

to give a degree of acrimony to the secretions, sufficient to excite inflammatory action in the colonic glands, and thus produce dysentery and hepatitis.

As in the greater number of cases of hepatic abscess, in tropical climates, consequent of dysentery, it is not easy to explain satisfactorily why the hepatic affection rarely occurs until the dysentery has ceased; or, at least, until it is temporarily suspended. Dr. Parkes has hazarded an hypothesis, "that it is owing to the alliance, in point of excretion or secretion, between the large intestines and the liver; the non-action of the former organ, by chemically altering the blood, might give rise to that condition of the liver which ultimately, if unchecked, produces abscess."\* A clinical lecture does not admit of the examination of hypotheses, but I merely mention it as an ingenious idea; and there can be no doubt, that the sympathy between the colon and the liver is so great that morbid states of the one produce morbid states of the other—they both sympathize in a remarkable degree.

*Treatment.*—With regard to the treatment in this case, as the prognosis, from the moment of the admission of the patient into the hospital, was unfavourable, indeed, of the worst description, little advantage could be anticipated from any plan. The object was rather to soothe and abate the sufferings of the poor man than to cure. In the early stages of such cases, the object is, to allay inflammatory action, to improve the intestinal and biliary secretions, to abate the tenesmus, and to moderate the purging, whilst, at the same time, the powers of the habit are sustained. As soon as the dysenteric symptoms appear, the first indication to be fulfilled is to subdue the inflammation. If this be accompanied with fever, the blood-letting should be general, and followed by leeches, and the topical bleeding may require to be repeated, should the purging, griping, and tenesmus continue. Purgatives are too often resorted to, and these symptoms, especially the tenesmus, are better managed by demulcent enemata, containing large doses, say from eight to twelve grains or a scruple of ipecacuanha, combined with extract of gentian, which prevents the ipecacuanha from nauseating, and in this combination exerts a powerful sedative influence. This manner of exhibiting ipecacuanha, either by the mouth or per anum, in dysentery, was, I believe, first employed by Mr. Twining, a practitioner in India, and recommended by him in the *Calcutta Transactions*. It does not operate by diaphoresis; and, indeed, I have little confidence in diaphoretics, even in acute dysentery, unless in combination with mercurials, upon the influence of which the profession justly places much reliance. As subsidiary to local and general bloodletting, mercury has a powerful influence in changing morbid into healthy action. When the dysenteric symptoms subside, and the hepatitis is formed, mercurials are invariably prescribed, in larger or smaller doses, according to the climate in which the disease occurs, and the particular views of the practitioner. In my own practice I have never carried the administration of mercurials to ptyalism, but have ordered them merely in alterative doses. Mercury was ordered in this case.

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## ON THE PRODUCTION OF OXALATE OF LIME IN THE SYSTEM.

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MUCH attention has of late years been devoted to the subject of oxalate of lime deposit in the urine, and practitioners have been led to regard its occurrence as generally connected with severe dyspepsia, or hypochondriac melancholy. Various hypotheses have in consequence been framed to explain the origin of oxalic acid in the animal economy, some writers considering it as a derivative from the urea, others as emanating from the uric acid.

According to Dr. Prout, "the presence of oxalic acid in the system, as far as the primary assimilating processes are concerned, arises from one of two causes, which, for want of a better name, we term *proximate* causes—viz., the non-assimilation of oxalic acid taken as food, and the mal-assimilation of saccharine aliments, and in some extreme cases, perhaps, of albuminous and oleaginous aliments."† The former condition applies to individuals in whom the converting function of the stomach is deficient in power; the latter,

to those in whom there is positive derangement of that function. Dr. Prout observes, further, that diet has great influence in exciting the oxalic diathesis. Now, while I agree with this eminent physician as to the fact of the non-assimilation of oxalic acid under particular circumstances, I believe that numerous examples are to be met with, where oxalate of lime is excreted simply in virtue of a morbid transformation implicating the effete organic elements of the mucous lining of the urinary passages, independently of any notable disorder in the stomach, and apparently uninfluenced by saccharine articles of diet. It is then not unfrequently associated with an excited or irritable state of the mucous membrane.

I take leave to submit to the profession a few cases illustrative of this view, together with an abstract of some recent researches by Dr. Schmidt, of Dorpat,\* which tend to elucidate this important and intricate subject.

A fine, healthy-looking youth, with florid complexion, aged fifteen, was admitted under me in May, 1846. He complained of pain, the moment of commencing to void urine, at the lower part of the abdomen and the extremity of the penis, attended with retraction of the testicles. The urine was pale and limpid, very acid, specific gravity 1.017. It contained the ordinary proportion of uric acid and of earthy phosphates. When examined by the microscope, the octahedral crystals of oxalate of lime, first accurately described by Dr. G. Bird, were perceptible. His appetite and digestion were excellent, and had never been otherwise. The bladder was carefully sounded, but no calculus could be detected. The pain at the extremity of the penis, and retraction of the testicles, were relieved by the introduction of the instrument, but not that of the abdomen. However, every symptom yielded, after three weeks' time, to the exhibition of half-ounce doses of solution of acetate of ammonia, taken in conjunction with ten grains of bicarbonate of potash twice daily, and five grains of compound gamboge pill on alternate nights. Here the effect of the treatment was to diminish the acidity of the urine, and remove the morbid sensibility of the mucous membrane.

A gentleman, aged fifty-six, of spare make, was placed under my care by his medical attendant, in October, 1846, on account of difficulty in passing urine. He suffered from heavy pain and sensation of tightness at the lower part of the abdomen, and in the situation of the neck of the bladder, together with occasional dragging and darting pain, shooting down the thigh in the track of the ischiatic nerve. The urine is discharged with hesitation, in a very small stream, which is at times spiral. He is obliged to get out of bed about twice every night, to make water; hence, on arising in the morning, he feels tired and weary in his limbs. The above ailments are of two years' standing. He was treated for stricture twenty-five years previously. His appetite and digestion have been always good. The urine passed at night was very acid, and contained crystals of oxalate of lime; that voided in the morning was neutral to test-paper, free from oxalate of lime, but on exposure to heat a white precipitate appeared, which vanished upon the addition of nitric acid. A No. 5 yellow wax bougie was cautiously introduced, and exhibited, when withdrawn, an annular indentation, demonstrative of coarctation, at a point corresponding to the junction of the bulbous and membranous portions of the urethra. This gentleman, having an insuperable objection to drugs, was enjoined merely to abstain from sugar, in any form, potatoes, salt, and pickled meats, and to drink only watery diluents.

By undergoing, during two months, the treatment of gradual dilatation, with white wax bougies, the urinary irritation subsided, the stream of urine attained its normal size, and he was enabled to take his usual walking exercise without being exhausted as formerly. Still, in spite of his attention to diet, his forbearance from saccharine aliments, oxalate of lime continued to be excreted in his evening urine.

In this case, the pain in the sciatic nerve may be referred to irritation of the vesical nerves, since both are given off from the sacral plexus, agreeably to the principle laid down by Sir Charles Bell—viz., "that irritation on the internal branch of a nerve, by disorder of function in the viscera, will be felt or attributed to the external branch of the same nerve." ("Practical Essays," p. 95.) The circumstance of the morning urine depositing phosphates, when heated, would seem to point to a cachectic tendency, not uncommon in persons worn by protracted suffering, referable to the urinary organs.

\* Remarks on the Dysentery and Hepatitis of India, p. 114.

† On the Nature and Treatment of Stomach and Urinary Diseases, p. 71.

\* On the occurrence of oxalate of lime in the simplest cell-plants, and in the secretion of mucous membranes. *Annalen der Chemie u. Pharmacie*. März, 1847, p. 288.

The occasional introduction of a bougie proves very soothing to some patients. It seems to act by blunting the augmented sensibility of the urethra. A gentleman, aged seventy-two, resident at Brighton, suffering from dull aching pain in loins, and frequent desire to make water, usually applied to me, when he happened to be in town, to have a bougie passed, as it uniformly gave him relief. His urine was always slightly serous, seldom above 1.020 in specific gravity, and exempt from oxalate of lime. My conviction was, that he had renal calculus, and such turned out to be the case. On examination after death, a jagged mulberry concretion was found in the kidney. Here, probably, the particles of oxalate of lime, instead of passing off in the urine, coalesced, by a species of molecular attraction, with those aggregated in the kidney, as will be explained in a subsequent part of this paper.

A gentleman, under forty, of robust make, consulted me upon the 18th of December, 1846. He complained of dull pain, extending across the sacral region, aggravated on any movement of the trunk of the body; of uneasiness in the perinæum; and of seizures of agonizing pain, assailing him five or six times in the course of a year, confined to a spot about five inches up the rectum, which he likened to that of being impaled. He felt also discomfort when passing urine, towards the neck of the bladder, and along the urethra; and was a good deal annoyed with pruritus of the anus. Had been afflicted in this manner for three years, but of late the symptoms became much more severe; he was, in consequence, losing flesh, and felt unequal to take exercise, or pursue his worldly avocations. His appetite and digestion were good, his bowels regular, tongue clean, pulse natural, but he slept badly. On examining the rectum, I could detect nothing beyond a slight enlargement of the right lobe of the prostate gland. On passing a No. 9 white wax bougie slowly and gently into the bladder, the urethra evinced extreme sensibility; considerable heat and smarting were experienced as it traversed the membranous and prostatic portions of that canal. Prior to 1837 he had gonorrhœa several times. The urine was of high specific gravity, and very acid; that voided in the evening contained octahedral crystals of oxalate of lime; not so that in the morning. There was no trace of albumen, but at times, lateritious sediment. He was restricted to a plain nutritious diet; prohibited the use of sugar, potatoes, fat meats, and fermented liquors. A variety of treatment was resorted to during the consecutive months, consisting of occasional counter-irritation, warm baths, the administration of alkaline bicarbonates, alternated with mineral acids and bitter tonics, alterative aperients, and daily ablution, together with friction of the surface of the body.

The result has been a great improvement, as regards all the symptoms; he has gained flesh, and can attend to business. The pain in the back was most materially relieved by the regular douche bath. I may observe, that the swelling of the prostate subsided in the course of three weeks by the introduction of ten grains of mercurial ointment into the rectum at bedtime by way of a suppository. Yet notwithstanding the general amelioration in point of health, the evening urine still contained oxalate of lime, while that of the morning exhibited no trace of this salt, though allowed to stand for twenty-four hours. On acidulating, however, a portion of the morning urine, apparently exempt from oxalate of lime, with acetic acid, and letting it stand a few days, fine octahedral crystals were seen by the microscope. This specimen of urine, when voided, was cloudy, from the presence of mucus. Here we have a palpable example of a man in the prime of life, in whom there was no evidence either of deficient power, or of perversion in the converting function of the stomach, labouring under obstinate oxaluria, nowise influenced by regimen or by abstinence from saccharine condiments, obviously connected with morbid irritability of the urinary mucous membrane and adjunct structures, the sequel possibly of bygone gonorrhœal inflammation.

In cases of the above description, the main indications are, to restore or maintain the equilibrium of health, and to allay irritation. Due attention ought to be had to the state of the skin, and excrementitious discharges. The patient should be as much in fresh, wholesome air, as possible, and restricted to a plain nourishing diet, consisting of the stronger farinaceous articles, as rice, semolina, with animal food once a day. His drink ought to be pure water, avoiding beer and other fermented liquors. Nothing is more prejudicial than beer in instances of urinary irritation. Mild doses of alkalies are serviceable by rendering the urine less acrid, and counteracting the tendency possibly of acidulous urine to liberate the oxalate of lime.

Dr. Schmidt sets out by demonstrating the presence of oxalate of lime in the simplest cell-plants. A quantity of yeast cells mixed with beer, were allowed to stand at a temperature of from 80° to 85° Fahr. After a few days the liquor turned sour, and there formed upon its surface a thick slimy layer, resembling the buffy coat of blood. This layer progressively increased in bulk, and on examining a portion of the muco-granular substance composing it, numerous obtuse octahedrons with a square base, of great beauty, were perceptible. They were about a hundredth of a line in diameter, and possessed all the chemical characters of oxalate of lime. Other crystalline particles were observed interspersed here and there, which proved to be bibasic phosphate of lime. The formation of the oxalate does not take place at the expense of the cell-membrane, but at that of the albuminate content of the cell. This being acted upon by the acid as it is slowly generated, permits the disengagement of the crystalline particles. The oxalate of lime, indeed, is to be regarded as an essential physiological component of the cells, preëxistent therein, and not a product of decomposition of any of their constituents. The following experiment is very conclusive:—Dissolve fresh, well-washed yeast-cells in dilute muriatic acid, and allow the solution to evaporate spontaneously. There is left a brownish membranaceous cake. In this oxalate of lime octahedrons, with a square base, may be discerned by the aid of the microscope. Both oxalate and phosphate of lime, therefore, are constant attendants of the cells in necessary causal connexion with their development, and representing stages or vehicles, so to speak, for the conversion of carbonic acid into hydrate of carbon, and of the ammoniacal saline matter into albuminate. Probably the former is the function of the oxalate; the latter, of the phosphate of lime. Dr. Schmidt is of opinion that oxalate of lime can get into the circulation, or exercise its functions only when dissolved in the cellular content, in a way quite analogous to that of the phosphates—namely, as an albuminate combination, (oxalate of lime albuminate.)

Blood-serum and white of egg contain a notable proportion of calcareous salts; yet although a solution of a neutral oxalic salt be added to these, no precipitate ensues—the liquor remains untroubled. Now unless this fact be taken into account, the assumption of an oxalic diathesis, or of the capability of assimilation of a calcareous salt by the intestine, is quite gratuitous.

In the animal system, oxalate of lime is, under ordinary circumstances, the evident product of a morbid transformation of the effete organic elements. Dr. Schmidt's own case shows from how simple a source it may arise. "A slight cold confined me some days to my room. Occupied with literary work, I spent three days exclusively at the writing-desk. My diet was purely animal, (milk, eggs, butcher-meat, a choppin of red wine.) The urine formed a copious sediment of uric acid crystals, oxalate of lime, and uric salts. On the third day, I experienced slight headach, (cephalea gastrica,) and a little heartburn. I then quitted the room, took a brisk walk, while the thermometer stood at 14° Fahr., and both the indigestion and uric acid deposits vanished, and never have troubled me since."\*

The secretion of oxalate of lime may be presumed to take place in the kidney, because mulberry concretions are frequently found in the pelvis of this viscus. But it is by no means established that its elimination is effected simultaneously, and by the same apparatus, as the normal constituents of the urine. On the contrary, it seems highly probable that merely the urea, uric acid, and the like, percolate the proper glandular structure of the kidney; while the oxalate of lime emanates from the mucous membranes of the uropoietic system, from the renal calices, renal pelvis, ureters—nay, even from the bladder. The following facts are adduced in corroboration of this view:—Morbid augmentation of the mucus, and also pus in the urine, are frequently associated with oxalate of lime sediments or concretions. Recent urine, or a solution of uric acid and hippuric acid in phosphate of soda, (Liebig's artificial urine,) on being decomposed, at a blood-heat, with an oxalic salt, affords a precipitate absolutely insoluble in either medium, however small the amount, however great the dilution. The liquid, transuding through the Malpighian tufts, has to permeate a portion of cells, ere it can reach the pyramids and renal pelvis; and no insoluble matter, however subtilely divided, can escape in this way. When mulberry calculi occur in the kidney, they occupy the pelvis and interstices of the calices. Hence the oxalate of lime would seem to be formed almost immediately upon the trickling of the urine from the papillæ. The impacted calculus determines, sooner or later, partial hæmorrhage through

\* Op. cit., p. 300.

mechanical irritation; indeed, hæmorrhage from the kidney is, according to Dr. Prout, "perhaps more frequently produced by an oxalate of lime than by any other form of concretion."\* For this reason, the innermost strata, or those nearest the nucleus, alternate with layers of modified colouring matter of the blood.

If a combination of albumen with oxalic acid, analogous to that with phosphoric acid, or with lime, be secreted by the glandular cells of the mucous membrane, the following will be the result:—At the instant of contact of these two secretions, the feeble combination of the oxalate-albuminate is decomposed by the counter-current issuing from the papillæ, (acidulous hippurate, urate, phosphate of soda, Liebig); oxalate of lime is separated, and incrusts the glandular cells. These get impermeable, lose their vitality, and becoming detached, cohere with the loose adjunct cells, and thus form small, irregular-pointed concretions. These minute bodies, agglutinated by clots of blood—the consequence of hæmorrhage, caused by irritation of the renal papillæ, and rendered slippery, glide into the pelvis of the kidney. Here they may coalesce with similar concrete particles, which have preceded or followed them, so as to form calculi, or slip into the bladder, and constitute the smooth, so-called hemp-seed stones. Most, if not all, concretions which determine hæmorrhage of the papillæ, are mechanically lodged in the pelvis of the kidney, (mulberry-stones.) Those, however, which are spherical-shaped, pass at once into the bladder, and as they are unproductive of hæmorrhage in that situation, exhibit only a faint, greenish-yellow tinge. When renal calculi, consisting of alternate layers of oxalate and carbonate of lime, are dissolved in acids, the cellular incrustation may be detected by the colour imparted by iodine; for the membrane of the original cell resists the action of the acid.†

A strong argument in support of the above views is derived from the fact of the occurrence of oxalate of lime in the secretion of other mucous membranes—namely, in that of the biliary passages, and in the physiologically allied system of the reproductive sphere.

If fresh ox-gall be allowed to stand for a while in a cylindrical glass vessel, a slimy flocculence subsides. This is composed of amorphous mucus, epithelial cylinders, ova and embryos of the distoma and ascaris—lastly, very fine oxalate of lime octahedrons with a square base. The gall of rabbits, dogs, and of a large pike, (*Esox lucius*), as representing graminivorous, omnivorous, and carnivorous animals, gave each the same result. The gall of the last afforded crystals of remarkable beauty, one-eightieth of a line in diameter. A peculiar diathesis would seem to concur to its production, influencing one animal more readily than another. Thus, the oxalate has been searched for in vain in the biliary sediment from a cat, and met with only once in that from the human subject, notwithstanding numerous examinations. Diet and manner of living did not seem at all essential conditions, at least in so far as the pike was concerned.

A question now arises: Is oxalate of lime a necessary constituent of bile (bilate of soda)—in other words, a secretion from the cells of the liver; or is it a mere concomitant thereof—a secretion from the mucous glands of the biliary passages? In the latter case it must be present in solution; but in fresh vesical mucus directly removed through a wound in the gall-bladder, no trace of crystals could be discovered: it must therefore occur as an albuminate of the nature above described. Again: Fresh ox-gall, digested with twice its volume of alcohol, in order to separate the mucus, filtered, and placed for some days in a cylindrical vessel, afforded no trace of sediment. The same filtrate, evaporated so as to dissipate the spirit, and then dissolved in water, became turbid after some time, but no octahedral crystals could be seen after the most minute microscopic research. Mucus, on the other

hand, wiped from the interior of the gall-bladder, left in water during a few days, yielded abundance of crystals possessing all the attributes of oxalate of lime. It is thus manifest that the oxalate of lime in the gall sediments is eliminated from the mucous glands of the mucous membrane of the biliary conduits, and not from the proper cells of the liver.

The final argument adduced by Dr. Schmidt in support of the analogy betwixt oxalate and phosphate of lime, in reference to the mode of diffusion (double albuminate) through the organism and the seat of secretion, (mucous membrane,) is the constant appearance of the former in the mucous membrane of the impregnated uterus. This phenomenon was first noticed in rabbits by Reichert, about the sixth day after impregnation. The quality of the food swallowed did not seem to make the least difference. The result was uniformly the same, whether the animal was fed upon grain exclusively, or upon cabbage-leaves, grass, and trefoil.

Bloomsbury-square, July, 1847.

## ON THE INFLUENCE OF THE NERVOUS CENTRES ON THE INTESTINES.

By DR. JULIUS BUDGE, of Bonn.

To the remarkable effects of the irritation of the spinal cord on the movements of the heart, mentioned in my article of last May, I will now add another example of the influence of the "centre" of the nervous system on the parts which are only involuntarily moved—namely, the intestines.

If, immediately after the death of a rabbit, the skull is opened in such a manner that the "medulla oblongata" and "cerebellum" can be well seen, then these parts, on being touched by wires communicating with the magneto-electric machine, the large intestines are forcibly moved, as long as the apparatus is applied. This effect can principally be seen on the "intestinum cæcum," which, soon after the opening of the body of the beast, ceases to be spontaneously moved. Sometimes the movement is so strong, that the excrements are emptied, when an opening is made in the intestine. The effect above mentioned is the same if, instead of the "medulla oblongata," the "cerebellum" is electrified, but the effect is not so strong; an effect, however, never appears, if, before the wires are applied, the "nervus vagus" is separated on both sides; and, lastly, the movement of the "intestinum cæcum" can also be produced, if both sides of the "nervus vagus" are electrified.

Bonn, 1847.

## ON THE LAWS OF DIETING.

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(Translated from Liebig's "Annalen der Chemie," March, 1847, by Mr. JOHN BROWN, for THE LANCET.)

THAT the amount of calorifiant food, as distinguished from the peculiarly nutritive, as Liebig has demonstrated, is greater than that required to supply the waste of the solid matter of the body, is proved by the following table, which shows the amount of the ultimate constituents of the food of a cow during one day:—

	Food.		Fæces.		Consumption.		Nutritive.		Calorifiant.
	lbs.		lbs.				lbs.		lbs.
Carbon .....	11.90	...	5.10	...	6.80	...	.828	...	5.972
Hydrogen ...	1.61	...	.62	...	.99	...	.109	...	.881
Nitrogen ...	.45	...	.20	...	.25	...	.250	...	—
Oxygen.....	10.74	...	4.12	...	6.62	...	.373	...	6.247
Ash .....	1.71	...	1.09	...	.62	...	—	...	—
	26.41		11.13		15.28		1.560		13.100

In this case the food used was grass.

By multiplying the quantity of nitrogen consumed by 6.25, we get 1.56lbs, which is the quantity destined for nutrition.

A regular system of diet would therefore require such tables for every condition of animals, so that there may be a relation between the wants of the system and the food. If this method of reasoning be correct, the relation between the nutritive and the calorifiant constituents of the food is nearly as 1 to 8½. By comparing this fact, which is independent of all supposition, with the difference in the food of mankind, it is probable that some light may be obtained upon the difference in the relative number of these constituents. Milk, for

\* Op. cit., p. 67.

† The "quadrate pyramidal" crystals in the Malpighian vessels of the caterpillar of the sphinx convolvuli are, according to Müller's description and figures, (Archiv., 1846, p. 44, fig. 31,) evidently oxalate of lime. They occur in the cavity of the follicles, exterior to the glandular cells, and must therefore have been separated in a fluid state from the cells, and originally concentrated or crystallized in the efferent ducts. The same observer detected amorphous molecules of uric salts, along with the octahedrons, in the Malpighian vessels of insects. The pathological secretion of vertebrate animals appears to be a constant normal excretion in insects, but possibly only in the larva state. The subject, however, requires further investigation.

The occurrence of uric salts within the glandular cells, as the cell content of finer molecules, is very interesting. The urine would seem to be secreted through shedding and bursting of a whole series of glandular cells, in the mode above assumed for the oxalate of lime on the mucous membrane of the urinary conduits in mammals. Should not the same thing apply to birds, in the kidneys of which the uric saline deposits have been found to inject the most delicate uriniferous tubules?