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ON THE INFLUENCE OF THE RHUBARB PLANT IN PRODUCING OXALATE OF LIME IN URINE.

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Perhaps no circumstance has contributed so much to stimulate the increasing attention now paid to the pathology of urine, as the discovery of oxalate of lime being a more frequent constituent of it than was formerly supposed. This fact, and the importance of it in relation to a morbid state of the health, were first shown by Dr. Golding Bird, in some papers which appeared in the *Medical Gazette* for 1842, and they have been subsequently confirmed by the observation of others.

The disease, or series of morbid phenomena, of which the excretion of oxalate of lime is said to be pathognomonic, is one which must frequently present itself to the notice of the practitioner; many of those cases formerly classed with the dyspeptic, hypochondriacal, or nervous, being found to be examples of this affection,—cases characterised by “depression, with great irritability,” the more prominent symptoms of which are lowness of spirits, apprehension of impending evil, irritability of temper, emaciation, fatigue from slight exertion, diminished sexual power, pain, or sense of weight across the loins, with more or less gastric derangement, &c.

But it is important to know that there are other diseases in which oxalic urine is found. Lehmann* states that it often occurs in cases of tuberculosis, arthritis, and especially of osteomalacia, or softening of the bones. He has likewise met with it in endocarditis and other acute diseases. Dr. Watson, in a lecture on gravel, in the *Medical Gazette* for June, 1842, mentions boils, and carbuncles, and scaly affections of the skin, as diseases to which those are liable in whom the oxalic diathesis obtains. In two cases recently under my own notice where boils, of the carbuncular species, continued to succeed each other during many months, crystals of oxalate of lime were

constantly present in the urine, so long as the boils continued to appear.† It is also not improbable that oxalic urine will be found in spermatorrhœa, a disease, however, scarcely yet admitted into the nosology of British practitioners. Dr. G. Bird expressly refers to some circumstance which has determined the irritation to the urinary organs, as the most usual exciting cause of the affection which he describes; and Lallemand, in the preface to his work, “*Des pertes seminales involontaires*,” after remarking that most of the cases of spermatorrhœa which came before him were supposed cerebral affections, adds, “chez beaucoup d’autres malades, on avait cru voir des gastrites ou des gastro-enterites chroniques, des anévrismes du cœur, des phthisies commençantes, etc.; ou bien des affections nerveuses, et surtout un état hypochondrie.”

The analogy between the symptoms of the oxalic disease and the constitutional effects of spermatorrhœa is certainly strong. There is, moreover, a resemblance in the urine of these two diseases. “Le nuage floconneux,” so frequently referred to by Lallemand as a characteristic of spermatic urine, corresponds very much with the dense cloud, *eueorema*, which in oxalic urine is usually observed to subside towards the bottom of the vessel, after it has been at rest for a time.

But the presence of oxalate of lime in urine can only be considered diagnostic of disease when the oxalic acid is known to have been generated within the economy, and not introduced from without, with the food; for it has been remarked by Liebig that the analysis of urine, when made without respect to the inorganic salts, acids, and bases of the aliment, teaches nothing whatever, and justifies no healthy nor morbid inference.

It is, then, an important question whether there are any descriptions of food, in common use, which may be the means of impregnating the urine with oxalate of lime?

I am not aware that this subject has received much attention from those who have written on oxaluria. In the chapter devoted to the pathology of oxalate of

hastened by gently moving the glass, so as to give the fluid a rotatory motion, which will collect the oxalate at the bottom of the capsule.

“Having allowed the urine to repose for a minute or two, remove the greater portion of the fluid with a pipette, and replace it by distilled water. A white powder, often of a glistening appearance, will now become visible, and this, under a low magnifying power, as by placing the capsule under a microscope, furnished with a half-inch object glass, will be found to consist of crystals of oxalate of lime in beautifully-formed transparent octohedra, with sharply-defined edges and angles.”

* Simon's Chemistry, by Dr. Day, vol. 2, p. 200.

† I may here state, that in the examinations of urine referred to in the course of this paper, for the purpose of ascertaining the presence of oxalate of lime, the method invariably adopted was the one indicated by Dr. Golding Bird, which is as follows:—“Allow a portion of the urine passed a few hours after a meal to repose in a glass vessel. Decant the upper 6-7ths of the urine, pour a portion of the remainder into a watch glass, and gently warm it over a spirit lamp; in a few seconds the heat will have rendered the fluid specifically lighter, and induced the deposition of the crystals of oxalate, if any were present. This may be

lime in the admirable work of Dr. Golding Bird, the following two passages are all that bear upon this question:—"The quantity of oxalic acid generated is to a very considerable extent under the control of diet; some articles of food quite free from oxalic acid at once causing the excretion of this substance in very large quantities, whilst others appear to have the effect of nearly totally checking it." p. 137. Again, "The quantity of oxalate of lime is always the greatest after a full meal, and often absent in the *urina sanguinis*, or that passed on rising in the morning; and, moreover, disappearing under the influence of a carefully regulated diet, and reappearing on returning to the use of unwholesome food." p. 138. Dr. Bird does not specify in these extracts what are the articles of food which cause the excretion of the oxalate; or, what on the other hand, have the power of checking it; nor does he indicate what food is unwholesome in respect of which the diet can be carefully regulated.

Dr. Watson, in the lecture before referred to, is more explicit on this point, he says "The young stalks of the *rhubarb* plant, which of late years have come into such general use in this country for tarts in the spring, and sorrel, of which our neighbours the French consume a good deal in salads and in other ways, both contain oxalic acid; and hard water contains lime. Dyspeptic persons who drink such water, and eat such articles of food, and are thus daily introducing, without suspecting it, the constituent ingredients of the mulberry calculus, are very likely indeed to incur the pain and the exceeding peril of a renal concretion of that kind. You must see, therefore, the great importance of detecting the oxalic diathesis, and of forbidding, to those who have it, all such viands as contain the oxalic acid, and of recommending them to use pure water, even distilled water for drinking."

In addition to *rhubarb* and *sorrel*, *turnips* may also be mentioned as containing oxalic acid; but they are more particularly used as food for cattle. The *rhubarb* plant, however, may fairly be ranked as a common article of human food; so general has its use become, that if I am rightly informed, the market gardeners fail to meet, adequately, the annually increasing demand for it, especially in the markets of our larger towns. That a plant, containing so much oxalic acid,* used as food, should exert some influence in the cases of those in whom the oxalic diathesis exists, may reasonably be anticipated; but it does not appear that we are in possession of any information as to the precise nature and amount of this influence. Being therefore desirous, for practical purposes, of additional information on this subject, and with the view, further, of ascertaining how far the free use of *rhubarb*, as food, tended to

produce oxalate of lime in urine previously free from it, I made the following observations:—

Four individuals were selected, on whose compliance with my wishes I could rely. For the purposes of this paper I shall distinguish them by the initials A, B, C, D. They were all of the male sex, and of ages varying between 21 and 34. A and B were in perfect health; C was also in good health, but he had only recently got rid of a scaly affection (*psoriasis*), of the lips and face. D was a confirmed dyspeptic of many years standing. It was arranged that these four persons should partake freely of *rhubarb tart* at dinner, for ten consecutive days, and that I should be furnished each day with specimens of their urine, voided within the first six or eight hours after dinner. Before commencing the use of the *rhubarb*, I carefully examined the urine of each individual, selecting for this purpose portions of that passed in the evening—*urina chyli*, varying slightly in colour and specific gravity. Nothing abnormal was found in any excepting a slight deposit of urate of ammonia in the urine of C. The specific gravity of this urine was much higher than that of the rest, being 1.030. The following are the particulars of the ten days' urine:—

Urine of A.—First day, colour normal; specific gravity, 1.025; contained numerous small crystals of *oxalate of lime*. Second day, colour pale; specific gravity, 1.016; no *oxalate* present. On the third and subsequent days no *oxalate* could be detected, the urine being pale in colour, and otherwise healthy, the specific gravity varying between 1.013 and 1.022.

Urine of B.—Was perfectly healthy throughout the ten days, being normal in colour and specific gravity, and quite free from oxalate of lime or other unusual constituent.

Urine of C.—First day, colour normal; specific gravity 1.015; contained crystals of *oxalate of lime* in abundance. Second day, colour pale; specific gravity 1.010; contained crystals of *oxalate of lime*, as before. Third day, colour normal; specific gravity, 1.015; crystals of *oxalate of lime* larger, but not so numerous. Fourth day, as on the preceding. Fifth day, colour high; specific gravity, 1.020; contained still larger crystals of the oxalate. Sixth day, colour high; specific gravity 1.019; crystals as last, but more numerous. Seventh day, colour high; specific gravity, 1.022; crystals in size and number, as on the sixth. Eighth day, colour deep amber; specific gravity, 1.025; crystals numerous, some very large. Ninth day, as on the eighth. Tenth day, colour high; specific gravity 1.030; crystals of the *oxalate* still larger and very abundant.

Urine of D.—First day, colour high; specific gravity

leaves of the domestic *rhubarb*, or pie-plant, boiled, and served as 'greens,' were all of them shortly after seized with severe vomiting. In one of the persons it was followed by gastritis; the others recovered directly after the vomiting."

I am not aware that similar effects have resulted from the use of the plant in this country. It is not improbable that the activity of the American plant may be greater than that of our own growth, owing, possibly, to some difference of soil, in respect of the proportion of lime which it may contain; for there is no doubt that much of the immunity attending the consumption of the plant depends on the oxalic acid it contains being in combination with a base, like lime, for which it exerts so remarkable an affinity,

* In the *Medical Gazette* for June 3rd, page 40, is a notice, from an American journal, of an analysis of the *rhubarb* plant, by a Dr. Long, from which it appears that one of the smallest bundles in the market, weighing about one pound, contained 24½ grains of oxalic acid. It is further stated, on the authority of Christison's "Dispensatory," that the medicinal *rhubarb* root does not contain any free oxalic acid, but oxalate of lime, varying, according to the different localities producing it, from 11 to 40 per cent. Dr. A. T. Thomson, "Dispensatory," Article, *Rheum*, states the proportion of oxalate of lime in a drachm of *rhubarb* to be from 18 to 26 grains.

In the journal above referred to is also an account of "a family of four persons who, after eating very freely of the

1.030; containing numerous small crystals of *oxalate of lime*. Second day, as on the first; again containing crystals of the *oxalate*. Third and subsequent days, no *oxalate* could be detected; the urine in other respects remaining the same.

It thus appears that the *oxalate* was present in the urine of three out of the four, after partaking of the rhubarb but once, disappearing in two after the second day, but continuing to appear daily in the third, while in the fourth individual no trace of it was at any time detected. Finding the *oxalate* invariably present in the urine of C, he now wholly abstained from the further use of rhubarb. In the course of a week after, I again examined his urine, and found, notwithstanding the rhubarb had been discontinued, the *oxalate* still present, in crystals as large and numerous as before.

With the view of causing their disappearance I directed twenty drops of *vinum colchici* to be taken three times a day. Dr. Bird has pointed out the *colchicum* as a powerful remedy in *oxaluria*, and its effect in this instance was very remarkable. On examining the urine when three doses only of the remedy had been taken, the specific gravity which before was 1.032, was found to have fallen to 1.015; and not a trace of the *oxalate* could be detected in it. The urine, however, was paler in colour, and much increased in quantity. On examination the next day, the urine was found to correspond with that of the preceding. The *colchicum* was not continued longer than a few days. About ten days after it had been discontinued, on again examining the urine, the presence of the *oxalate* was once more detected, but the crystals were much diminished in size. I continued during the succeeding six weeks to make frequent examinations of this person's urine, constantly finding the *oxalate* present, ultimately in very large crystals.

It has been before stated that this individual, C, had been afflicted with an obstinate cutaneous disease, (*psoriasis*), a short time previously to his becoming the subject of these observations. A point of some practical importance, in connection with the treatment of his case, is here worthy of notice. After a persevering trial of a variety of remedies, including purgatives, sarsaparilla, iodine, tonics, arsenic, &c., with numerous topical remedies, without any benefit being derived, he having closely watched the influence of various articles of food in his case, came to the conclusion that salt, and salted meats, were prejudicial to him; he therefore henceforth rigidly abstained from salted food, and from salt itself, excepting in the minutest quantities, and in the course of a few weeks had the satisfaction to find his troublesome disorder completely removed.

I shall presently mention another fact corroborative of the supposition, that household salt has some tendency to exasperate or originate diseases characterised by *oxalic* urine.

During the six weeks succeeding the specified period of ten days, the individuals, A, B, D, continued to partake, almost daily, of the rhubarb. I was, however, unable again to detect the presence of the *oxalate* in their urine, though a careful search was made as often as every second or third day. Subsequently, an abundant crop of small crystals was once more discerned in the urine of A. Ascertaining that he was at the time

continuing to eat freely of rhubarb, I was at first disposed to believe that he had at length saturated his system with it, but I further learned, that during the week preceding the reappearance of the *oxalate*, the only description of animal food of which he had been partaking was *salt ham*. Seeing that the *oxalate* was not present in his urine previously to his taking the ham, and bearing in mind the fact before-mentioned, of the prejudicial influence of salt in an *oxalic* disease, I concluded that the ham was essentially concerned in the production of the *oxalate* on this occasion.

On reviewing the foregoing observations, the conclusions which appear to be fairly deducible from them may be briefly stated as follows:—

1. That, in a great proportion of instances, *oxalate of lime* will be present, for a longer or shorter period, in the urine of persons using the rhubarb plant as food.

2. That there are, on the other hand, some individuals in whose urine no *oxalate* can be detected during such use of a rhubarb diet.

3. That a rhubarb diet is capable of inducing the *oxalic* diathesis in individuals predisposed to it, or to the diseases characterised by it; and that it must therefore necessarily tend to exasperate and prolong such diathesis, when it already exists.

To these the following corollary may be added:—

That the presence of *oxalate of lime* in urine should not be disregarded by the practitioner, from the supposition that it may originate in articles of food, but should, under any circumstances, be considered indicative of the *oxalic* diathesis, or of a tendency to it not less important.

I may, in conclusion, observe that it is, perhaps, impossible to adduce satisfactory reasons for the different results noticed in different individuals. Why, under the same circumstances, *oxalate of lime* should be present in the urine of one, and absent from that of another, or why, in the same individual, it should appear at one time and not at another, is, doubtless, out of our power to explain.

It is generally supposed that the stomach has the power of decomposing the vegetable acids. In the common saline draught, for example, it is believed that the tartaric or citric acid undergoes decomposition, leaving the alkaline base at liberty to form other and beneficial combinations; but, from the fact of these and many other of the organic acids;* for instance,—the malic, succinic, gallic, acetic, *oxalic*, and meconic, having been detected in urine, though introduced into the stomach in a free state, it is obvious that the power of decomposing them possessed by the stomach cannot be uniformly exerted. We may hence account for the presence of *oxalate of lime* in urine, on some occasions, by supposing *oxalic* acid introduced with the food, to pass the ordeal of the digestive powers intact.

Runcorn, August 14th, 1846.

* Simon's Chemistry, vol. 2. p. 338.