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ISAACS (C.E.)

REMARKS
UPON
CHYLOUS, OR MILKY URINE;

WITH AN ACCOUNT OF TWO CASES OF THAT DISEASE.

BY C. E. ISAACS, M.D.,

One of the Surgeons of the Brooklyn City Hospital, Consulting Surgeon to the King's County Hospital, and to the Seamen's Retreat, Staten Island, etc.

READ BEFORE THE NEW YORK ACADEMY OF MEDICINE, JUNE 15TH, 1859.

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I HAVE been induced to submit to the profession, the following remarks, in consequence of the great rarity of this disease, and its doubtful and unsettled pathology; and with the hope that the facts here recorded (some of which it is believed are new), may throw some light upon a subject which, at present, is involved in great obscurity.

Both the cases about to be described, occurred at the Seamen's Retreat, Staten Island, and were under the care of Dr. T. C. MOFFAT, Chief Physician of that Institution, who most carefully noticed the symptoms, and very kindly afforded me every facility of investigation, and all the assistance in his power.

I beg leave here to return to him my sincere thanks, and also to his assistants, Dr. William R. Robinson and Dr. I. M. Forshee, for their exertions in obtaining for me many interesting facts relative to the cases concerned.

Peter Lopez, æt. 26, born in Spain, was admitted into the Seamen's Retreat, Staten Island, Nov. 13th, 1858, for an abscess of the scrotum. He stated, that about three years ago, while in Havana, he noticed that his urine was of the color of milk. He was at that time, as he believed,

in perfect health. His urine, then, was only occasionally milky. Sometimes it would not be so for a week or two, and then would become milky for many days. He now observes, that the urine voided a short time after eating is always milky. Sometimes he suffers from retention, for a few hours, and then, when the urine starts, a long, cylindrical, fibrinous coagulum will come out first, with great force, and then the milky fluid escapes freely. He says he has been quite well, and able to work all the while, since he first noticed this peculiar appearance of the urine. He has had both gonorrhœa and syphilis, and has taken large quantities of the iodide of potassium during the last three years. He has also been profusely salivated. His general health at present does not seem to be much impaired; he eats and sleeps well. For a short time before he noticed the appearance of the milky urine, he suffered from pain in the lumbar region, which continued until two months ago. He thinks that he has lost flesh, to some extent, and says that he easily gets tired in ascending the stairs. His urine does not change on standing, and always coagulates with heat and nitric acid. As a general rule, that which he passes first in the morning is clear, and that which he voids after breakfast is milky. The quantity passed in the twenty-four hours is normal.

On the 11th of December, I examined a specimen of this man's urine.

This urine had the precise color of milk. The odor was peculiar, and resembled that of moist clay. Specific gravity 1012—acid reaction; contained no coagula of fibrin; coagulated by heat, nitric acid, and alcohol. A drop placed under the microscope, exhibited an exceedingly fine molecular arrangement. A quantity of this urine, agitated in a vial, with sulphuric ether, instantly became divided into two distinct portions. The upper layer was composed of the ether, which was now of a deep yellow color. The inferior layer was of a slightly brownish-yellow color, and semi-transparent, like clarified horn. This consisted of albumen. The upper layer, allowed to evaporate, left a copious deposit of

oil—thus proving that the milk-white color of the urine was owing to an intimate mixture of oily matter with albumen, forming, indeed, a kind of emulsion.

This was further demonstrated, by mixing a portion of the semi-transparent, horn-like colored albumen with a much smaller quantity of sweet oil, and agitating the mixture, which soon became of a milk-white color.

The ethereal solution, evaporated upon glass, showed, under the microscope, beautiful crystals of the neutral triple phosphate. The oil, which was left by evaporation of this ethereal solution, exhibited, under the microscope, crystals of margarine—a few well filled and many shrivelled fat vesicles. Chloroform, agitated with a portion of this urine, and then allowed to rest, was seen as a deep yellow layer, containing the oily matter, and which floated on the surface of the albumen, which appeared beneath it as a snow-white mass. Alcohol instantly precipitated the albumen, also of a snow-white color.

A small quantity of the urine was evaporated to dryness in a porcelain capsule. The residuum was then mixed with distilled water, so as to form a very moist paste; to this about six times the amount of alcohol, in bulk, was added. This mixture was then very gently heated over a spirit lamp, for a few moments, and after two hours standing was then filtered. The filtered solution was slowly evaporated to one-fourth its bulk. A drop of this solution was then evaporated on a glass slide, and placed under the microscope, when imperfect crystals of urea were observed, with those of chloride of sodium. Another drop of this solution, mixed with nitric acid and evaporated, gave crystals of nitrate of urea; with oxalic acid, the solution afforded crystals of oxalate of urea. To a small quantity of the solution, nitric acid was added; this was allowed to stand for thirty-six hours; a few reddish granules (no crystals) were deposited at the bottom of the vessel. These were placed on a glass slide, and heated with a few drops of nitric acid, when a reddish-pink color was produced, which changed to a beautiful reddish-purple on being held over the vapor of ammonia (purpurate of ammo-

nia). Ammonia, added to another portion of the filtered solution, caused a deposit of foliaceous (basic) crystals of the triple phosphate. These having been removed by filtration, lime water was added to the solution; phosphate of lime was then precipitated, in a finely granular, or amorphous form. A part of the dried residuum, mixed with hot alcohol, filtered and placed on glass and evaporated, gave crystals of hydrochlorate of ammonia.

Sulphuric acid was demonstrated to exist in this urine by adding to the filtered solution, first a few drops of nitric acid, and then a solution of chloride of barium, which threw down an insoluble precipitate of sulphate of baryta. Hydrochloric acid was also shown, by first adding a very small quantity of nitric acid and afterward a solution of nitrate of silver, when a white, curdy precipitate was thrown down of chloride of silver.

Acetic acid did not coagulate this milky urine, while it instantly coagulated milk, separating the casein. This urine contained no red globules, nor could any tube casts be detected, after the most careful and repeated examinations. In conclusion, then, chemical tests and microscopical examinations conclusively demonstrated, in this urine, the existence of urea, lithic acid, chloride of sodium, hydrochlorate of ammonia, sulphuric acid, hydrochloric acid, the triple phosphates of ammonia and magnesia and the phosphate of lime—in a word, the principal normal constituents of the urine, and it is probable, that *all* of them existed in this fluid. In addition, this urine contained oil and albumen (and some times fibrin), and it was conclusively demonstrated, *that the peculiar milky appearance of the urine was owing to the intimate combination of these two substances, forming, indeed, a kind of emulsion.* I examined several specimens of this man's urine, at different times, but always obtained the same results. Unfortunately, he was under observation in the hospital only about six weeks, having been sent home, by order of the Spanish consul. For a fortnight, he took gallic acid, \mathfrak{Dj} . to \mathfrak{zss} . ter in die, but without marked influence upon the condition of his urine.

[A specimen of the urine of Lopez was here exhibited to the Academy].

George Barrett, æt. 23, a native of Santa Cruz, of rather thin, spare habit, ordinary weight, about 138 or 140 lbs., a sailor before the mast $5\frac{1}{2}$ years, had usually good health until October, 1855. At this time, he was employed as a laborer, on board the brig Competitor, for five days, *taking in a cargo of spirits of turpentine*. At the end of this time, he was seized with a severe attack of *Hematuria*, and was admitted into the hospital, Seamen's Retreat, Staten Island. He was under treatment twelve days, and discharged cured.

Since then, has been troubled with attacks of intermittent fever, but has remained free from all derangement of the urinary organs, until the time specified below. He went to sea, and arrived in the port of New York in the ship Juno, from Sidney, New South Wales; the voyage occupied four months. While in Sidney, was under treatment in the infirmary, for periosteal swelling of the tibia, and took large quantities of iodide of potassium, and cream of tartar. Ten weeks before sailing, he experienced a constant desire to urinate, and noticed that small clots of blood would at times interrupt the passage of the urine, which was of natural color. *Ten days after sailing, he observed that his urine resembled milk*, and his feet began to swell. The captain regarded it as scurvy, and prohibited the use of salt meat. He had two chills on the voyage. He took some pills from the captain, which made his mouth sore. He now voided urine about 18 or 20 times in the twenty-four hours. He entered the Seamen's Retreat on the 24th of August last, complaining of swelling and pain in the knee, and some periostitis of the tibia. He had a wearied and haggard look. There was some dull pain in the loins. His urinary troubles, however, were not mentioned by him, nor noticed by his attendants. He took iodide of potassium, and had dry cupping and liniments applied to the lumbar region. The first specimen of urine which I examined was brought to me by the patient himself, on the 8th of

September. It was of a milky color, odor of aluminous earth. He made some urine, in my presence, of a light, yellowish, smoky color. It became like solidified jelly, or blanc-mange, in five minutes after it had been voided. I noticed at the time of passing urine, that several lumps and strings of fibrin, escaped with force from the urethra. Some of these were yellow, some of a reddish color, of various sizes, from that of a pea to a large pigeon's egg—all contained, within their substance, myriads of the red globules of the blood. Examined under the microscope, these masses consisted of minute threads, or filaments, crossing each other in different directions, and were evidently composed of fibrin. As previously stated, this yellow, smoky urine rapidly became solid, assuming the form of the vessel into which it had been voided; this clot soon contracted, gradually becoming much smaller and separating, and as it were, squeezing out the fluid portion, which was then of a yellowish, white color.

A thin red layer slowly formed at the bottom of the vessel, which was composed of the red globules of the blood. I may here state, that no tube casts were ever detected in any specimen of his urine. This urine was passed before me by the patient at 12 m. The milky urine, which he brought to me in a bottle, was voided about an hour and a half after breakfast. I examined it with the greatest care—as I also did subsequently several specimens of his urine, passed at various times, and occasionally in my presence. The greatest care and caution were taken by Dr. Moffat and myself, to avoid all sources of deception and error.

This urine was of a milk-white color, of the odor of aluminous earth. It had assumed the shape of the vessel in which it was contained. A portion of the contracted clot, or rather the solid part, and which much resembled blanc-mange, was placed under the microscope, and found to consist of minute threads or filaments, crossing each other in various directions. The specific gravity of the fluid portion was 1010—a drop of this under the microscope, exhibited myriads of molecules, in active motion; but no oil

globules. This fluid portion coagulated by nitric acid; *but not by heat*. It was not perceptibly changed by acetic acid. By the application of various tests and processes, similar to those used in the case of Lopez, I ascertained that the urine contained only a very small portion of urea and of lithic acid—while the other constituents of this secretion seemed to exist in their normal proportion. By the mixture of sulphuric ether with the milky fluid, the oil was separated, and the albumen deprived of its color—exactly as in the urine of Lopez. This fluid portion, on standing for some hours, deposited a thin layer of blood globules at the bottom of the vessel.

Subsequent examinations of Barrett's urine gave similar results to that just stated—only that in about four or five weeks afterward, the urine coagulated, both by heat and nitric acid, and continued to do so until the time of his death.

It may here be mentioned, that during the course of treatment, the urine was not influenced, either in its quantity or quality, by either an exclusive animal, or a vegetable diet. The same remark can also be made, as to the effect of exercise or repose, neither of which seemed to exert any influence in this respect. About the middle of September, he took ℥j. gallic acid, ter in die, gradually increased to ℥ij.; continued to take this remedy two weeks, without any benefit; dry cupping with rubefacients daily to the loins. On the 24th September, Dr. Moffat writes: "Since you were here, I have caused Barrett to void his urine in bottles, three times daily; that passed on rising differs from the other specimens only in color. It is darker, and seems to contain more blood. It becomes of the same jelly-like consistence, and on the addition of nitric acid to a portion just voided, flakes are thrown down, reacting like albumen. That voided in the middle of the day and at night is like what you have often seen (smoky yellow); only I have noticed, that the last voided on going to bed, retained its fluidity, and only a small portion became as it were saponified." He has been living chiefly on animal diet (beef steaks, mutton

chops, etc.), which he relishes and appears to digest well. I tried the effect of the hot-air bath twice, but as it only seemed to weaken him, without producing any benefit I did not use it again. He does not seem to be losing flesh, nor is there any improvement. Tannin was prescribed, on the 5th of October, 10 grains three times a day, gradually increased. In the early part of November, gave tannin and alum, of each 15 grains, *ter in die*, and gradually increased to two scruples, and finally one drachm of the mixture, three times a day, was given for four weeks, without any benefit. On the 8th of October, Barrett came to see me, bringing with him a bottle of milky urine. He also made some, in my presence, which was of a yellowish-white color—lumps and strings of fibrin passed out of the urethra. This urine coagulated in ten minutes. It resembled very closely that which he had previously passed before me.

Barret also brought with him a letter from Dr. Moffat, in which he stated that "the quantity of urine now passed by B. amounts to a gallon per day; also, that he had tried the effect of various kinds of diet, but did not find that they materially influenced the quality of the urine." The effect of exercise had been carefully noticed, the urine observed before rising, also after lying in bed for many hours, also after walking for a considerable time; but the conclusion of these observations was, that neither exercise, nor the opposite condition of absolute repose, seemed to exert much influence upon the condition of the urine. On the 27th of October, Dr. Moffat writes: "I can perceive but little change in the patient. His appetite is excellent, the urine remains unchanged in its character."

On the 21st December, all remedies were suspended, and good diet only given; beefsteaks, chops, oysters, milk, eggs, porter, etc., etc. "His urine now no longer coagulates on standing, as at first, but remains fluid; neither is it so milky or bloody in appearance as formerly. He weighs to-day precisely what he did when he came here, viz., 138 pounds." On the 29th December, Dr. Moffat brought me a specimen

of the patient's urine, voided after thirty hours' fasting. It was of a light yellowish color, with a very slight coagulum. At the bottom, was a thin layer of red globules. This urine coagulated by heat and nitric acid. Dr. M. says, "B. has suffered for several weeks past from *headache*, which is now constant, and very distressing. He has no appetite, but great thirst; has eaten nothing for thirty hours; his strength is rapidly declining."

The urine has now entirely lost all its milky appearance. From this time, his symptoms became much more unfavorable. Chills occurred, followed by fever and exhausting sweats. The headache increased in intensity; nothing relieved it; his appetite entirely failed; he became partially delirious; his look was wild and staring; great prostration of strength ensued, and on the 10th of January, 1859, he expired.

[Two specimens of the urine of Barrett (one having been preserved in alcohol and the other in chloroform) were here exhibited to the Academy.]

Post mortem, thirty-six hours after death; thermometer, three degrees below zero. Present, Dr. Moffat, Dr. Robinson, Dr. Forshee, and myself. The general appearance of the body was not remarkable, although there seemed to be some emaciation. Both lungs, from their apices to the inferior surface of the lower lobes, were studded equally, and throughout their substance, with millions of miliary tubercles, from the size of a grain of sand to that of a mustard or hemp seed. Under the costal pleuræ, they were also in countless numbers. *He had never complained of cough or pain in the chest.* The heart was healthy; the stomach presented nothing remarkable, either exteriorly or on its mucous surface; the mesenteric glands not enlarged, but contained small deposits of yellow tubercular matter in their interior; the liver, spleen, and intestines apparently healthy. There were three tubercles, about the size of a buck-shot, in the substance of the prostate gland.

Kidneys.—These organs were examined with very great care.

Right Kidney.—Length, 5 inches; width, $2\frac{1}{2}$ inches; thickness, $1\frac{5}{8}$ inches; weight, 5 ounces.

Left Kidney.—Length, $5\frac{1}{4}$ inches; width, $2\frac{1}{4}$ inches; thickness, $1\frac{1}{4}$ inches; weight, $5\frac{1}{2}$ ounces.

The capsule was easily stripped from the surface of the kidney, without tearing its substance. The surface was smooth, and in color, consistence, vascularity, etc., appeared healthy. There were about fifteen or twenty yellow tubercles, of the size of a grain of wheat and of a small pea scattered through the substance of each organ. There was, however, no reason to believe that they had interfered, except, perhaps, to a very trifling extent, with the functions of the kidney. On splitting open the organ, the division between the cortical and pyramidal portions was beautifully and distinctly marked. The interior of the kidney, as seen by the naked eye, appeared perfectly healthy. I made a most careful and prolonged microscopical examination of the organs, using different powers, and occupying four days' time. Very many thin slices of the cortical and pyramidal portions of the kidney, made with Valentin's knife, also fine scrapings of the organ, the epithelium of the straight and convoluted tubes, the malpighian bodies, the vessels, and the fibrous matrix, were all most carefully and repeatedly examined, in their natural condition, and also while acted on by various chemical reagents, and were all, apparently, in the most healthy condition. I noticed some oil globules in the epithelium of the convoluted tubes, but these were not so numerous as to be very remarkable. On making thin sections of the apices of the pyramids, some of the straight tubes were filled with a brownish-yellow colored substance (as seen by reflected light), but appearing black when viewed by transmitted light. These tubes were doubtless filled with some of the same fibrinous and albuminous material which had passed off in the urine. The calices and pelvis of the kidney contained numerous small lumps or masses of fibrin, which inclosed within their substance very many

red globules of the blood. Some of these masses adhered strongly to the apices of the pyramids. I requested my friend, Dr. J. C. Dalton, the learned and distinguished Professor of Physiology and Pathology in the College of Physicians and Surgeons, New York, to examine a piece of the kidney which I sent him. He very kindly complied with my request. He writes: "In the cortical substance, I found the epithelium, in many instances, containing minute fat globules, although not in excessive quantity. The glomeruli looked natural. In the medullary portion, both the tubes and their epithelium had an extremely healthy aspect. The epithelium, in the part which I examined, being particularly free from fatty or granular deposit of any kind," etc.

In conclusion, it may be stated, *that the structure of the kidney was decidedly healthy*, and that no morbid condition could be detected in its structure, with the exception of a very few small and scattered tubercles, which did not apparently interfere with its function. I may here remark, that so far as I am aware, this is the only instance in which a complete and microscopical examination of the kidney has been made in any case of chylous urine.

It is, perhaps, of some interest to consider from what portion of the kidney the hemorrhage proceeded. It has been stated that, in the case of Barrett, the straight tubes in the lower portion of the pyramids were filled with the albumen and oily matter, and that small clots of blood adhered to the apices of the pyramids. The blood globules could only have escaped into the convoluted tubes by actual rupture of the malpighian bodies; or, otherwise, from the venous plexus; the tubes either of the cortical or pyramidal portion, or of both, having been also ruptured. It is worthy of remark that, notwithstanding the actual rupture of capillaries which must have been of such frequent and, indeed, of almost constant occurrence, no trace of such ruptured vessels could be detected, upon the most careful and repeated microscopical examination of the kidney. Such result is, however, not so surprising, when we reflect that often after hemorrhage from the stomach, intestines, and other organs, we

cannot always detect the ruptured vessels from which the hemorrhage proceeded, either by the unaided eye or by the microscope.

As has already been stated, this disease is exceedingly rare. Dr. Watson, in his "Practice of Physic," says he has never met with a case. I have conversed with many of our oldest practitioners, in the large cities, who made the same remark. Dr. Prout appears to have given a more complete account of this disease than any other writer. He had seen thirteen cases; of these, five were males and eight females. In three cases, the disease occurred before puberty; one was an infant eighteen months old. Of the thirteen cases, seven occurred in natives or residents of hot climates, where it is said not to be very infrequent. The general health suffered less than might have been expected. Two of the females, while laboring under this affection in a marked degree, became pregnant, and brought forth healthy children. Hence the disease does not interfere with the generative function, or with the secretion or qualities of the milk. Dr. Prout also observes: "Of the thirteen cases, four are now dead; of the remainder, four are alive and well; of the others, I can give no account. Two of the fatal cases died from inflammation of the abdominal viscera, one from emaciation and prostration, *having labored under the disease twenty years*. The fourth died after many years duration of the complaint—cause unknown." I am aware of only one *post mortem* of this disease, and the account of which is given by Dr. Prout. It was in a girl fifteen years of age. He remarks: "The disease is not necessarily connected with organic lesion of the kidney; at least, organic lesion appreciable by the senses. The kidney, which was found to be perfectly healthy, was exhibited at my lectures, in 1831."

It does not appear that he made any microscopical examination of the kidney. Dr. Elliotson, in the "Medical Times and Gazette," of London, relates three cases of this disease.

Case 1.—Urine resembled chyle, contained abundance of urea; chylous character of urine less in that made before breakfast. The patient was a female, *æt.* 30; the disease

lasted twenty years, and she finally died emaciated. For several years during its existence, her general health was good.

Case 2.—Man, æt. 32 years; had labored under the disease nine months; urine passed before breakfast was natural; after meals, it was milky and coagulated in half an hour. He had become thinner and weaker, and had pain in the situation of the kidneys.

Case 3, was that of a lady, æt. 64. *Has had the disease thirty-eight years*, with intermissions of months and years, during which the urine was natural.

Dr. Bence Jones, in the "Medical Times and Gazette," Nov., 1853, reports four cases of this disease. In one of these cases, *the patient had passed milky urine for twenty-five years*, yet had long ceased from trying to obtain medical relief. He remarks, that "although the *fat* passes off in the urine after food is taken, yet the albumen, fibrin, and blood globules are thrown out before any food has been taken. During rest, the albumen is not excreted, and does not appear in quantity in the urine, even after food is taken, provided there is perfect rest. A short time after rising, the urine may coagulate spontaneously, although no fat is present in perceptible quantity; and this may happen previous to any food.

"Though the urine made just before and a short time after bleeding, was as milky as usual, in the afternoon, yet the serum of the blood was not milky. It did not contain a larger quantity of fat than healthy blood does."

It will be observed, on the other hand, that in the case of Barrett, the urine was not apparently changed either by exercise or by absolute repose.

A very interesting case of chylous urine is related by Dr. Golding Bird. The patient was a very fat woman, "who expressed herself as quite well, with regard to her general health." She had been accustomed for several years to pass milky urine, especially during part of her pregnancies. The appearance of the urine was exceedingly capricious, sometimes being constant for weeks together, and then disappear-

ing for some time. It bore no evident relation to the quality, quantity, or hours of her meals, nor to the periods of menstruation. *The only general rule she observed was, that it most frequently appeared when she first voided urine on rising from her bed.* Hence she fancied it was produced by lying on her back all night. Dr. Bird drew off by a catheter, some strongly-marked milky urine. This was at 2 P.M. She had not taken any food since breakfast, nor had she risen from her bed, except to pass water, which was free from any milky appearance. It would be difficult to believe that the fatty matter, which occasioned the milky appearance of the urine, was in this instance derived from the chyle.

A specimen of chylous urine was presented to the "New York Pathological Society, by Professor J. T. Metcalfe, and the case was reported in the September number of the New York Journal," for 1856. "The patient was a young unmarried lady, æt. 26, native of Cuba, of nervous temperament, having previously enjoyed good health, began to be dyspeptic three years ago. From time to time, she complained of pain in the lumbar region; and on several occasions passed bloody urine. Two years ago, for a short time, had been troubled with swelled feet. No disturbance of the menstrual function, except that the catamenia had come on three or four days later than the regular time, and sometimes at irregular intervals. Three months before coming under observation, she noticed that her urine became milky in color, as it was passed. No diminution of the normal quantity was observed. It had a peculiar odor, an acid reaction, s. g. 1019. On standing, it deposited a copious sediment, the upper part being somewhat turbid. The sediment was composed of urate of ammonia, and a very unusual abundance of renal and vesical epithelium. Heat and nitric acid gave a copious precipitate of albumen.

Sulphuric æther, agitated with the urine, removes the fat, which collects in quite a thick layer between the two fluids. Chloroform affects it in a similar manner. On microscopic examination, no tube casts are to be found. From time to

time, small whitish clots pass with the urine from the bladder. These were found to consist of an amorphous stroma, entangling multitudes of oil globules and epithelial scales. The patient was treated by tonics and generous diet, and in the course of two months was quite well.

Dr. Metcalf stated, that he had been informed by Dr. Brown Séquard, that this disease was not uncommon in Cuba, and other places within the tropics, especially in young persons.

In the Archives of Medicine (by Professor Lionel Beale of London), No. 1, page 10, Dr. Goodwin of Norwich states that he has seen good results from the use of gallic acid, which was continued eight months; while taking it the milky appearance disappeared, but returned again four or five days after the medicine was stopped. A case of chylous urine, in a boy 8 years old, is related by Dr. I. P. Bramwell of Perth, in the "*Edinburgh Med. Journal*," Feb. 1858. The urine was quite milky, but did not coagulate on standing. It contained uric acid crystals and epithelium from the bladder, sulphates, and chlorides.

In a case related, in the same work, by Mr. Cubit of Stroud, it was found that the compound spirits of lavender, used in the first stages of the complaint, would clear the urine, but did not improve the general health. I may here mention, that the foregoing cases are all which I have been able to find in the medical works and journals to which I could obtain access, and which seemed to possess any especial interest.

Causes.—Exposure to cold, especially when the body is heated, has apparently excited the complaint. It has been attributed to the influence of mercury, but this seems to be doubtful. In the case of Barrett, the primary cause was, undoubtedly, the inhalation of the vapor of turpentine. I have ascertained, from the captains of coasting vessels, who bring cargoes of turpentine from North Carolina, that the crews of such vessels are very subject to attacks of hematuria. In the case of Lopez, the cause could not be clearly ascertained. It has been already stated, that the disease is

said to occur most frequently in hot climates. The usual causes are most probably those which operate, by determining an increased afflux of blood to the part, and consequent congestion of the organ.

Pathology.—Various opinions have been expressed by authors upon this point. Dr. Prout says: “The proximate cause of this affection is partly in the assimilating organs, and partly in the kidneys. The chyle, from some derangement in the processes of assimilation, is not raised to the blood standard, and consequently, being unfit for the future purposes of the economy, is agreeable to a law of the economy, ejected through the kidneys, but those organs, instead of disorganizing or reducing it to the crystallized state as usual, that is, instead of changing the chyle into the lithate of ammonia, permit it to pass through them unchanged. If the chyle was properly converted into blood, not chyle, but blood ought to be thrown off by the kidneys; on the other hand, in proof that the kidneys are affected, I have often found chyle in the blood, when a trace of albuminous matter has not been perceptible in the urine.”

According to Bence Jones, “this disease consists in chronic congestion of the kidneys, which may even last, more or less constantly, for a quarter of a century. The close examination of such cases clearly proves that, except in the presence of minutely divided fatty matter, which appears only when the chyle passes into the blood, there is no connection between this disease and chyle, but that it depends upon congestion of the kidneys, which causes albumen, fibrin, and blood globules to pass out into the urine.” He also considers “that there is a change in the capillaries of the kidney (perhaps in those of the mamillary processes), whereby, as in a filter, when the weight of fluid is too great, some substances are allowed to pass, which would be retained if the filter were stronger.” He also considers, that “the remarkable variations of the disease, the causes which make it worse, and the good effect of treatment, especially of astringents, confirm his opinion.” Dr. Elliotson regards the disease as “an affection of the nervous system of the kidney. There

is no reason to believe, that the assimilating functions are less perfect than in health, or that the blood sent to the kidney differs from the blood of health, materially or all."

Having now considered the most important cases which have been recorded, as well as the different opinions of various authors, the following facts appear to be conclusively established.

1. That this disease may continue for many months, and even years, without much apparent injury to the general health.

[See the cases of Golding Bird, Bence Jones, Prout, Elliotson and others.]

2. That in such cases there may be, and have been, intermissions of several days, and sometimes of months and years, during which the urine was apparently healthy.

The urine of the same person has been observed to be milky at one emission, or voiding, and perfectly healthy when passed the next time. In the "*Archives of Medicine*," edited by Dr. Lionel S. Beale, London, 1857, Dr. B. remarks, that he has analyzed the urine voided, at two different times in the day, by the same patient. The first urine was chylous, and contained 13.9 of fatty matter, in 1000 of urine. The second specimen contained no fatty matter whatever.

Dr. Brown Séquard, in his "*Journal de Physiologie*," April, 1858, says, that he has observed this curious and alternating condition to occur many times in the same person. The patient, a native of Mauritius, finally died after ten years' duration of his disease.

3. That notwithstanding the daily loss of albumen, fibrin, red globules, and fatty matter, that there may be very little or no emaciation. The patient may, on the contrary, abound in adipose tissue, and the muscles apparently well nourished. See the cases of Golding Bird, Elliotson, etc.—also, those of Lopez and even of Barrett, whose weight remained the same for some weeks.

4. The fatty matter generally appears in the urine after eating, and but seldom before, or if so, in a very small quan-

tity. But there are exceptions to this, as in the case of Golding Bird.

5. That astringents, and especially gallic acid, with attention to diet, exercise, etc., seem to have been the most efficacious remedies; but that the disease is generally very little under the *permanent* control of remedies.

6. The kidney is certainly in a very different condition from that of Bright's disease (so called) inasmuch as renal epithelium tube casts, etc., are not generally found in the urine, neither do pathological changes occur in the kidney secreting milky urine, at all resembling those in Bright's disease. On the contrary, in the only two cases which I have been able to find, viz., that of Prout and the case reported by myself (Barrett), the kidneys were perfectly healthy.

7. *From the examination of the kidneys, in the case of Barrett, it is positively and conclusively demonstrated*, that there was in this instance no *organic* lesion of the kidney, and from the symptoms and phenomena of the other cases, the same conclusion may properly be deduced with regard to them. Moreover, the state of general good health, the intermittence of the symptoms, the absence of loss of weight and the effect of remedies, all show that there was not, in any probability, any *organic* lesion of any other organs—at least, in the greater number of cases.

In conclusion, it may be asked what is the true pathology of this disease? The opinions of several authors have been noticed: of Prout, who believes that the organs of assimilation are in fault, as well as the kidney, and that the chyle, from being imperfectly organized, is not raised to the blood standard, and is therefore unfit for the purposes of nutrition, etc. This view has been very generally adopted by the profession. Now, if this opinion was correct, how can we explain the fact, that the body is so well nourished, that often there is no loss of weight, that the general health remains good, and that the functions of nutrition and secretion are so well performed? If the chyle was badly elaborated, or diseased, the blood must be so likewise, and

would be incapable of nourishing the system—all the functions of which must become disordered. Moreover, the loss, or drain upon the system, is really from the escape of the albumen, fibrin, and red globules of the blood, by the kidney, and not so much from the mere loss of fatty matter—for I have ascertained conclusively that a very small portion of oil or fatty matter, united with albumen, is capable of rendering a large amount of urine very milky in appearance. The kidney is in a condition which freely allows the escape of the elements of blood. The milky condition of the urine has been noticed principally after meals, from which circumstance it has been supposed that the chyle passed off at that time into the urine. This is, perhaps, the case in most instances; but in that related by Golding Bird, the patient was visited at 2 P.M., previously to which time he had not risen on that day, except to pass water on three several occasions, and had eaten nothing since breakfast. The three first specimens of urine were not milky; he introduced the catheter and drew off a quantity of highly milky urine. This could not well be attributed to the presence of chyle. As the patient was a very fat woman, may it not have resulted from the decomposition of the adipose tissues, and consequent absorption of the oily or fatty material? The effect of astringents in causing the disappearance of milky urine, can hardly be explained by their beneficial influence upon the digestive and assimilating processes. In a word, the kidney in this disease allows both blood and fatty matter to pass, but there seems to be no proof that this chyle and the blood are actually diseased, or unfit for the purposes of nutrition and secretion.

Dr. Bence Jones attributes the disease to chronic congestion of the kidney, which, he says, may exist for more than a quarter of a century! He also considers that there is a peculiar condition of the capillaries, etc. (see his remarks previously quoted). If this theory were true, it is probable that some traces of congestion would have been formed in the post mortems just related. Would his cases have been so favorably affected by astringents? Dr. Elliotson thinks

that the disease depends upon a peculiar condition of the organic nerves of the kidney. Finally, it must be admitted, that the number of well observed cases, and especially of post-mortem examinations, of this rare disease is too small to enable us to come to a positive conclusion as to its pathology. We may hope much from the additional information to be obtained from cases which will occur hereafter, and which, taken in connection with the rapid progress of physiological chemistry, cannot fail to bring us nearer to the truth.

It may, however, be remarked, at the present time, that inasmuch as it has not been proved to depend upon any disease of the assimilating organs, or upon *organic* lesion of the kidneys, we are then justified in regarding it as a functional derangement of those organs, and which probably depends upon a peculiar condition of the renal nerves and capillaries, not as yet made manifest to the naked eye, nor even when aided by the microscope. If any of the facts or reflections contained in this paper have advanced our knowledge of this obscure and difficult subject, the object of the author is then accomplished.