm one, do well to leave the Mediterranean by the end of the first week in May, say for the Italian lakes or Geneva, where warm weather comes usually a month or six weeks later. With them the question is not whether they can stand midsummer heat without actual injury, but what climate and what locality is likely to do them the most good. They can scarcely, with safety, return home to the north until the end of May, and a cooler climate in May than that of the shores and islands of the Mediterranean is likely to brace and benefit them. To those who are not so situated, who would not fear midsummer weather in southern England, who would not try to escape from it by going to our north-east coast, or to the Highlands of Scotland, May is a most enjoyable month at Mentone or elsewhere in the Riviera and in the Mediterranean generally. The air is pleasantly warm only, pure, and balmy, and vegetation luxurious; the sea is warm enough for sea-bathing (65 deg. to 68 deg.), and merely a passing shower to be expected, just enough to lay the dust and to water the flowers. Such, however, I have found to be the state of the climate in May all over the Mediterranean, from Malitza to Constantinople, in Corsica, Sardinia, Corfu, Malta, Algeria, Tunis, Asia Minor. I have never actually suffered from heat, and have only found the thermometer occasionally above 70 deg. or 75 deg. in the day, and 60 deg. or 65 deg. at night. I do not speak, of course, of the temperature in the South Mediterranean when a sirocco or south-

east desert-wind reigns. In Algeria, for instance, I have known it go up to 96 deg. Fahr. for forty-eight hours. But this desert-wind thus raises the thermometer at any time in spring on the south shores or in the southern regions of the Mediterranean for a few days, and this fact is one of the drawbacks of the south Mediterranean as a health-residence.

With June, however, the heat became more intense and ceased to be agreeable. M. Brea's medium for that month is 70 deg., deduced from a day maximum of 75 deg. to 76 deg., and a night minimum of 64 deg. to 66 deg. When this is the case, the nights begin to be oppressive, the days are unpleasantly warm, and it is well for all who can go to a cooler region to do so, even the sound; as to the sick and weak, it is folly for them to remain if they can possibly get away. A medium temperature of 70 deg., continued for weeks and months, develops in the human organisation the susceptibility to all tropical diseases, and the Mentone medium for July and August is five degrees more, 75 deg. That such is really the case is apparent from the medical literature of our military stations in the Mediterranean, which abounds with the description of serious disease, febrile, malarious, dysenteric, and other, developed by such a temperature. Mentone may be assimilated to the warmest and most sheltered regions of the Mediterranean, owing to its mountain protection; and a large population placed under the same hygienic conditions as the population of Malaga, or as our troops at Gibraltar, Corfu, or Malta, would, no doubt, develop the same climatal diseases under the influence of a temperature for three months presenting the medium of 70 deg. and 75 deg.

In conclusion, I would say that my experience this spring corroborates that of my colleagues at the sanatoria of the Riviera. Invalids had better not leave the locality where they have wintered, or its vicinity—Hyères, Cannes, Nice, Mentone, San Remo,—until the end of April, on account of the cold east winds of the north. This rule, however, does not apply if they are well enough, and enterprising enough, to go further south, as, for instance, to Ajaccio, Algiers, Tunis, Palermo, Malta, etc. By the end of the first week in May, however, they had better seek cooler quarters more north. Those who are well, or quite convalescent, can remain, generally with perfect comfort and safety, until the end of May, but not later.

Many of those who winter on the Riviera for health motives have been told at home, or are told in the south, that they must spend two or three consecutive winters abroad. Under such circumstances, as some have broken up their establishment at home, and others dread the heavy expense of the double journey, or wish to travel, the desire is frequently expressed to remain on the Continent in some mountain sanatorium, where the heat of summer would be avoided. The mountains of Switzerland are crowded with such sanatoria, to which the town Swiss resort in summer as we do to the seaside, not only on health grounds, but for a change—for a holiday. As most of these mountain hotels or pensions (boarding-houses) are very cheap (from 4s. 6d. to 6s. 6d. a-day), the object of economy is attained—a most vital one to many. Having been obliged hitherto, as already stated, to remain in England in summer, I had no personal knowledge of these health-resorts, but have been in the habit for years of sending patients to several at the head of the lake of Geneva, which my Geneva medical friends told me were amongst the best in Switzerland, viz., Les Avants, Glion, Champéry, Morgins, Villars, Les Diablerets, La Comballatz, La Rossinière, and Corboyer. I determined, therefore, on leaving Mentone this year, to examine them carefully, and came direct to Geneva, arriving June 16th. I found the change in temperature most agreeable, the thermometer in the day being about 68 deg.; at night, about 58 deg. But it was raining every day more or less, and I was told that it had been raining for three months, ever since March, which had much damaged the spring season. So the south-westerly clouds which had passed over our heads on the north Mediterranean shore on the other side of the Alps without giving us any rain, had broken on the Swiss mountains, and deluged the land. I remained five days at Geneva, interviewing minutely several of my friends, professors of the Faculty of Medicine, and several intelligent non-medical Swiss residents. I also had a long conversation with Dr. Lombard, the author of the well known work *Le Climat des Montagnes*. He was one of the first to draw the attention of the profession to the treatment of disease by mountain-air, and is still a vigorous, hale, intellectual man, although in his seventy-sixth year. He has just published the first two volumes of an important work on Meteorology. It is encouraging to his juniors, even to sexagenarians, to see so aged a man still full of life, energy, and scientific ardour, taking a vivid interest in all the scientific questions of the day.

From the analysis of these various sources of information, I came to the conclusion that, by the time the Genoese Riviera becomes too warm for chest-invalids to remain there prudently, that is, about the end of