One venesection to the extent of fourteen or sixteen ounces practised at the commencement would have been preferable to the repeated draining by cupping. Peacock was cupped ten times, and four ounces may be taken (on the average) as the quantity drawn on each occasion, making altogether (independent of trickling) forty ounces, a quantity which I cannot consider as called for by the symptoms. Indeed, Carter himself shows that the pulse had been reduced to a feeble state than desirable, employing (on the 11th) the words, "the pulse has rather more force."

According to Coates, convulsions are rare. Carter says, that convulsions, distinct from those preceding death in the true delirium tremens, are infrequent, occurring about twelve times in one hundred cases, and he does not tell us whether they are a fatal symptom or not, neither whether they occur solely in the delirium ebriosum alone, or in the true delirium tremens also. I hope these points may be determined by the experience of those who may chance to see this paper.

From the cases related in it, I conclude a strong presumption is raised that epileptiform convulsions are not a fatal symptom when they occur in the delirium ebriosum, and are accompanied by a pulse, moderate in strength, and not exceeding 104 in frequency. Indeed, Blake says that the most favorable circumstances in the true delirium tremens are—1st, the disease not having occurred previously; 2ndly, the pulse being of good strength and not beating more than 100.

7, Delahay-street, Westminster,
Feb. 6, 1843.

ON THE PREVENTION

OF

PHOSPHATIC DEPOSITION IN THE ANIMAL ECONOMY.

By ALEXANDER URE, Esq.

Every medical man familiar with the treatment of urinary disorder must confess, that among the most puzzling cases he encounters are those characterised by a deposition of the earthy phosphates; and that while it is an easy matter to render acid urine alkaline, it is by no means so easy to render alkaline urine acid.

M. Rayer, in his recent elaborate work on Diseases of the Kidney, has given, under the head of "Néphrite Simple Chronique" (tom. I., p. 372), the reports of eight cases of individuals, in whom the urine was alkaline and depositing phosphates. Out of these eight we find no less than five in which the remedial means resorted to effected no change in the qualities of the urine; in one, great improvement ensued; two only were cured, each of whom was under thirty years of age.

In a paper of mine, published in vol. XXIV. of the "Medico-Chirurgical Transactions," it was stated that when benzoic acid or a benzoic salt is administered internally, hippuric acid is formed, and may be discovered in the urine. It was, moreover, suggested that the therapeutic application of the above fact might prove beneficial in the treatment of certain forms of gravel and in disordered conditions of the renal secretion connected with a gouty habit. Some interesting

particulars, in corroboration of these views, have been since recorded by Dr. Walker, of Huddersfield,* and by Mr. Soden of Bath.† These gentlemen, however, exhibited the benzoic acid in union with balsam of copaiba. The following case, which has been attentively watched along with me by my intelligent friend, Mr. Farquhar, of Albemarle-street, will, it is hoped, serve to illustrate the pure *dynamic* effects of the remedy in a clear manner:—

H. H., aged thirty-seven, of spare make and sedentary habits, consulted me on the 9th of May, 1842, relative to a disorder of the urinary secretion. He said that about ten months previously he noticed, for the first time, a whitish deposit in his water, which, ere long, concreted on the chamber-pot, forming a hard grey crust, most difficult to remove; the urine had a very offensive odor, and varied occasionally in appearance, presenting sometimes a greenish, at other times a brownish color; at the above date it was slightly opaque and of a pale yellow hue, emitting a pungent ammoniacal smell, alkaline to litmus, and effervescing briskly upon the addition of a few drops of hydrochloric acid; almost as soon as discharged it threw down a white flocculent sediment, consisting of phosphate and carbonate of lime; it did not afford any uric acid; its specific gravity was 1.023; it was voided without pain or difficulty, and in a full stream; there was little or no increase of the mucous secretion, and no albumen. The patient's appetite was good, his tongue clean, and he slept well; but he was pale, complaining of general lassitude and languor, and of a sense of weakness across the loins; his bowels were generally confined.

1000 grain measures of the above urine, evaporated to dryness by a water bath at a temperature not exceeding 160° Fah., left only thirty-six grains of dry extract, and exhaled, during the process, a great quantity of ammonia, as proved by a slip of moist red litmus paper held over the dish becoming instantaneously blue.

He was directed to take an aperient dose of rhubarb and ten grains of benzoic acid, twice in the day, and to live well, but plainly.

May 12. Has taken the medicine without suffering the slightest inconvenience. He says that the urine, within a few hours after the first dose, became clear, and ceased to deposit any chalky sediment. It is now natural in all respects; acid to litmus; specific gravity 1.022.

After six days longer he discontinued the use of the benzoic acid. Towards the end of the month the urine became again alkaline, and I was induced to try him with the usual routine of medicines recommended in cases of this description, in order to see whether the urine could be brought to a permanently normal state. He was accordingly directed to take nitric acid in full doses thrice a-day, and an opiate at night. These, after a sufficient trial, produced no change. Hydrochloric acid, sulphuric acid combined with sulphate of iron, bark, tartaric acid in conjunction with sal-ammoniac, were each in turn freely administered, but to no purpose, for the urine continued alkaline and loaded with white sabulous matter. He

* Provincial Medical Journal, Feb. 1842.

† Ibid, Aug., 1842.

eventually resumed taking the benzoic acid, and with immediate good effect. Professor Mitscherlich, of Berlin, visited London in October last, when I had the advantage of this distinguished chemist's inspecting the above patient's urine along with me, and verifying the remarkable change produced.

Dec. 1. The patient again applied to me on account of a return of the turbid alkaline urine. I found its specific gravity 1.024. Two ounces evaporated *in vacuo*, left twenty-eight grains of extract, consisting of animal matter, salts, with but little urea. Ordered to recommence the benzoic acid.

4. Urine is now natural; remaining limpid and acidulous after standing for twenty-four hours. The acid stain is permanent on litmus paper. Its specific gravity is 1.020. Two ounces yielded by evaporation forty-nine grains of extract.

Thus, after the administration of the benzoic acid, the urine, although of an inferior density, afforded nearly double the amount of solid residuum that it did previously.

11. A slight sediment has made its appearance in the urine, which proves upon microscopic examination to be crystals of ammoniaco-magnesian phosphate, unaccompanied by the amorphous phosphate or carbonate of lime. To suspend the use of the benzoic acid, and to take twenty minims of hydrochloric acid diluted with water thrice a-day.

25. Urine turbid, alkaline, effervescing briskly with nitric acid, notwithstanding he has been taking hydrochloric acid regularly during the last fortnight. The sediment consists chiefly of phosphate and carbonate of lime, and is deposited only from the urine secreted during the course of the night. To take eight grains of benzoic acid at bed-time and to discontinue the hydrochloric acid.

30. Urine transparent and acid, remaining so after the lapse of many hours. Specific gravity 1.018. It contains the natural proportion of phosphates and uric acid. On account of some uneasiness in the loins he was ordered to rub in the tartar emetic ointment.

January 12, 1843. The uneasiness formerly complained of is removed. He has ceased to take any benzoic acid for five days past. The urine is somewhat cloudy. At the suggestion of Dr. Prout I was led to prescribe for him the solution of acetate of ammonia in half ounce doses.

20. Urine still cloudy, notwithstanding the use of the spirit of Mindererus. In consequence of his suffering from some irritation within the chest, he was desired to employ the same counter-irritant salve, to take small doses of tartar emetic in solution thrice daily, and a dose of benzoic acid every night.

22. Feels much better in all respects; the pulmonary oppression is gone; urine is natural, and continues limpid and acid after several days repose.

It may be observed, in conclusion, that his general health and appearance are materially improved, and he is now enabled to check all tendency to calcareous urinary sediment by simply swallowing a few grains of benzoic acid at bed-time.

REMARKS.

It has appeared to me expedient to give the above case at some length, as it offers several highly instructive points for consideration. The subject is a man in the prime of life, stricken with slow consuming

disease; complaining of languor, lassitude, and progressively losing flesh and strength. His urine (and the urine generally) furnishes a good criterion of unhealthy action in the system; is alkaline, throwing down a white starch-like sediment. It is deficient in uric acid, while the greater portion of the urea is resolved into carbonate of ammonia. No other substance except the benzoic acid seemed capable of controlling the septic influence which led to these changes. Other vegetable acids were not tried, as they uniformly disorder the stomach, and mineral acids failed. The latter, indeed, according to Sir B. Brodie's experience, are much less influential in cases like the present, where the phosphate is deposited by the urine in the form of an impalpable powder, with little or no increase of the mucous secretion than in those in which the urine contains the triple phosphate.*

Benzoic acid, therefore, enables us to solve the hitherto embarrassing problem of rendering an alkaline urine acid at pleasure, and consequently of obviating the irritation which such urine occasions in the membranous surface with which it comes in contact; a species of irritation which opium is not unfrequently employed to allay.

The transition to the ammoniaco-magnesian phosphate is noted upon the 11th of December, 1842. This may be ascribed to some faulty assimilation in the first passages, as it yielded readily to the exhibition of another acid—namely, the hydrochloric, which did not affect the former deposit. Thus a reflex light, so to speak, is often thrown upon the phenomena of disease, from carefully studying the action of remedies. I may here point attention to the fact, that I have observed a copious formation of crystals of the above triple phosphate in urine after a repast of *sour-kraut*; a circumstance, by the way, which may perhaps account for the great immunity of the Germans, who partake freely of that food, from uric acid calculus.

Not only benzoic, but likewise cinnamic acid, is transformed by passing through the system into hippuric acid, as was established by me last spring.† To detect the free hippuric acid after the administration of one or other of these acids, it is merely requisite to inspissate a portion of urine by means of a steam-bath, to boil the resulting extract with alcohol *in vacuo*, and allow a little of the clear supernatant liquid to evaporate spontaneously upon a slip of glass. In the course of some hours, characteristic crystals of hippuric acid—namely, quadrangular prisms with dihedral summits may be distinguished with the microscope. This agrees with the recent researches of Pelouze, who has shown that urea may be present along with lactic acid or hippuric acid, without entering into chemical combination with either of them;‡ thus demonstrating the fallacy of all the theories based upon the supposition of the existence of lactate or hippurate of urea.

In order to ascertain the solvent power of urine containing hippuric acid upon phosphate of lime, the following experiments were instituted:—A quantity

* Lectures on Diseases of the Urinary Organs, p. 220.

† Pharmaceutical Journal and Transactions, June, 1842.

‡ Annales de Chimie. September, 1842, p. 65.

of subphosphate of lime was separated from fresh filtered urine by means of pure caustic ammonia in a glass vessel excluded from access of air. The precipitate was well washed with distilled water and dried. A subphosphate was in this way procured, identical with that which forms the various deposits and concretions in the human body. A certain measure of the said urine, having a specific gravity of 1.025, was allowed to digest at a blood-heat along with a given weight of the above subphosphate. After three quarters of an hour had elapsed it was saturated with caustic ammonia, and thereby yielded more than double the amount of subphosphate of lime, which natural urine of the same specific gravity contains, according to the observations of Cruickshank.

Both the prepared subphosphate and the carbonate of lime are promptly taken up by a warm aqueous solution of hippuric acid; which may thus, independently of its antiseptic agency, serve to hold dissolved any excess of these inorganic matters. Human urinary calculi occasionally consist of one or both of them. Frommherz (Jahrb. der Chemie u. Phys. XVI., 329) has given the details of the analysis of a stone from the human bladder, composed of 90.673 per cent. of carbonate of lime, 2.966 of phosphate of lime, 4.015 of albumen and coloring matter; the nucleus being a particle of quartz. Bergemann (Poggend. Annalen XIX., 558) examined a human urinary calculus, of which the main constituent was carbonate of lime. Winkler (Geiger's Mag. XXI., 253), on the other hand, met with a calculus containing no less than 87.627 of phosphate of lime. A prostatic concretion examined by M. Barruel (Journ. de Chimie Med. VI., 12), was composed of 80 per cent. of phosphate and carbonate of lime, and 20 per cent. of a substance perfectly resembling coagulated albumen. Indeed I am disposed to believe with Dr. Yelloly, that phosphate of lime is seldom found in animal concretions uncombined with carbonate of lime (Phil. Trans., 1829, p. 79).

Phosphatic depositions are frequently observed in conjunction with gouty affections. Hippocrates says, that a thick urine which forms a whitish sediment, *παχυ δε ουρον λευκην υποστασιν εχον*, oft betrays pains in the joints (Prædict. lib. II., Cap. 10, n. 7). A remarkable case is collated by Haller (Disp. Pract. tom. VIII., p. 795), "De materiâ calcareâ post diurnam arthritidem per vesicam urinariam eductâ." "I know a gouty subject," says Naumann (Handbuck der Med. Klin. tom. VI., 398), "who suffers from chronic catarrh of the bladder. From time to time the urine becomes milky, and throws down a quantity of muco-albuminous matter mixed with phosphate of lime." M. Civiale, a deservedly high authority in questions of this kind, remarks (Du Traitement Médical et Preservatif de la Pierre, p. 65), "chez les personnes atteintes depuis longtemps de la goutte et déjà épuisées par les souffrances, la gravelle qui survient ou qui continue est plus spécialement phosphatique." "I know one person (Otto by South, p. 103) in whom, during an atonic attack of gout, the whole mouth, throat, and gullet were largely covered with a whitish mucus, which, when dried on blotting paper, left behind a large quantity of phosphate of lime." Tiedemann found white, stone-like, roundish concretions, principally consisting of phosphate of lime, in

most of the muscles, especially in those of the extremities of a gouty subject (Op. cit., p. 252). It is, moreover, well ascertained that the calcareous incrustations which are met with between the serous and fibrous coats of arteries are frequent in the gouty, and in many instances tophaceous concretions contain no urate of soda but phosphate of lime (John, in Meckel's Archiv. für die Physiologie, vol. I., part 4, p. 513).*

Hence it appears probable, that in many such cases the calcareous deposition is to be referred to a debilitating and septic influence acting upon the system at large. To counteract which it behoves the medical practitioner to advise such hygienic and therapeutic means as will maintain that equilibrium of function which constitutes health. A strong argument in favor of the antiseptic power of benzoic acid, or rather of hippuric acid, is deduced from the fact that the urinary secretion, a secretion above all others prone to rapid spontaneous putrefaction, remains untainted for days, and sometimes even weeks, when this acid is one of its component parts.

13, Charlotte-street, Bedford-square,
January 31, 1843.

WOUND OF THE ABDOMEN, WITH PROTRUSION OF THE INTESTINE.

TO THE EDITORS OF THE PROVINCIAL MEDICAL JOURNAL.

GENTLEMEN,—If you think the following case worthy of publication, I shall feel obliged by your inserting it in your Journal.

I remain, Gentlemen,

Your obedient servant,

J. C. JERRARD.

Honiton, February 4, 1843.

Caroline Jummerhays, aged eleven years, received a wound from the point of a scythe in June last. The child was running at play, and fell as she passed a

* Albumen is more or less intimately connected with most of these deposits. It has a great affinity for the phosphate of lime in the degree of saturation which characterises the phosphate as bone-earth; and combines with it in variable proportions, forming compounds insoluble in water. Some chemists have found from 8 to 9 per cent. of phosphate in the albumen of the serum of blood (Berzelius, Traité de Chimie, tom. III., p. 516, Bruxelles, 1830). In order to determine the action of hippuric acid upon an insoluble compound of this nature, the following line of investigation was adopted:—To a portion of the filtered white of egg diffused through water, a few drops of caustic ammonia, and then a little phosphate of ammonia were added; into the mixture a small quantity of a solution of chloride of calcium was slowly dropped, as recommended by Berzelius. The resulting precipitate being well washed and dried at a low temperature, appeared as a semitransparent, horny-looking substance, composed of 52 per cent. of bone-earth and 48 of albumen. A small quantity of this being treated with boiling distilled water, formed a kind of coagulum, and upon testing the water afterwards for lime, not a trace could be detected. On adding, however, a little hippuric acid to the water, and allowing it to digest at a moderate warmth along with the albuminous compound, the coagulum ere long broke down, a portion of the albumen seemed to dissolve, as did the phosphate of lime, for a copious white cloud ensued upon the addition to the filtered liquor of a solution of oxalate of ammonia. The presence of phosphoric acid was proved by nitrate of silver.