

posit that are characteristic. Bladder pus never settles in this way. However intense the cystitis, however deep the layer of pus at the bottom of the glass, it is always capped by a fluffy, rolling mucocloud (like the thunderheads on the horizon of a summer sunset) if the pus comes from any part of the urinary tract except the kidney (Plates V, VI).

But this distinctive pyuria is only encountered in the suppurative forms of pyelo-nephritis. When the lesion is mild and catarrhal we must look further for our diagnosis.

Bacteria appear in the pyelo-nephritic urine in a characteristic manner. When there is a notable pyuria the bacteria need not be especially noted. They befog the supernatant urine, but that is all. Yet there are many phases of mild catarrhal pyelitis, acute as well as chronic, in which pus is present in so small a quantity that the urine is clouded by the bacterial swarm rather than by pus—i. e., there is *bacteriuria* with all its characteristics, already studied at length (p. 363). We need not repeat them here.

PLATE IX
THE URINE OF ACID, SUPPURATING PYELO-NEPHRITIS
 Albumin is always present in the urine of pyelo-nephritis. In the catarrhal (*bacteriuria*) cases there is habitually not enough albumin present to give the urine its characteristic light albuminous cloud. The urine is acid and milky when passed. On standing it becomes almost clear, retaining only a bacterial haze, while the pus accumulates in a flat, cohesive, yellow or greenish mass at the bottom. The specific gravity of this urine is always low, and the amount of pus varies from day to day.

The *casts* are characteristic of the grade of kidney lesion. They often contain blood, pus, and epithelial cells.

Certain other characteristics of the urine of pyelo-nephritis are its *light colour and low specific gravity*, attributable to the deficient excretion of solids, and its *acidity*. The urine is always acid in catarrhal and almost always so in suppurative cases, and this is the more striking when the urine is so malodorous and purulent as to suggest ammoniacal cystitis.

To sum up: A characteristic pyelo-nephritic urine is light in colour and acid in reaction. It is hazy with bacteria, and if it contains pus in any quantity, this deposits in a solid flat mass, green or yellow. (Compare Plates V, VI, and IX.) Albumin may be discovered in the filtered urine, and the microscope reveals casts unless their presence is obscured by pus.

The Perinephritic Tissue.—Fibro-lipomatous perinephritis (p. 540), characterized by condensation of the perirenal fat into a dense fibro-lipomatous envelope, is constantly met with in several cases of long standing, while some fibro-lipomatous masses are found about the pelvis in almost all cases.

PLATE IX



Suppurative Perinephritis.—The result of irruption or extension of a renal abscess into the perinephritic tissue has already been described (p. 541).

The Opposite Kidney.—Catarrhal pyelo-nephritis is habitually bilateral, and it is common for a catarrhal pyelo-nephritis to occur in the fellow of a kidney affected by any extensive suppuration.

But whether the opposite kidney is catarrhal or sound, it tends to undergo a compensatory hypertrophy to make amends for the deficient excretion of the diseased organ. Indeed, the catarrhal nephritis which so often affects it is doubtless due to the congestion of overwork.

Other Organs.—Urinary Organs.—When the kidney is primarily inflamed the infection is spoken of as descending, though, as a matter of fact, it is not common for the inflammation to descend to the bladder. Indeed, the patient often seems singularly immune from the consequences that might be anticipated from the zealous soundings and washings to which he is so often subjected. In spite of purulent urine and surgical trauma Nature for once is kind, and tries to spare the prostate and bladder. On the other hand, when the prostate and bladder are primarily infected, the additional renal lesion does them no harm, except inasmuch as it deteriorates the patient's powers of resistance.

Other Organs.—That the bacterial sclerosis of the kidney now under consideration has any relation to general arterio-capillary fibrosis, I do not know. The two may be met with in one patient. The cardiac hypertrophy of renal sclerosis is encountered here. The digestive disorders are apparently toxemic and functional. Septicemia and pyemia are possible complications.

GENERAL SYMPTOMATOLOGY

The general symptoms of surgical renal infection may be due to auto-intoxication from renal insufficiency (urinary toxemia) or to actual septicemia or pyemia. We need not here concern ourselves with that special and peculiar form of urinary toxemia occurring when both ureters are suddenly and completely obstructed (see Calculous Anuria).

URINARY TOXEMIA

Urinary toxemia is a chronic auto-intoxication due to renal insufficiency—i. e., to the inability of the diseased kidneys properly to perform their function of eliminating certain excrementitious substances from the circulation. This condition is common to all the diseases of the renal parenchyma, whether medical or surgical. It is usually called uremia, a misleading term, for which I prefer to

substitute the more accurate title, urinary toxemia, which serves to distinguish it clearly from urinary septicemia; while at the same time it does not hint, as uremia does, that the retention of urea (itself a diuretic) plays any part in causing the symptoms.

Etiology.—The causes of urinary toxemia are all reducible to one condition—viz., inability of the renal epithelium to perform its function. This the surgeon encounters in an acute and a chronic form.

Acute urinary toxemia occurs as (a) acute post-operative renal congestion, and (b) acute reflex renal congestion after operations, etc., upon the urethra and bladder (see Urinary Fever). Calculous anuria will interest us elsewhere.

Chronic urinary toxemia may occur from the chronic congestion of urinary retention—be it urethral, prostatic, or ureteral—or from chronic interstitial nephritis. In practice the two causes act together. The congestion of retention permits infection; that, in turn, causes interstitial nephritis, and the congestion continuing hastens the functional dissolution of the diseased organs.

Symptoms.—The symptoms of urinary toxemia, whether acute or chronic, are those commonly described in text-books on the practice of medicine as the symptoms of chronic interstitial nephritis and uremia. The picture in acute cases is anuria (or oliguria), auto-intoxication, and death—unless, perchance, the attack subsides spontaneously or the surgeon intervenes. In chronic cases, when the surgeon sees them, the symptoms of chronic urinary toxemia are commonly intermingled with and obscured by those of urinary septicemia.

Treatment.—1. For the acute forms, *diuresis* by mineral waters, or, in emergencies, by saline infusion, *diaphoresis* by the hot pack, by pilocarpin, etc., the administration of urotropin (p. 373), cupping the loin, even venesection, if the patient is plethoric, to *reduce renal congestion*, and such mechanical or operative measures as may be appropriate to *remove the cause of the renal congestion*—among these last nephrotomy may figure, if the future justifies the confidence Harrison and Edebohls place in it (p. iv).

2. For the chronic forms the diuretic waters are useful, as are the various diuretic drugs employed by the physician, among which I especially favour the sodio-salicylate of theobromin, the bichlorid of mercury, and the tincture of the chlorid of iron. Appropriate diet, regulation of the bowels, such hygienic measures as exercise, climate, etc., and avoidance of mental strain, are important accessories to the treatment. But best of all, when this chronic urinary toxemia arises from a surgical cause, is the surgical relief—

whether by drugs, manipulation, or operation—of the cause (retention, infection, etc.) of the toxemia. If this can be removed the progress of the renal sclerosis may be checked, and, to all appearances, even cured, an outcome to which no medical or hygienic measures aspire.

URINARY SEPTICEMIA

Urinary septicemia is septicemia arising from the absorption through the kidneys of bacterial products in the urine. It is due to the retention of infected urine. Therefore it always includes urinary toxemia, and to this are due some of its peculiar features.

Many forms of septicemia and pyemia result from diseases of the genito-urinary organs. A prostatic abscess, a periurethritis, an infiltration of urine, a suppurating testicle (to mention only a few of the more notable causes), may and do set up a generalized infection. But this is not *urinary septicemia*.

Occurrence.—Urinary septicemia results from retention of purulent urine. It is most commonly encountered in cases of prostatic hypertrophy. Old, tight strictures evoke it, and it always occurs with pyonephrosis and suppurative pyelo-nephritis.

Pathogenesis.—It will be observed that urinary septicemia is always due to changes in the kidneys. Any renal suppuration in which there is accumulation of pus in the kidney inevitably gives rise to urinary septicemia. On the other hand, urethral stricture and prostatic hypertrophy cause urinary fever only by producing renal retention and suppuration.

Symptoms.—The symptoms of this condition may be grouped under several heads—viz.:

Fever.—The fever of urinary septicemia is as irregular as that of any septicemia. When acute it may be interrupted by successive chills, or it may merely run high in the afternoon and low in the morning. In mild chronic cases there may be but a slight afternoon rise, with perhaps a subnormal temperature at night, while occasionally the temperature may remain subnormal for days at a time.

Circulation.—The circulatory conditions vary through an equally wide range. The heart may show the feebleness of age or the hypertrophy of chronic nephritis. If the patient is robust the pulse is rapid and tense, and as he fails it may grow more so, or it may become weak and thready. Arterial sclerosis is a common complication in long-standing cases.

Digestive Organs.—The condition of the digestive organs is usually characteristic. The bowels are constipated, the appetite poor, and, while any acute indigestion is unlikely, that general digestive discomfort common to every form of auto-intoxication is met with

here. Nausea, vomiting, and hiccough are symptoms of grave uremia. A foul diarrhea may bespeak intense poisoning. *In severe cases the condition of the tongue, mouth, and fauces is pathognomonic. The tongue is bright red*¹ on its tip and sides, while the dorsum is coated and brown or grayish (Plate X). The entire organ, indeed *the entire mouth and fauces are dry and parched*. The saliva is diminished in quantity, viscid in consistence, and acid in reaction. In the last stages of the disease the foul breath, the sordes, the cracked, parched tongue brown in the centre and bright red all about, form a characteristic and repulsive picture.

The result of this condition of the mouth and tongue is the *buccal dysphagia*, first described by Guyon. On account of the dryness of his mouth the patient accepts with avidity all fluids, but has an aversion to solids, which he can masticate and swallow only with considerable discomfort.

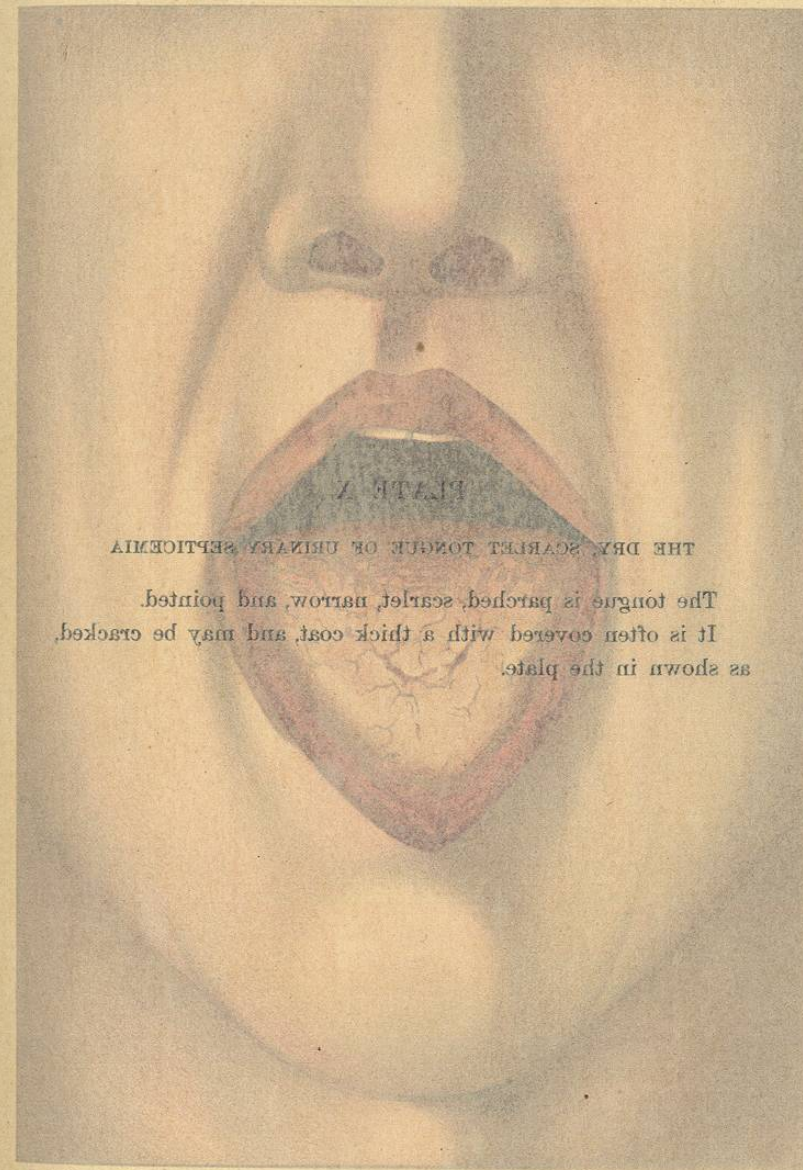
Uremic Symptoms.—Drowsiness and torpor are often the earliest uremic symptoms. Later the drowsiness may deepen, or may alternate with or give place to a mental restlessness with wanderings and hallucinations, whence the patient may at first be recalled, though later he goes into a permanent maniacal or comatose condition. At the same time hiccough and persistent vomiting are likely to occur, with absolute constipation or severe diarrhea—and then the end.

The Urine.—The urine is albuminous, purulent, perhaps bloody, often ammoniacal and fetid. It contains casts, but these may be obscured by the pus. These qualities are not peculiar, but the striking and ominous characteristic is the polyuria. The gravity of the patient's condition may often be fairly well estimated by this symptom alone. For as he loses ground his kidneys, instead of ceasing to secrete, as might be expected, habitually pour out a torrent of dilute urine. The patient passes from 4 to 6 litres (quarts) during the twenty-four hours, two thirds of it by night. This polyuria is a warning sign. It indicates a collapsed nerve force and threatens the worst.

The Patient's Aspect.—When a patient comes complaining of his bladder or kidneys a glance will reveal the presence of urinary septicemia to the experienced eye. His face is usually thin, drawn, and sallow, or, if fat, flabby and pasty. There is a history of failing digestion and lost weight. The skin is dry, perhaps feverish. There may be a slight edema of the extremities, but this symptom is often

¹ The *redness* and dryness of the tongue are directly due to the renal condition and are therefore constant, while the *coat* is attributable to the digestive disturbance and is therefore variable, or may even be entirely absent.

PLATE X



THE DRY, SCARLET TONGUE OF URINARY SEPTICEMIA

The tongue is parched, scarlet, brown and pointed. It is often covered with a thick coat and may be cracked as shown in the plate.

R. J. HOPKINS, Fec.

THE DRY, SCARLET TONGUE OF URINARY SEPTICEMIA