A clinical study of diseases of the kidneys : including systematic chemical examination of urine, for clinical purposes : systematic microscopical examination of urinary sediments : systematic application of urinary analysis to diagnosis and prognosis : treatment / by Clifford Mitchell.

Contributors

Mitchell, Clifford, 1854-1939.
Francis A. Countway Library of Medicine

Publication/Creation

Chicago : W.T. Keener, 1890.

Persistent URL

https://wellcomecollection.org/works/e8hdex34

License and attribution

This material has been provided by This material has been provided by the Francis A. Countway Library of Medicine, through the Medical Heritage Library. The original may be consulted at the Francis A. Countway Library of Medicine, Harvard Medical School. where the originals may be consulted. This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org





17.26.159

Alonzo Boothby.

Digitized by the Internet Archive
in 2012 with funding from
Open Knowledge Commons and Harvard Medical School

http://www.archive.org/details/clinicalstudyofd00mitc

A CLINICAL STUDY

OF

DISEASES OF THE KIDNEYS

INCLUDING

SYSTEMATIC CHEMICAL EXAMINATION OF URINE, FOR CLINICAL PURPOSES. SYSTEMATIC MICROSCOPICAL EXAMINATION OF URINARY SEDIMENTS. SYSTEMATIC APPLICATION OF URINARY ANALYSIS TO DIAGNOSIS AND PROGNOSIS. TREATMENT.

BY

CLIFFORD MITCHELL, A. M., M. D.

CHICAGO:
W. T. KEENER,
96 WASHINGTON ST.
1890.

BOSTON MEDICAL
JAN 25 1917
LIBRARY

1414

COPYRIGHT,
CLIFFORD MITCHELL,
1889.

PREFACE.

Harley has well said that the state of the urine is a key to the condition of the body. While some diseases may not affect the urine, morbid urine indicates disease. Chemical and microscopical examination of the urine enables the practitioner to determine the diagnosis in a large number of disorders and, oftentimes, to save the lives of patients.

The object of my work is to show the practical bearing of thorough examination of the urine on the diagnosis, prognosis, and treatment not only of diseases of the kidneys themselves, but of many other disorders. The relation of urinary analysis to diet I have endeavored to explain at considerable length It is by careful observation of the condition of the urine that we often differentiate among various therapeutic agents, mineral waters, and adjuvants of many kinds.

I have devoted one hundred pages of this book to a consideration of the treatment of Bright's disease. The modern treatment of albuminuria consists in carefully observing many particulars. I have discussed with as much minuteness as possible circumstances of diet, air and exercise, care of the skin, place of residence, psychical influences, etc., etc., which, if observed in connection with proper remedial treatment, will often keep the patient with chronic Bright's disease alive for many years, in some cases, possibly, to the natural limit of life.

I have endeavored so far as possible to write the book for American patients and from an American standpoint as regards diet and mode of life. The influence of English writers on diet and hygiene has been too strongly felt in this country. We should accept with some reserve the dietetic regulations of those who are more familiar with the Hogarth type of eater and his needs, than with the sufferings of the American stomach in general or the Mississippi Valley liver in particular. Should any American novelist make his characters disport themselves out-of-doors during an Illinois

winter, or in a New York blizzard, as do those of Dickens in the comparatively balmy English holiday week, he would be justly held up to ridicule. Yet many of our own medical writers do not hesitate to advise American "featherweights" to pursue that mode of living which our gigantic Saxon kinsmen in their English climate may find salutary.

In order to make the book useful for the general practitioner, I have inserted numerous tables by study of which diagnosis is made easier. A large number of clinical notes from the experience of well-known physicians will explain the action of various remedies which I have found useful. I have paid some attention to the details of management of cases during such emergencies and complications as arise in the course of Bright's disease.

I think it necessary in considering renal diseases to pay attention also to those of the entire urinary tract. The authors of many works on diseases of the kidneys ignore diseases of the kidney-pelvis, ureters, bladder, and urethra. But inasmuch as the kidney soon feels the effects of any hindrance to the flow of urine in the lower urinary tract, the practitioner

should become familiar with those disorders on which the renal lesion may depend.

In quoting from the works of others, I have, as a rule, named my authority on the spot.

The drawings for the cuts of microscopical objects were made by Dr. J. A. Hemsteger of Chicago.

70 State Street, Chicago.

TABLE OF CONTENTS.

CHAPTER I.

CHEMICAL EXAMINATION OF URINE FOR CLINICAL PURPOSES.

How to detect Albumin, Peptones, Bile, Sugar; how to estimate the quantity of Albumin and Sugar; how to examine a Urinary Sediment for Urates, Phosphates, Uric Acid, Blood, Pus, Calcium Oxalate, Mucus; how to estimate the quantity of Urea, Chlorides, Phosphates, Urates, Sulphates, etc.; List of Reagents and Chemical Apparatus required, with five illustrations. Apparatus used by the author ..... Pages 5–42

CHAPTER II.

MICROSCOPICAL EXAMINATION OF URINE FOR CLINICAL PURPOSES.

How to Select a Specimen of Urine for Examination; how to collect a Urinary Sediment; how to remove a Drop of the Sediment by means of a Pipette; how to use the Microscope; how to use Chemicals in Microscopical Work; how to identify, with the Microscope, Uric Acid crystals, Blood, Pus, Mucus corpuscles, Calcium Oxalate crystals, Epithelial cells, Triple Phosphate crystals, Calcium Phosphate crystals, Bacteria, Tubercle Bacilli, Tube Casts of all sorts; List of Reagents and Apparatus for Microscopical Work; twelve illustrations. Apparatus used by author ..... Pages 43–72

CHAPTER III.

SYSTEMATIC APPLICATION OF URINARY ANALYSIS TO DIAGNOSIS.

What to do when Albumin is found in the Urine; how to differentiate between Functional and Organic Albuminuria; Classification of Renal Lesions; six Tables, showing at a glance the Etiology, Symptoms, Condition of the urine in the various renal lesions, acute and chronic; Albuminuria according to Lesion; Acute Exudative Nephritis; Acute Parenchymatous; Acute Diffuse; Chronic Parenchymatous Change;

Puerperal Nephritis; Parenchymatous Change in Diabetes Mellitus; Chronic Diffuse Nephritis; Sclerosis; Gouty Kidney; Lardaceous Disease; Acute and Chronic Hyperæmia of the Urine in the various Renal Lesions, Acute and Chronic; how to tell whether Nephritis is Acute or Chronic; two Tables, showing Symptoms of Acute Nephritis; Table of Differential Diagnosis in Chronic Renal Lesions, parenchymatous, diffuse, sclerotic, etc..... Pages 73–97

CHAPTER IV.

THE PROGNOSIS IN DISEASES OF THE KIDNEYS.

The Prognosis in Functional Albuminuria; the Prognosis in Organic Albuminuria. Favorable and unfavorable signs. The Prognosis in Chronic Nephritis; *the Bearing of Tube-Casts on Prognosis;* Nephritis without Albuminuria; Condition of the Heart; Dr. Tyson's Conclusions for the Life Insurance Examiner; Summary of Prognosis ..... Pages 98–110

CHAPTER V.

THERAPEUTICS OF BRIGHT'S DISEASE.

One Hundred Pages on the Treatment of Bright's Disease: how to cure Functional Albuminuria; what Cases of Acute Nephritis are Curable, and how to bring about Recovery; Indications for Use of Remedies; Complete Hygienic Details: What the Patient should Eat, what he should Drink, and what he should Wear; how to prevent Post-Scarlatinal Nephritis; how to cure Post-Scarlatinal Nephritis; Table, giving Choice of Leading Remedies in Acute Nephritis; Treatment of Emergencies, with Remarks on Use of Purgatives, Diuretics, and Diaphoretics; Cerebral Symptoms and Heart Failure; Treatment of the Anæmia of Acute Nephritis; how to cure *Sub-Acute Nephritis;* Climatic Cure of Sub-Acute Nephritis; Diet, Hygiene, and Remedies in Sub-Acute Nephritis. *Chronic Nephritis:* Diet, Place of Residence, Care of Skin, Air and Exercise, Psychical Influences; Food and Drinks in Chronic Nephritis; Use of Mineral Waters; Alcoholic Drinks; the Milk Treatment, and just how to use it. Climatic Cure of Bright's Disease: Relative Advantages of Egypt, Cape Town, Southern California, New Mexico; Winter Resorts in Europe and America for the Nephritic Patient; Summer Resorts in the United States, England, Switzerland, etc. The Value of Rest in the Treatment of Bright's Disease; the Effect of Psychical Influences; Clothing and Baths for the Albuminuric; Value of Fresh Air and Exercise; Use of Oxygen Gas, Passive Exercise, etc. How to follow the Course of a Case by Examination of the Urine; the Author's Method of Classifying Cases Clinically by ascertaining the Quality of the Urine.

Remedies in Chronic Nephritis; Table, giving Choice of Leading Remedies in Chronic Renal Degeneration, dependent upon Hepatic Disorders; what Mineral Waters to use; Clinical Notes; Remarks on Treatment of Dropsy; Remedies in Chronic Diffuse Nephritis due to Syphilis, Gout, or Malaria; the Treatment of Syphilitic Cases; the Treatment of Gouty Cases: Remedies and Waters; the Treatment of Malarial Cases; Treatment of Anæmia; Remedies in Sclerosis, both according to Cause and Symptomatically; Treatment of Sclerosis prior to Cardiac Hypertrophy and subsequent to it; Treatment during Stage of Heart Failure; Signs of Death in Sclerosis; Remedies in Lardaceous Disease; Remedies in Acute Hyperæmia; how to cure Acute Hyperæmia of the Kidneys; Causes of Chronic Hyperæmia, with Treatment; New Remedies used as Heart Stimulants.

The Heart in Renal Diseases. Apex Beat; how to tell when the Heart is Hypertrophied and Dilated; Weak Heart; Cardiac Failure; Mitral Diseases: Differential Diagnosis; Atheroma; High Arterial Tension; Low Arterial Tension; Treatment of Renal Disease with reference to the Heart. *The Albuminurias of Pregnancy:* How to tell whether a Pregnant Woman is in Danger of Uræmia; Choice of Remedies in Puerperal Cases; Clinical Notes: Treatment of Convulsions; Induction of Labor. *Complications of Renal Diseases:* Treatment of Ascites, Apoplexy, Asthma, Bronchitis, Cardiac Lesions, Epistaxis, Erysipelas, Gangrene, Gastric Disorders, Headache, Hydrothorax, Hydropericardium, Jaundice, Nervous Derangements, Œdema, Palpitation of the Heart, Pericarditis, Peritoneal Effusion, Pleuritis, Pneumonia, Retinal Lesions, Septicæmia. *Uræmia:* Landois's Theory; Rôle of the Liver; Acute Uræmia; Symptoms, Diagnosis, and Treatment; Treatment of Uræmic Convulsions; Uræmia during Pregnancy; Chronic Uræmia more prevalent than generally known; Treatment. *Syphilis of the Kidney.*

SUMMARY: *General Indications for the Use of Fifty Remedies in Bright's disease,* with sixty-five Clinical Notes from the Experience of noted Practitioners in this country and abroad, illustrating the effect of medicinal agents..... Pages 111–216

CHAPTER VI.

PYURIA AND HÆMATURIA.

Examination of the Urine in Diagnosis of Diseases of the Kidney-Pelvis, Bladder, etc.; how to tell where Pus in the Urine comes from; how to tell where Blood in the Urine comes from; Use of the Spectroscope; Diagnosis by Instrumental Exploration; Examination of the Saliva after Injection into the Bladder of Potassium Iodide Solution; Ratio of Albumin to Hæmoglobin. Newman's apparatus..... Pages 217–225

CHAPTER VII.

RENAL TUMORS.

Hydronephrosis; Cystic Degeneration; Hydatid Cysts; Table of Differential Diagnosis in cases of Renal Tumors; Differential Diagnosis between Renal and Non-Renal Tumors; Etiology, Diagnosis, Prognosis, and Treatment of Hydronephrosis, Cystic Degeneration, and Hydatid Cysts.....Pages 226–233

CHAPTER VIII.

SUPPURATIVE DISEASES OF THE KIDNEYS, RENAL PELVIS, AND URETERS.

Etiology, Pathology, Diagnosis, and Treatment of Suppurative Nephritis, Pyelo-Nephritis, Pyonephrosis, and Pyelitis; Micro-Organisms in the Urine, and Infective Processes; Precautions in the Use of Instruments; Administration of Boracic Acid; Dietetic Rules; Directions for Cupping of the Loins; twenty Remedies of Value, with Clinical Notes; Perinephritic Abscess: Causes, Diagnosis, Prognosis, and Treatment....Pages 234-255

CHAPTER IX.

RENAL CALCULUS.

Forty Pages on an Important Subject; Frequency of Calculous Disorders in the West; the Uric Acid Diathesis: Diagnosis; what to do when Renal Calculus is suspected; the Urine in Oxaluria and Phosphaturia; how to tell in what Part of the Urinary Tract a Calculus is Lodged; Analyses of Urine in cases of Renal Calculus; Treatment of Uricæmia (Uric Acid Diathesis); Details in regard to Food and Drinks; what Food to Avoid; what Mineral Waters to Drink; Solvent Treatment of Calculus; Remedies in Uricæmia; Palliative Measures; Oxaluria: Diagnosis, Diet, and Treatment; Phosphaturia: Causes, Diagnosis, Treatment; when there is Flatulent Dyspepsia.
Treatment of Renal Colic: Remedies, Manipulation, Baths, etc; Treatment of the Hæmaturia of Renal Calculus; when to Operate for Renal Calculus; Nephro-Lithotomy and miscellaneous Surgical Measures; Renal Colic in Children: how to detect Uricæmia in children..... Pages 256–296

CHAPTER X.

CHRONIC RENAL TUBERCULOSIS. CARCINOMA, AND OTHER TUMORS. FLOATING KIDNEY.

How to Find Tubercle Bacilli in Urine; the Urine in Genito-Urinary Tuberculosis; Symptoms of Genito-Urinary Tuberculosis; Table of Differential Diagnosis in Tubercular Pyelitis,

Calculous Pyelitis, and Renal Cancer; Treatment of Renal Tuberculosis.

Cancer of the Kidney: How to Detect its Presence; Symptoms and General Treatment. Other Tumors. Diagnosis and Treatment of Floating Kidney; "Strangulation of the Kidney;" General Treatment of Renal Hæmaturia.....Pages 297–311

CHAPTER XI.

SUPPURATIVE DISEASES OF THE URETERS, BLADDER, PROSTATE, AND URETHRA.

Diagnosis of Ureteritis and Renal Tenesmus; Differential Diagnosis between Renal Tenesmus and Renal Colic; Prognosis and Treatment of Ureteritis, Cystitis: Diagnosis; the Urine in Cystitis; Extraordinary Progress in Diagnosis from use of the Cystoscope; the Urine in new Growths of the Bladder, and in Stone in the Bladder; Hemorrhage from the Bladder; Prognosis in Cystitis; Treatment of Cystitis. Diet and Hygiene, Mineral Waters, Remedies, and Clinical Notes; Solutions used in washing out the Bladder. Cystitis in the Female: Diagnosis and Treatment; how to use the Catheter; how to wash out the Bladder; Catheter Fever; Treatment of Hemorrhage from the Bladder; Suppuration in the Neck of the Bladder: Differential Diagnosis from Pyelitis; Treatment. Fissure in the Neck of the Bladder in Females; Hemorrhages from Neck of the Bladder and Prostate.

Prostatic Disorders: Hypertrophy; Congestion; Chronic Prostatitis; Prostatic Irritability; Treatment. Urethritis: how to find the Gonococci; "Clap-threads" in the Urine. Summary: How to Examine a Patient when Pus is found in the Urine, with hints for the diagnosis..... Pages 312–356

CHAPTER XII.

OLIGURIA AND ANURIA. INCONTINENCE OF URINE. MOTOR-NEUROSES.

Oliguria and Anuria; Diagnosis and Treatment; Retention and Suppression; Treatment. Incontinence of Urine: Causes; what to do in cases of Urinary Incontinence; Diet and Treatment, Medical and Surgical, of Incontinence. Motor-Neuroses of the Urinary System: Spasm of the External Sphincter; Spasm of the Detrusors; Treatment. Paresis of the Bladder: Diagnosis and Treatment. Enuresis: Treatment and Clinical Notes; Examination of the Patient in Motor-Neuroses, with hints for the diagnosis.....Pages 357–368

CHAPTER XIII.

DIABETES MELLITUS AND INSIPIDUS.

How to Test for Sugar in the Urine; Haines's Test; Brücke's Test; when to Test for Sugar; Differential Diagnosis between Glycosuria and true Diabetes; Early Recognition of Diabetes; Diabetes Decipiens; Analyses of Urine; what to do in cases of Diabetes; how to Estimate the Quantity of Sugar in the Urine; Fehling's Solution, how made; Relation of Uricæmia to Diabetes; the Prognosis in Diabetes; Unfavorable Signs; the Urine in Diabetic Coma; Early Recognition of Diabetic Coma; how to Test the Urine in cases of Diabetic Coma.

The Cure of Diabetes Mellitus, when possible; Systematic Method for the Cure; Bill-of-Fare in Diabetes; Drinks; Effect of Diet, Rest, and Exercise; Baths; Residence; Climates to be sought; Massage and Electricity; Respirations; Care of the Mouth and Teeth; Removal of drops of Urine; Protection of the Skin; Occupations; Accidents; Oxygen; Mineral Waters; Remedies; Clinical Notes; Empirical Treatment; Complications.

Diabetes Insipidus the two Forms; Symptoms, Diet, and Treatment..... Pages 369–398

CHAPTER XIV.

MISCELLANEOUS.

Disorders in which Peptone is found in the Urine; Biuret Test; Tests for the various Peptones; the Urine in Diseases of the Liver: Jaundice, Acute Yellow Atrophy, Functional Disorders of the Liver, Carcinoma, Amyloid Disease, Cirrhosis, Hepatic Tumors; the Urine in Pernicious Anæmia; the Urine in Neurasthenia; the Urine in Insanity and Epilepsy; Ehrlich's Typhoid Fever Reaction: its use in Pneumonia, Phthisis, Puerperal Fever; Aromatic Compounds in the Urine; Indican in the Urine; the Urine in Diseases of the Upper Air Passages: Uricæmia and Congestion of the Larynx and Pharynx; Summary of the Urine in Cancer, especially Cancer of the Stomach. Tests for certain Poisons in the Urine: Iodoform, Carbolic Acid, Morphine.... .....Pages 399 to 410

APPENDIX.—Tables, showing at a glance how to tell what percentage of the normal average a given quantity of Urine, Urea, or Phosphoric Acid is.....Pages 411 to 416

INDEX.....Pages 417 to 431

BOSTON MEDICAL
JAN 25 1917
LIBRARY

CHAPTER I.

Systematic Chemical Examination of Urine for Clinical Purposes.

Before entering upon the study of urinary pathology it is necessary to become familiar with the physical characteristics of normal urine, its chemical constituents, and the microscopic appearance of the sediment. Attention should also be paid to the changes taking place in normal urine as it becomes old. It is often the case that patients will collect their urine and set it aside for a day or two before giving it to a physician for examination. It is always advisable to inquire into the age of a specimen of urine about to be examined, so as to waste no time on urine several days old.

For quantitative chemical analysis the urine of twenty-four hours is necessary. The best day for collecting is

Sunday. To collect the urine of twenty-four hours the patient should begin Sunday morning after breakfast. He should save the first urine voided after breakfast and all voided during the day, including that which is voided on going to bed at night, pour it all into a bottle and label "Day Urine." He should also save all the urine voided during the night and that which is voided on rising the next morning, pour into a second bottle and label "Night Urine." These two bottles contain the total urine for twenty-four hours.

The day urine should be two or three times as much in quantity as the night urine, provided the patient is in health. In addition to the urine of twenty-four hours, the patient should furnish for microscopical examination a sample of *freshly voided* urine passed after the twenty-four hours' urine has been collected. Moreover, in special cases where it is desirable to detect traces of albumin and of sugar, examinations of the urine should be made at different hours of the day.

A complete examination of urine, therefore, to be satisfactory, should include the following:

I. Quantitative chemical analysis of the twenty-four hours' urine, with also qualitative tests for abnormal constituents and estimation of the quantity of such as are found.

II. Microscopical examination of the sediment of the twenty-four hours' urine and of the sediment of a freshly voided sample of urine passed about noon.

III. Tests for albumin and sugar at different hours of the day. Test for albumin at whatever hour the patient is most fatigued, or after the most active exercise of the day. Test for sugar in the urine voided about three hours after the heartiest meal of the day. I have found sugar in urine voided between three and four o'clock in the afternoon when I could not find it at any other time.

It is not necessary for clinical purposes to make what chemists would call a thorough quantitative analysis, since the significance of many of the urinary solids is either unknown or of little importance. Estimation, approximately, of the total solids according to a method given in Table III should be made, and also quantitative estimates of urea, phosphoric acid and, in certain cases, uric acid; if albumin and sugar are found,

the quantity should be estimated. Indican should be tested for and the result compared with normal urine. I have arranged a series of tables which will be found in the Appendix, giving comparisons with normal averages, taking as standards the analyses of Yvon-Berlioz and Parkes, respectively. These tables will be found serviceable to those making numerous quantitative analyses, as comparison of the results of any analysis with normal averages can be made at once without the trouble of figuring.

In cases where it is impossible to obtain the total urine of twenty-four hours, microscopical examination of any freshly voided specimen may be made and chemical tests applied to urine voided on rising in the morning. Reliance should not, however, be placed on the results of a few tests of single specimens. Moreover, patients should be taught to furnish as much urine as possible for analysis. Many patients seem to feel that it is indelicate to supply the physician with a large quantity of urine, and give him but an ounce or two, or possibly but a few fluidrachms. Urinary examinations have been much more valuable in their teachings since the collection of

twenty-four hours' urine has been insisted on. Patients are usually willing, and among the more intelligent classes even anxious to supply the full quantity for the twenty-four hours if they understand that it is wanted, and the suggestion be made that Sunday be taken for the day of collection.

TABLE I.

Constituents of Normal Urine.

Constituent.	*Average amount in 24 hours.*
Water, . .	40 to 50 fluid ounces, or 1,200 to 1,500 C. c.;
Urea, . .	308.6 to 617.2 grains, or 20 to 40 grams;
Urates, . . .	6.17 to 12.34 grains, or 0.4 to 0.8 gram;
Kreatinine, . .	7.7 to 20 grains, or 0.5 to 1.3 gram;
Hippuric acid, . .	7.7 to 15.4 grains, or 0.5 to 1 gram;
Chlorides, . .	154.3 to 246.8 grains, or 10 to 16 grams;
Earthy phosphates,	15.43 to 23.14 grains, or 1 to 1.5 gram;
Alkaline phosphates,	30.86 to 61.72 grains, or 2 to 4 grams;
Sulphates, . .	46.29 to 61.72 grains, or 3 to 4 grams.

TABLE II.

Physical Characteristics of Normal Urine.

1. *Quantity in 24 hours:*

   Average, 48 fluid ounces; 3 pints; 1500 Cubic centimetres.
   Possible normal range: Men, 30 to 60 fluid ounces; Children, 17 to 50 fl. oz.; Women, 26 to 45 fl. oz.

2. *Color:*

   Yellow to amber; after drinking, pale; on rising, dark amber. In young children, but little color.

3. *Specific gravity:*

Of the 24 hours' urine, 1015 to 1025; after a full meal, high as 1030; on rising, 1015 to 1025.

4. *Solids:*

55 to 75 grams, or 850 to 1155 grains, in 24 hours.

5. *Reaction:*

Of the 24 hours' urine, slightly acid; after drinking, neutral; after full meal, neutral or slightly alkaline.

6. *Odor:*

Of the 24 hours' urine, faintly aromatic.

7. *Transparency:*

Usually clear when freshly voided; faintly visible cloud after standing a few hours; sometimes partially opaque when first voided, but later clear, above, with flocculent mass beneath;* sometimes turbid on cooling.†

8. *Consistence:*

Perfectly fluid like water.

TABLE III.

How to Examine Urine as to Chemical and Physical Characters.

Characteristic. *Method of Examination.*

1. *Quantity in 24 hours:*

Cause patient to collect all urine voided in 24 hours, beginning and ending with an empty bladder. Measure in Cubic centimetres or fluid ounces and compare results with Table II. 1. (Quantity).

2. *Color:*

Let ten or fifteen fluid ounces of the 24 hours' urine settle,

*A slight sediment of earthy phosphates, cleared by a few drops of nitric acid, can hardly be regarded as abnormal.

†Caused by deposition of urates, which clear on application of heat.

and note color of the urine in the middle and upper parts of the glass; or filter, and note color of filtered urine. If colorless to straw yellow, it is *pale;* if yellow to amber, is *normal;* if reddish-yellow to brown, is *highly colored.* Note any unusual color, as green, dirty-blue, blood-red, intense yellow, brown, or black.

3. *Specific gravity.*

Take the specific gravity of the 24 hours' sample with a good urinometer, standardized for a temperature of 77° F., and use a fluted glass jar;* read the figure on the scale from *above* the fluid.

4. *Total amount of Solids:*

Estimate the quantity of solids from the specific gravity: multiply the last two figures of the sp. gr. by Hæser's coefficient, 2.33, and the product will be approximately the number of grams of solid matters in every 1,000 C. c. of the urine; multiply this product by 15½ and the new product will be the number of grains in every 33.8 fluid ounces of urine. [Another and more rapid method is to measure the quantity of urine of 24 hours in fluid ounces and multiply the number found by the last two figures of the sp. gr. The product represents approximately the number of grains of solids in the whole urine of 24 hours]. Consult TABLE II., 4. (Solids).

5. *Reaction:*

The urine being in a beaker or vessel with a wide mouth, dip into it a piece of neutral litmus paper. Hold the paper in the urine until it is saturated; if it turns red, the urine is said to be acid; if it turns blue, alkaline; if it does not change color, it is neutral. In case the neutral litmus paper cannot be obtained, the ordinary red and blue papers may be used. Dip into the urine a slip

*A long stemmed urinometer standardized at 60° and provided with a thermometer is also valuable.

of red litmus paper, and also, using the other hand, a slip of blue. Hold the papers in the urine until they are saturated; if the blue paper is reddened, the urine is acid; if neither is changed in color, it is neutral.

If the urine is found to be alkaline, allow the litmus paper used to dry, and notice whether the blue color remains, or whether the red has returned. If the blue color remains, the urine is alkaline from *fixed* alkali; if the red returns, the urine is alkaline from *volatile* alkali.

If a piece of bright blue litmus paper is very quickly turned a marked red in *freshly voided urine*, there is hyper-acidity of the urine.

6. *Odor:*

Notice whether the odor be (1) normal (faintly aromatic), (2) strongly urinous, as in that of fevers, or (3) fetid and ammoniacal, as in stale urine.

7. *Transparency:*

Notice whether the urine deposits a sediment on standing. If the sediment is plainly visible, the urine is abnormal except perhaps in cases of females, and possibly when the deposit consists of earthy phosphates or urates. (See TABLE II., 7, foot note.)

A slight turbidity or "mucus cloud," barely perceptible, is noticed in all normal urine on standing for a short time; after the urine has been voided for some hours, a turbidity may normally be present.

The urine of children four or five days old is somewhat turbid.

The turbidity seen in urine is due to the presence of substances, which the water of the urine cannot dissolve or keep dissolved, and which, after long standing, form what is known as a sediment, that is, "something which settles to the bottom."

Urine which is transparent is not necessarily normal.

Urine which is very turbid when freshly voided is abnormal.

8. *Consistency:*

Observe whether the urine is (*a*) perfectly fluid like water, readily flowing through a tube of very small diameter and dropping easily from it, in which case its consistence is normal; or, whether (*b*) it is thick, "ropy," and viscid; or, (*c*) creamy, forming a jelly-like mass after being voided.

Notice whether the froth on the surface of the urine is (*a*) temporary, in which case it is normal, or (*b*) permanent.

I. Notes on Manipulation.

1. *Quantity:* To collect the urine of young children place a clean sponge over the genitals and fasten the diaper over it.

To measure the urine of 24 hours, use a 64 fluidounce graduated jar, or two smaller ones. To convert fluid ounces into Cubic centimetres multiply by 29½.

2. *Color:* To determine the *color* of turbid urine, have recourse to filtration.

In order to filter urine there is need of a funnel, filter paper, and a receiving vessel of some kind, such as a salt-mouthed bottle or a beaker. A filter-ring and stand are also very useful.

Funnels for this purpose are of glass, and those three or four inches in diameter across the top are of convenient size.

Filter paper is unsized paper, and the best is called Swedish, and may be bought already cut in circular form; filters seven and a half inches in diameter fit well into the funnels above described. In order to fold a filter so as to fit it into a funnel, first fold it in two, then turn the right half over on the left. In this way a funnel shape is given to the paper. Now fit it into the funnel and it is ready for use. When the paper thus folded has been fitted into the funnel three "pockets" can be seen; the liquid may be poured into any one of these three "pockets" except the middle one. It is often well to wet the paper *slightly* so as to fit it better to the funnel, and, for quick filtrations where the filtered urine only is wanted the filter paper may be ribbed. At the bedside, use small filters one to two inches in diameter folded as above, and inserted without a funnel into a wide mouthed test-tube. Observe the color of the urine after it has come through the filter paper.

3. *Specific Gravity:* Be careful to note as to whether your urinometer is standardized for 60° F., or for 77°. Take the temperature of the urine, using a chemical thermometer, and warm or cool it to the temperature to which the urinometer is standardized. (Or consult Table of Corrections for temperature. See "Practitioner's Guide in Urinary Analysis.") Squibb's urinometer, recommended by Prof. Tyson, is standard-

ized at 77° F., and is free from many objections. A urinometer with a long stem and provided with a thermometer is also useful.

4. *Solids:* In taking the specific gravity with a view to estimation of urea or solids, the urine should first be boiled, filtered while hot, then cooled to standard temperature, 77° F., with a Squibb urinometer, or 60° F., if a common instrument is used.

5. *Reaction:* Litmus-paper may be procured in the form of little books, which should be kept protected from the air. Blue litmus can be turned red by exposing to action of acid fumes or by immersing in vinegar and water; in the latter case dry before using. Remember that urine on standing may grow more acid, and finally may change to alkaline reaction.

II. Tests for Albumin, Peptone, Bile, Sugar.

In general, examine a specimen of the 24 hours' urine. In doubtful cases, examine the urine of each micturition during some one period of 24 hours; if albumin is sought for, cause the patient to take as vigorous exercise as is prudent before voiding urine for examination; women should take a cleansing injection before voiding urine for examination, especially if they are troubled with leucorrhœa.

A. Albumin: If the amount of albumin is

small, or there is doubt as to its presence, as there might be in cirrhosis, lardaceous degeneration, and congested kidney, especially in early stages; or, if it be desired to test for small quantities of albumin in the urine of a patient recovering from acute nephritis, recourse should be had to a careful and systematic search as follows:

(1). Get the urine perfectly clear; filter through several papers folded together, and if it comes through turbid, warm with one-fourth its bulk of Liquor Potassæ and filter again. If the filtered urine is still turbid, warm it with a few drops of magnesian fluid (magnesium sulphate one part, pure ammonium chloride one part, pure Liquor Ammoniæ one part, distilled water eight parts, all by weight) and filter.

(2). Fill a test-tube, preferably a short one, to the depth of half an inch with the clear filtered urine; hold it somewhat inclined in the left hand, and with the right, take up by means of a pipette, preferably roughened at the upper end, pure colorless nitric acid and allow the latter to flow down the side of the inclined test-tube into the urine.

If there is any difficulty in causing the acid to flow steadily from the pipette, rotate the latter, covered by the index finger, between the middle finger and the thumb, as suggested by Dr. Tyson. Wait a few moments until the acid

has slowly sunk through the urine, then bring the tube from the inclined position to the vertical. If a whitish zone is seen at the juncture of the urine and acid, albumin is *probably* present. Set the tube aside while the next test is being made.

(3). Pour three fluidrachms of the clear filtered urine into a perfectly clean test-tube preferably a long, narrow one, and add two drops of acetic acid to it. Shake well so that the acetic acid may be well diffused throughout the urine. Take the reaction by pouring a drop or two on a piece of blue litmus-paper. If the latter is not turned slightly red, add another drop of acetic acid, and try again with the litmus-paper. See that the urine turns blue litmus-paper slightly red, then holding the tube by the bottom between the thumb and forefinger, heat the upper part gradually to boiling. If a whitish turbidity appear where the urine has been heated, and if moreover a whitish zone was seen resulting from the cold nitric acid test (2), albumin is present, and nothing further need be done.

(4). When albumin is abundant, tests two *and* three will be noticeably successful; if there is any doubt read the following:

Remarks.

1. If a turbidity be obtained with the nitric acid test, but nothing at all with the heat test

applied to the clear acidified urine, the urine being allowed to stand six hours after the heat test has been performed before a decision is made, *albumin is absent.*

2. If with the nitric acid test we are unable to see any zone or turbidity, but with the heat test a turbidity is plainly visible, add a few drops of nitric acid to the urine which has been boiled, and if the turbidity disappear, *albumin is absent.* If it does not disappear, add up to 15 or 30 drops of nitric acid, and if the turbidity persists, *albumin is present.* [Go back to the test-tube in which the cold nitric acid test has been performed, and after it has stood for a time you will probably in a good light be able to see a few flakes of albumin. Even if you do not, however, the heat test now indicates a very small amount of albumin].

3. Whether the nitric acid test shows a zone or not, if the heat test shows nothing at the time it is performed, but, if after six hours, a turbidity is noticed, apply heat again and if the turbidity disappear, *albumin is absent;* if it does not disappear, on boiling, *albumin is present.* [Go back as in (2) to the test-tube in which the cold nitric acid test has been performed].

4. If, before making the heat test, upon adding acetic acid the urine becomes turbid (as compared with a specimen of the clear filtered urine to which nothing has been added) and if, after

heating, this turbidity is not increased (seen by comparing with the same bulk of clear filtered urine to which the same amount of acetic acid has been added, but which has not been boiled), *albumin is absent.* If the turbidity is increased, *albumin is present.* The conditions described in 2, 3, and 4 will not usually cause any trouble. I lay great stress on the importance of comparing results, and have seen dozens of students detect albumin in this way who were unable to see any change before comparison was made. Moreover, comparison does away to a great degree with the necessity of a good light, dark back-ground, etc., and thus saves time.

5. If the urine has been boiled with an alkali to make it clear, it should be carefully neutralized, by addition of acetic acid, drop by drop, before the heat test is tried. Add the acetic acid, drop by drop, taking the reaction by pouring a drop of urine on red litmus-paper. When the urine turns neither red litmus-paper blue, nor blue litmus-paper red, it is neutralized. Enough should be added so that a faint tinge of red may be seen on the blue paper, then proceed with the heat test. Freshly voided urine can generally be filtered clear through several thicknesses of filter paper, and effort in this direction should always be made first.

6. Instead of a pipette, my own device, a small glass syringe, may be used, to which

a glass tube, slightly tapering, is connected by rubber tubing. I have found this superior to the pipette in point of ease of manipulation. Fill the syringe with the acid, then inserting the tip of the small glass tube inside the test-tube held inclined in the left hand, with the right fore-finger gently press on the piston. The acid will flow out very regularly and slowly, and a clear-cut, well defined zone is seen, if albumin be present. The syringe should, of course, be well packed and in good order.

III.—Estimation of Quantity of Albumin.

Rough Method of Estimation of Albumin:—Set the second test-tube—namely, that one in which the acidified urine has been boiled—aside, and then note the amount of albumin which has settled. If the amount is *insignificant*, the loss of albumin in 24 hours is under 2 grams (31 grains); if *moderate*, from 6 to 8 grams (93 to 124 grains); if considerable, 10 to 12 grams (155 to 186 grains); if very large, about 20 grams (310 grains). Boil daily, using test-tubes of the same size, the same amount of urine passed at about the same hour of day, adding 3 drops of acetic acid. Set the tube aside, and compare results with those of a preceding day.

Rough Method of Estimation of Percentage of Albumin: Fill a test-tube two-thirds full of

clear, filtered urine and add 20 drops of nitric acid; let settle. If the entire fluid is coagulated, 2 to 3 per cent of albumin, by *weight*, is present; if the coagulated albumin reaches half-way up the column of urine, 1 per cent of albumin is present; if one-third the way up, 0.5 per cent; if one-quarter the way up, 0.25 per cent; if one-tenth, 0.1 per cent; if the curved part of the tube is barely filled with coagulum, 0.05 per cent; slight cloudiness merely, less than 0.01 per cent.

It is well to perform the operations in a graduated test-tube, as the comparisons can then be made more accurately, and a record of results jotted down in a note book from day to day.

Esbach's Method:—Dissolve 10 grams (155 grains) of picric acid and 20 grams (310 grains) of pure citric acid (dried in the air) in 800 or 900 Cubic centimetres (about 0.8 or 0.9 of a quart) of cold, distilled water. After the substances have dissolved, add distilled water enough to make a litre (1.05 quart). Obtain the specially constructed tube which has an upper mark, R, a second mark below it, U, and the figures 7, 6, 5, etc., one above the other, beginning just below U, and going down to nearly the bottom of the tube. Fill the tube with urine, which has been shown to be albuminous, as far as the mark U. Then add the picric acid solution up to the mark R. Close the mouth of the tube with the thumb, and invert a dozen times without shak-

ing. Then close with a rubber cork, and let it settle for 24 hours. Read the height of the deposited albumin in figures on the tube. If, for example, the sediment is as high as the figure 5, it means that this particular specimen of urine you are examining contains 5 grams (77 grains) of albumin to the litre. The graduation of the instrument, therefore, represents in *grams* the quantity of albumin contained in a litre of the urine under examination. Reckon a gram 15½ grains, and a litre a quart. See how many litres of urine the patient passes in 24 hours, and multiply this number by the number of grams in one litre, found by estimating, and the result is the total amount of albumin the patient is voiding in 24 hours.

The urine in all cases should be acid. Hence, if it does not redden blue paper, add a few drops of acetic acid. Urine loaded with albumin may better be diluted with water, so that the sediment does not rise above the figure 4. If this is done by adding an equal amount of water, then double the result found; if by adding two parts of water to one of urine, multiply the number of grams (figure on the tube) by three and so on.

For clinical purposes this method gives at the end of 24 hours sufficiently accurate data. All estimates should be made from a specimen of the mixed urine of 24 hours, and in cases where there is no great hurry it is well to let the *preci-*

pitate settle 30 hours instead of 24. To find the *percentage* of albumin move the decimal point one place to the left. Thus, if a specimen is found to contain 4 grams to the litre, the per cent of albumin is 0.4 that, is four-tenths of one per cent. The *total quantity* of albumin voided in 24 hours is, however, what I prefer to record.

B. Detection of Bile.

(*a*) *Coloring Matter:*—1. Drop into a test-tube containing nitric acid to an inch in depth a splinter of wood and boil. The acid turns yellow. Proceed now as in testing for albumin. If bile coloring matter be present, there will be seen after the acid is caused to flow down the side of the tube into the urine a series of colors at the juncture. The colors from above downwards will be *green*, blue, *violet-red*, and yellow. Green is the most constant and first color in order; the violet, shading into red and yellow, is most always seen.

Criticism:—The above test is not always successful. The urine tested should be that *freshly voided.* If the test fails, dip a piece of white filter paper into the urine and let it dry. Brown coloration on the paper indicates bile. Try also the following:

2. Float a *few drops* of urine on some tincture of iodine in a test-tube. Green color at juncture indicates presence of bile-pigment.

Detection and Approximate Estimation:—To 20 minims of clear filtered urine reduced to 1008 in sp. gr. add 60 minims of test-fluid prepared as follows:—

Pulverized peptone - - - gr. xxx;
Salicylic acid - - - - gr. iv;
Acetic acid (B. P.) - - - m. xxx:
Distilled water to - - - fl. oz. viii.

To be filtered repeatedly until transparent.

If bile salts are present in quantity greater than normal, a distinct milkiness promptly appears, becoming more intense in a moment or so. If the bile salts are in normal or less than normal quantity, there is no immediate turbidity, but in a short time a slight tinge of milkiness is seen.

C. Detection of Peptones—Ralfe's Test.

Whether or not serum albumin has been found, take cold Fehling's solution* and cause fresh amount of urine to trickle down the side of the test-tube into it. A rosy-red color at juncture indicates presence of peptones; a violet coloration may be noticed when serum albumin is present, in which case try the test on urine freed from albumin by boiling and filtering.

D. Sugar.

In *testing* for sugar obtain urine voided two or three hours after the principal meal. In

* See Sugar.

estimating the *quantity*, collect and measure the urine of twenty-four hours. To test urine for sugar in routine manner use the *caustic potash test.*

1. *Liquor Potassæ test:*—Add an equal amount of freshly-made solution of potassium hydrate (sp. gr. of solution, 1060) to the urine, mix well, boil upper part of column of fluid, and, if sugar be present, the heated portion will be colored, first yellow, then brown-red, while the non-heated part does not change color. Nitric acid destroys the color and the fluid gives off an odor of molasses. This test is useful for its simplicity, but it is not very delicate.* If it gives no marked coloration, recourse should be had to the following:

2. *Copper test for Sugar:*—Grind up in a glass mortar five grains of pure crystallized copper sulphate and ten grains of pure neutral potassium tartrate. Dissolve the whole in two fluidrachms of liquor potassæ. A blue liquid results. Take a little of this, say, 15 minims or about 1 C.c., dilute with four times its bulk of distilled water and boil for a few seconds. *If clear*,† proceed as follows:—remove any albumin from the urine by cautiously acidulating with acetic acid, boiling well, and filtering; then add to the

* To test for *small quantities* of sugar requires much judgment and experience.

† If the solution is not clear on boiling make a new solution or add a little more liquor potassæ and filter.

hot, clear, blue liquid a few drops of the urine and raise to the boiling point, if in the mean time the blue liquid has cooled. A yellow precipitate indicates sugar in abundance. If no precipitate is obtained on adding a few drops of the urine, add more, drop by drop, bringing to the boiling point occasionally, until finally a volume of urine equal to that of the blue liquid has been added. If now there is no yellow precipitate, sugar is absent, clinically speaking.*

It will be found convenient to procure Haines's sugar-test liquid for routine work in sugar-testing. It is a blue liquid containing sulphate of copper, alkali, and glycerine.

Quantitative Estimation of Sugar.

1. Rough Method:—Collect urine of 24 hours. Take specific gravity. Multiply last two figures of the sp. gr. by 2, and this result by the number of litres of urine passed in 24 hours. Subtract 50 and the result is the amount of sugar in grams. Multiply by 15½ to get it to grains. Suppose total amount of urine in 24 hours be four litres; sp. gr. 1036: $(36\times2\times4)-50=238$ grams of sugar in the 24 hours urine.

2. Approximate Method:—Collect the urine of 24 hours, measure carefully, pour four fluid ounces into an eight ounce bottle and add a

* The author hardly thinks it worth while to discuss the interminable subject of traces of sugar, in a work of this kind.

small piece of yeast, then pour four fluidounces into another eight ounce bottle, adding no yeast. Set aside the two bottles in a warm place for 24 hours, then take specific gravity of the urine in each. It will be found that the one containing the yeast is of lower specific gravity than the one without the yeast. Each degree of sp. gr. lost means one grain of sugar to the fluidounce of urine, or 0.2196 gram of sugar to the 100 C. c. of urine. For example, suppose the patient voids 150 fluidounces of urine in 24 hours; suppose sp. gr. of the urine in the bottle with yeast to be 1035, in that of the bottle without yeast 1045, then this specimen of urine contains ten grains to the fluidounce, and in 150 fluidounces there will be 150×10 grains or 1,500 grains of sugar passed in the 24 hours. This method of estimation should be made from time to time in order to ascertain whether the patient is voiding more and more sugar or less and less. The same urinometer should always be used and, preferably, one with a long index, so that the variation in degrees can be easily read off and closely observed.

N. B. In making the fermentation estimate be sure that the bottle containing urine *without yeast* be tightly corked; the urine containing yeast may be poured into a bottle provided with a nicked cork to permit escape of the carbonic acid gas formed.

Occasionally it is wise to make an accurate estimation of the percentage of sugar.

E. Sediment.

Proceed now with the examination of the sediment; go back to the first portion of the urine which has been standing so that the sediment, if any, may settle. Pour off the supernatant urine very carefully down the side of a glass rod; when nearly all the urine has been poured off from the sediment cease pouring; save the urine that has been poured off and let it settle again for microscopic examination, No. 2. Divide the sediment, if abundant, into two portions, reserving one portion for microscopical examination, No. 1. [If the sediment is not abundant, proceed at once to the microscopical examination].

N. B. It is sometimes necessary, especially when a uric acid sediment is to be looked for, to collect the urine of separate micturitions, let settle and observe carefully in how many hours or minutes the sediment is perceptible.

I. Chemical Examination of the Sediment.

(*a*) Warm a little of the sediment in a test-tube, taking care not to boil; pass the tube to and fro in the flame of the alcohol lamp; if the sediment clears noticeably (shown by comparison with sediment in another tube not heated)

urates are present. Sediment often reddish.

(*b*) Whether urates have been found or not, examine the sediment with the naked eye for *uric acid* crystals. These appear as reddish, or reddish-brown specks, like red-pepper grains. They may be seen either along the sides of the glass in which the urine is contained, or on the bottom of it. Hold the glass up at arm's length and look at it from below. If the urine is in a bottle, the uric acid crystals may possibly be collected in the lowest corners of the curving bottom.

(*c*) If the sediment is reddish in color, or dark, test for blood: take equal parts of spirits of turpentine and tincture of guaiac, shake well, and cause an equal volume of *sediment* to flow down the side of the tube into the mixture; a blue coloration at the juncture indicates presence of *blood*. [If blood is present, the phosphates in urine when precipitated by caustic potash and gentle heat will appear *blood-red* in color]. The tests should be made on freshly voided urine if possible and, if unsuccessful, the microscope should by all means be used; it is in general, moreover, advisable to use the microscope in order to make the differential diagnosis between hematuria and hemoglobinuria.

In performing the turpentine and guaiac test pay no attention to a whitish turbidity, which

appears in the lowest part of the liquid after the urine is added.

(*d*) Take a fresh sample of the sediment, add four or five drops of U. S. P. acetic acid to it, shake well, and compare with the same bulk of sediment to which just as much distilled water has been added as was acetic acid. If the sediment is noticeably cleared by the acetic acid, *earthy phosphates* are present. Take a fresh amount of the sediment to which nothing has been added, and dip into it a piece of red litmus-paper; it should be turned blue, if the phosphatic sediment is in any abundance. Allow the paper to dry, and if the blue color persist, *calcium phosphate* is probably the chief constituent of the sediment, the urine being alkaline, from fixed alkali as it is called. If the blue color disappear when the paper dries, *triple* (ammonio-magnesian) *phosphate* is the one. (In all cases the microscope should be used to confirm results).

(*e*) If the sediment is not wholly urates nor phosphates, nor both, but there is evidently something else present, pour some more of it into a test-tube and add a few drops of Liquor Potassæ. If the sediment be originally of a whitish color, and on addition of the caustic potash become greenish and glassy, first stringy, then thicker, till it forms a lump, *pus* is present. The stringiness may be perceived by pouring the

mixture from one tube to another, or by trying to remove by means of the pipette. If the sediment is dissolved by the caustic alkali, but has not been by heat, *mucus* is the constituent. [Uric acid is soluble in Liquor Potassæ but is not light colored].

The above directions apply to testing well-marked and characteristic sediments examined within a few hours after the urine has been voided, and before any changes have taken place. In other words, before the urine becomes stale. In many cases chemical identification of a sediment is not easy, and recourse to the microscope must be had. Note, however, the following:—

Practical Hints.

1. The urine on standing deposits some little sediment, but remains generally turbid, the turbidity not settling, not even if the urine stand for days; the sediment removed by the pipette does not respond to tests (*a*) to (*e*); *bacteria* are present and the sediment needs use of the microscope for recognition. [Such urine if tested for albumin needs magnesian fluid and warming before filtration, otherwise it will not filter clear]. Held up to the light in a test-tube the urine will be seen, especially when shaded with the hand, to be traversed by fine, silky, interlacing waves.

2. No sediment is noticeable at the end of a few hours, but a very slight one after twelve to twenty hours, the urine not being alkaline. Examine with microscope for calcium oxalate. [If enough of the sediment can be collected, and no albumin is present, divide into two parts, add acetic acid to one and nitric to the other. If acetic acid have no effect but nitric acid dissolve, it is possibly *calcium oxalate.* Verification by means of microscope not only desirable, but absolutely necessary, as certain forms of the oxalate are of great clinical significance]. Keep the sediment in a cool place, or in a well-stopped bottle. Urine containing calcium oxalate sediment will often deposit it on the sides of the glass, forming numerous fine lines running in bands. It is often the case that the sediment is either caught in the mucous cloud, or according to Tyson, the whole of the cloud-like mass so much resembling mucus is made up of the oxalate of lime (chemical term, calcium oxalate). When it has settled there will often be noticed two parts to the sediment:—a soft, grayish layer on the bottom, and, over this a whiter, denser layer with a wavy, but well-marked surface.

3. The sediment is abundant enough for chemical tests and settles within a few hours. It clears partly with heat, but does not respond to any other tests. In this case, after warming, add a drop or two of Liquor Potassæ, and, if it

clears noticeably, *urates* and *uric acid* both may be present. Verify with the microscope.

4. If the sediment clear *wholly* on application of heat, so as to be as clear as the urine itself, decanted or filtered from the sediment, it is composed of urates and no further *chemical* tests need be made.

5. If the sediment with heat has not cleared, or only partly cleared, and, moreover, on addition of acetic acid has cleared only in part, and, further, if it respond to no other of the tests thus far given, recourse should certainly be had to the microscope.

6. If the test for pus given in (*e*) be not successful, pus is not necessarily absent. This test is of value only (a) when the urine is acid in reaction, and (b) when also the amount of pus is considerable. When the amount of pus is inconsiderable even though the urine be acid in reaction, the test applied as in (*e*) will not give a cohesive lump, but the sediment disappears, and the fluid becomes vitreous and stringy. Use as much sediment and as little supernatant urine as possible.

The chemical test in such cases not being marked in results, many prefer Day's test; pour a little tincture of guaiac *not freshly made* into a test-tube and let some of the sediment trickle down into it. If a blue color appear, in course of a few minutes, *pus* is present. This test,

however, should be confirmed, if possible, by microscopic identification of pus corpuscles.

7. The test for pus given in (*e*) fails in alkaline urine: pus is not necessarily absent; if urine is turbid when freshly voided, clears considerably on standing, and the sediment is greenish, stringy, tenacious, and clings to the side of the glass, the ropy strings being soluble in acid, it is *pus*. *Mucus alone does not form a similar cohering mass.* For verification, test the urine itself as follows:—fill a test-tube half full with the filtered urine to be tested, and heat gradually the upper part of the column of the fluid to boiling. An increase of the opacity in the portion so heated, as compared with the lower portion not boiled [seen against dark background] indicates presence of pus, if this increased opacity remains after addition of one or two drops of acetic acid.

8. The sediment does not respond to the various tests, and, it has been noticed, that the urine filters very slowly: excess of *mucus* is present, and the sediment becomes a thin liquid with flakes on addition of Liquor Potassæ. If pus is present at the same time, this test will not be successful.

In which case take a solution of iodine dissolved in potassium iodide solution and add a little of it to acetic acid; pour the mixture into the urine and a turbidity will be seen, due to

presence of *mucus*. This test distinguishes mucus from pus. Filter urine suspected to contain much mucus and allow the filter paper to dry; if it appear coated, as if with glistening varnish, much *mucus* is present.

9. If the urine is albuminous and of acid reaction: the sediment may be very slow in settling; do not wait for it to settle, but shake well in a test-tube, boil, and filter. If the filtered urine on cooling throws down a sediment which in turn is cleared by application of heat, the sediment consists of *urates*, at least in part.

Table IV.

Important Constituents of Urinary Sediments.*

Constituent.	Color of Sediment.	Reaction of Urine.	Test.
Urates.....	Reddish or fawn colored.	Acid.....	Heat dissolves.
Uric acid.....	Reddish crystals	Acid.....	Recognized by naked eye.
Blood.....	Reddish.....	Any reaction.	Blue with turp. & guaiac.
Phosphates.. ...	Whitish	Alkaline or neutral.	Acetic acid dissolves.
Pus.....	Whitish	Any reaction.	Caustic potash makes stringy.
Mucus(Epithelia)	Whitish	Any reaction.	Caustic potash makes flaky.
Calcium oxalate.	Whitish	Any reaction.	Soluble in nitric acid and in acid sodium phosphate.

*For all constituents not mentioned here, consult "Practitioner's Guide in Urinary Analysis," second edition.

II. For identification of epithelia, oil globules, tube-casts, fungi, and spermatozoa, see Chapter II. Consult Chapter II. also for closer identification of substances just mentioned in Table IV.

F. Normal Constituents.

Urea, Chlorides, Phosphates, Sulphates, Urates, etc.

Estimation of the *quantity* of the normal constituents is of importance. Mere qualitative testing is of no moment, for all normal urine contains them. Estimation of urea is of the greatest importance as an aid to prognosis and diagnosis. See Chapter IV.

(*a*) Estimate first the *urea:* use the hypobromite process with, for example,

(1) Doremus's instrument. 100 grammes (1543 troy grains) of caustic soda dissolved in 250 C. c. (8.5 fluidounces) of distilled water. Of this solution take 10 C. c. (2.7 fluidrachms) and add 1 C. c. (16 minims) of bromine. Shake the mixture well, until the bromine is dissolved and the whole becomes yellow in color. Dilute with 10 C. c. of distilled water. Pour the whole into the cup of Doremus's ureometer and carefully fill limb with it. Then by means of a curved pipette introduce 1 C. c. of urine into the soda solution. Effervescence takes place

and the soda solution is displaced by the gas formed. Every division on the scale of the instrument indicates 0.001 gramme of urea in 1 C. c. of urine.

(2) As bromine is unpleasant to use, try the hypochlorite method, with, for example, the instrument devised by Lyons or Squibb, or the apparatus of Fowler. In using the Lyons instrument proceed as follows :

Have ready two solutions: one of potassium bromide, 90 grains to the fluidounce in strength, the other Liquor Sodæ Chloratæ, preferably Squibb's. Do not use a stale sample of the soda solution. Mix 5 C. c. of the bromide solution with 25 C. c. of the chlorinated soda, let stand a few minutes, then pour into the ureometer.

Now fill the graduated test tube exactly to the mark with the urine to be examined, and lower it into the bottle by means of a thread, or by the aid of a pair of dressing forceps, taking care that none of its contents are spilled in the operation. Fill the graduated jar with water, which must be of the same temperature as the air of the room, to a point a little above the 0 of the scale, supporting the extremity of the overflow tube so that no water can escape. Remove the rubber cap from the vent tube and connect the apparatus, pressing in the rubber corks firmly so as to make the joints air-tight.

Finally put on the rubber cap, drawing it down so as to force a little water out of the overflow tube, and bring the level of the water remaining exactly to the 0 mark, the orifice of the overflow tube being on the same level. A little practice will make this easy.

To make sure that the connections are all perfectly air-tight, lower the end of the overflow tube a few inches; a few drops of water will escape from diminished pressure, but if the joints are perfect there will be no further dropping. If there is any leakage, the defective joint must be found, and the difficulty corrected before proceeding further with the experiment. Having made sure that the connections are perfect, catch the curved end of the overflow tube over the edge of a measuring graduate, (an ordinary bottle or any other receiver may be used in place of the graduate). Now, by canting the bottle, cause the urine to flow out of the test tube and mix with the hypobromite solution. Effervescence is at once produced, and the gas evolved forces a corresponding volume of water out of the overflow tube. Shake the bottle occasionally, but not too violently, to promote the escape of the gas. When the action appears to be at an end, pour into the measuring graduate water enough to reach above the opening of the overflow tube, in order that cooling of the gas evolved, which is at first

quite warm, may not draw air into the apparatus. Let the apparatus stand 15 or 20 minutes to cool, then shake the bottle containing the urine once more and proceed to read off the result. To do this, it is necessary to bring the opening at the end of the overflow tube just to the same level as that of the fluid remaining in the graduated cylinder, since raising or lowering the tube slightly affects the volume of the gas to be measured. The percentage of urea is read off without need of any calculation from the scale of the instrument.

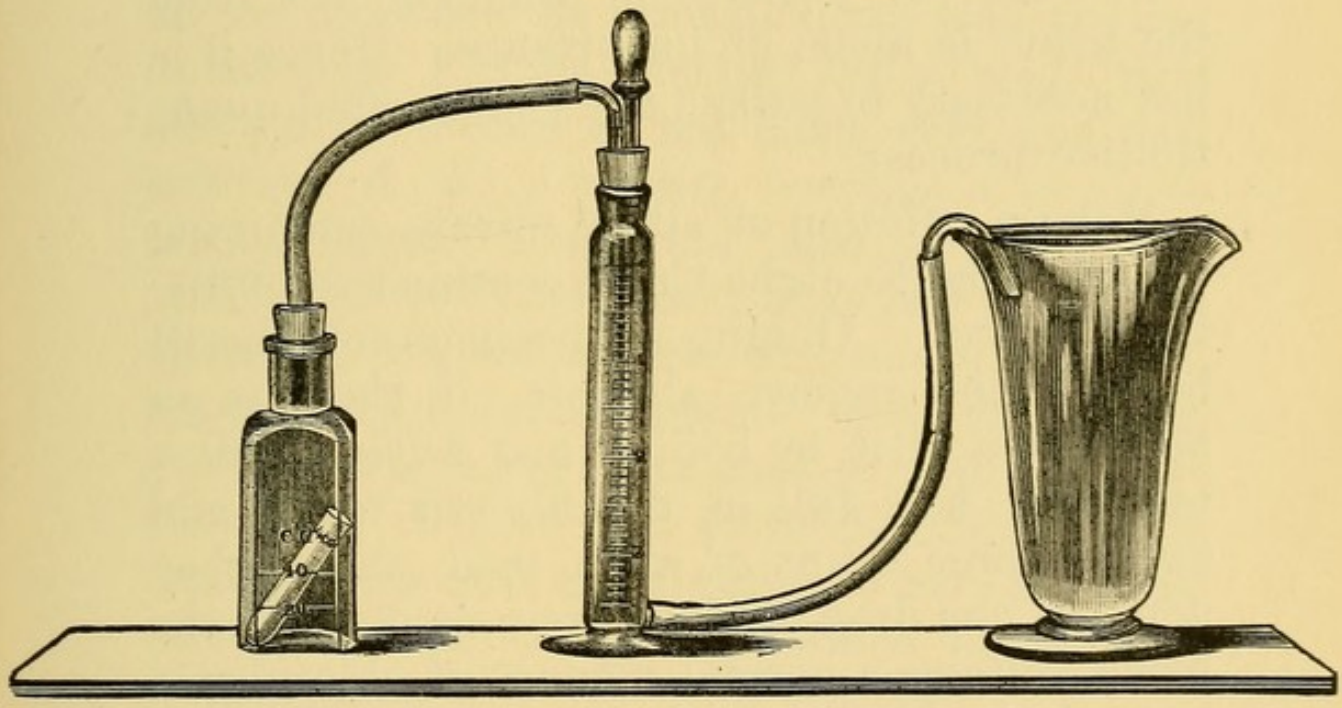


FIG. 1. LYONS'S UREA INSTRUMENT.

To calculate approximately the total urea of 24 hours, multiply the quantity of urine expressed in Cubic centimeters by the percentage of urea obtained. Thus, suppose quantity of

urine in 24 hours is 1500 C. c. Suppose percentage of urea is 2½. Then 1500 × .025 = 37.5 grammes of urea, approximately, in the whole urine for 24 hours. [To reduce to troy grains multiply by 15½].

If the urine is of specific gravity above 1025, dilute urine with equal parts water before estimating, and multiply percentage figure obtained by 2.

(*b*) Estimate the *sodium chloride* in an approximate way :

Decrease or absence of common salt from the urine is alone of importance. Hence it is not necessary to pursue any complicated quantitative process.

Make a solution of silver nitrate containing one gramme to eight Cubic centimetres of distilled water. Obtain a specimen of the 24 hours' urine, remove albumin, if there is an abundance of it, by boiling and filtering, fill a test tube half full of the filtered urine, add two or three drops of nitric acid, shake, then add just one drop of the silver nitrate. If the urine contains a normal amount of chlorides, a precipitate is formed in the shape of *cheesy lumps* which do not further divide, nor make the urine more milky, by moving the glass about.

If the chlorides are so diminished as to be of clinical significance, no lumps will form, but a

turbidity only, and the entire fluid becomes milky. (Tyson).

If no chlorides are present, there will be no turbidity at all. In cases where the physician may be unable to prepare a weighed amount of the silver nitrate, let him dissolve some of the crystals in distilled water and proceed as follows :

Procure half a dozen test tubes of the same size; make a mark with a file half way up each one of them; make another mark an inch, say, above this one, being careful that the marks on all the tubes are the same distance from the end of the tube. Fill the tube half full of urine, then add a drop or two of the nitric acid, and then solution of silver nitrate pouring it in up to second mark. Shake well and let precipitate settle. Set tube aside and next day repeat the operation in a second tube and compare results, noting height of precipitate. If the precipitate grows less and less in amount, it is an unfavorable sign; if more and more, favorable. It is important in each examination to have the urine of twenty-four hours from which to examine a specimen.

(*c*) Phosphates—*Earthy Phosphates :*

These may be approximately estimated as follows :

Get a test tube 16 centimetres (6.299 inches) long and 2 centimetres (.787 inch) wide. Make

a mark on it one centimetre from the bottom (.399 inch). Fill one-third full with clear or filtered urine, add a few drops of Aqua Ammoniæ or Liquor Potassæ, warm over a lamp until a precipitate is plainly seen. Lay aside for 10 or 15 minutes. If the sediment is noticeably above the mark, the earthy phosphates are increased; if noticeably below, decreased. (Hoffmann-Ultzmann).

Alkaline Phosphates:

Add to clear, filtered urine one-third its bulk of magnesian fluid (page 12). A snow white deposit takes place. If the entire fluid present a milky cloudiness, the amount is normal; if the cloudiness is denser and creamy, the amount is too great; if but slightly cloudy and transmitting light distinctly, the phosphates are diminished. (Tyson).

(*d*) *Sulphates.* Prepare solution of barium chloride (1 gramme in 8 Cubic centimetres of distilled water and one-half of one Cubic centimetre of hydrochloric acid).

To clear urine in beaker, add one-third its bulk of the barium chloride solution. Opaque milky cloudiness normal. Intense opacity, consistency of cream, too much. Slight cloudiness, too little. (Tyson). Compare with normal specimen to which the same amount of chemical solution has been added.

(*e*) *Urates.* Procure two very narrow test

tubes and on each mark with a file the same distance up. Fill one with normal urine up to the mark, and the other with the urine to be examined up to the mark. Then add to each one-tenth in bulk of hydrochloric acid. Let stand over night and compare quantity of deposit in the suspected urine with that in the normal. Use in each case a specimen of the 24 hours' mixed urine.

(*f*) *Coloring Matter.* A rough estimate of the coloring matter present in the urine may be made by noting the depth of color obtained with the nitric acid test (page 12). The darker the color zone, the more the coloring matter relatively. Compare with specimen of 24 hours' normal urine. For *indican* color zone use hydrochloric acid.

[The methods described from (*b*) to (*f*) are roughly approximate. It is wise in obscure disorders to make an estimation of the total *nitrogen* in the urine of 24 hours, also of the total *phosphoric acid* of the phosphates, of the *acidity*, and, if effusion be suspected, of the *chlorides*].

Reagents and Apparatus.

for chemical work in urinary analysis.

1 *Graduate*, 1,000 C. c. capacity.
1 *Graduate*, 100 C. c. capacity.
1 *Urinometer*, with beaker.

Sheets of litmus paper, blue and red.

Filtering apparatus: funnels, three or four inches in diameter; *filter papers*, seven and a half inches in diameter. *Filter ring* and *stand.* Several *beakers* of various sizes. *Test-tube rack*, two dozen medium size *test tubes*; two or three test-tube *brushes.* Half a dozen *nipple pipettes* ("medicine-droppers").

Alcohol lamp.

A glass *mortar* and *pestle.*

Half a dozen *conical glasses*, for collection of sediments.

1 albuminimeter (Esbach).

1 ureometer (Lyons).

A small *file.*

Magnesian fluid (see page 12).

Nitric acid, chemically pure, colorless.

Acetic acid, U. S. P. 36 per cent.

Fehling's solution (may be had in sealed flasks).

Compressed yeast, freshly made.

Spirit of Turpentine.

Tincture of guaiac.

Picric acid, pure crystals.

Citric acid, pure crystals.

Solution of *potassium hydrate*, sp. gr. 1060.

Liquor Potassæ, U. S. P.

Copper sulphate, pure crystals.

Neutral *potassium tartrate*, pure.

Liquor Sodæ Chloratæ (Squibb).

Solution of *potassium bromide*, (90 grains of the pure crystals to the fluidounce of water—six grammes to every 30 C. c. of water).

Solution of *silver nitrate*, (10 grammes in 80 Cubic centimeters of distilled water).

Aqua Ammoniæ.

Solution of *barium chloride*, (10 grammes of barium chloride, 80 Cubic centimeters of water, 5 Cubic centimeters of hydrochloric acid).

APPARATUS FOR URINARY ANALYSIS.

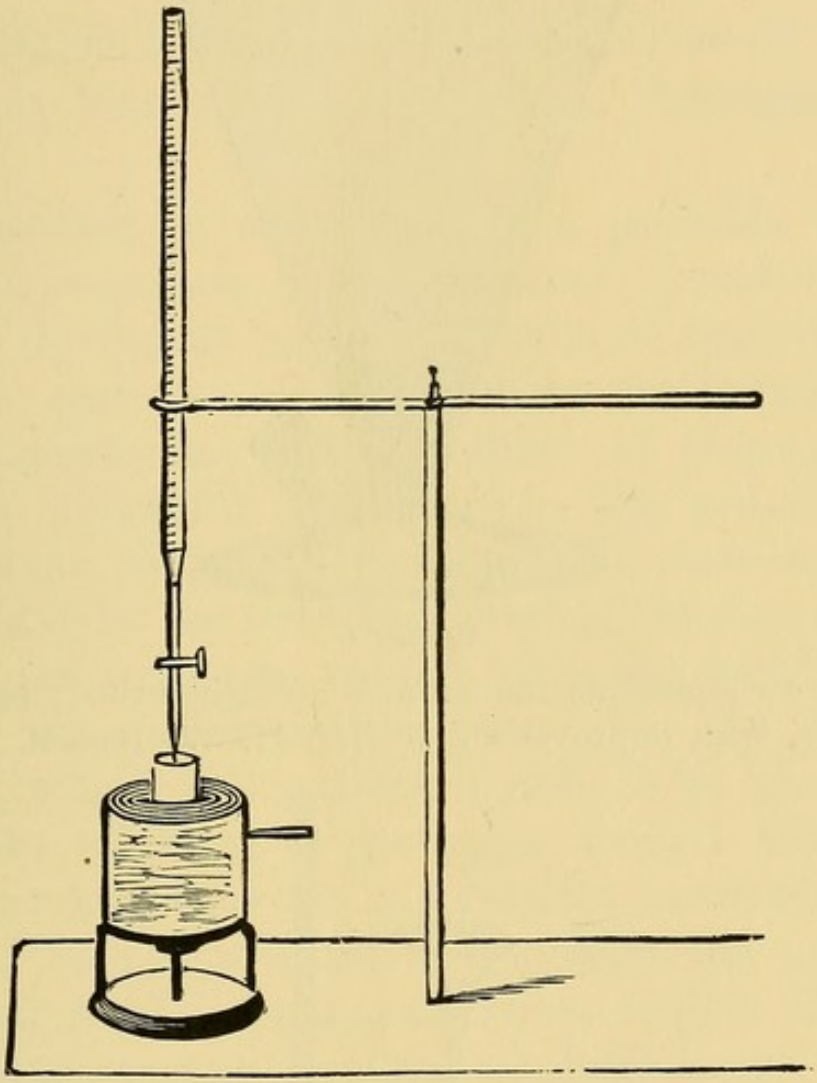


FIGURE 3.

Figure 3 represents the author's apparatus for volumetric analysis of phosphoric acid in the urine. It consists of a burette with glass stop-cock, a burette holder, a water-bath, and an alcohol stove.

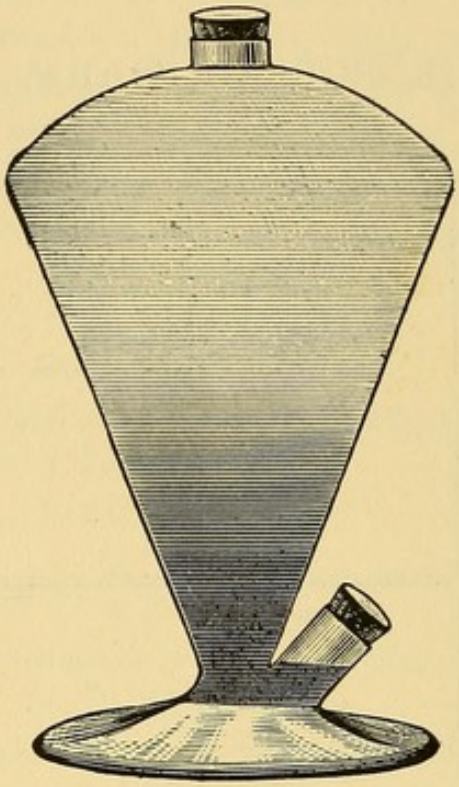


FIGURE 4.

Figure 4 represents the author's air-tight urinary sediment collector, with improvement by Dr. H. W. Bassett.

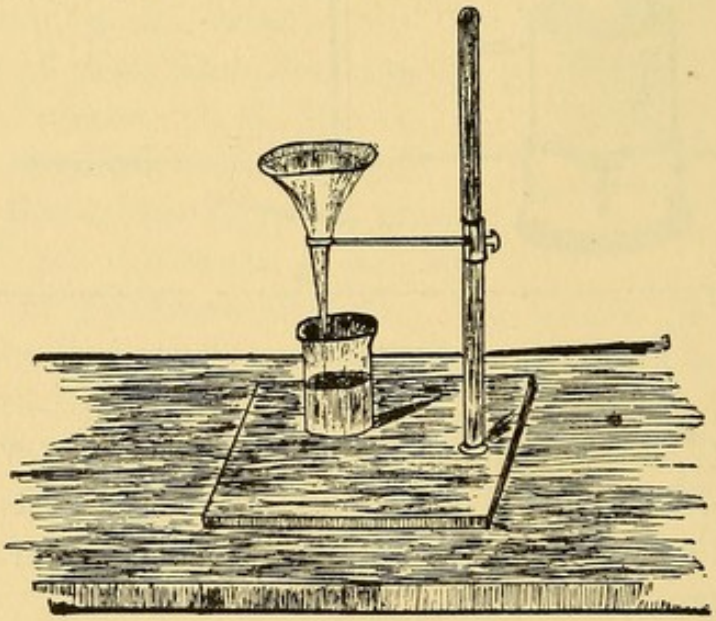


FIGURE 5.

Figure 5 represents a complete apparatus for filtering urine.

CHAPTER II.

Systematic Microscopical Examination of Urinary Sediments for Clinical Purposes.

Selection of specimen.—If a possible thing, collect in serious cases the urine of each micturition during at least one period of twenty-four hours, and examine the sediment forming in each specimen; if the number of micturitions be too great for this, examine the sediment in the *urine voided on rising in the morning*, that voided *after the principal meal of the day*, and at least one specimen voided *after the greatest exercise* which the patient may take. In chronic cases, where the patient is able to be about, be sure to examine a specimen voided after the patient has been on his feet for some time. I prefer to examine microscopically the urine of several micturitions as above, rather than to examine a specimen of the whole 24 hours' mixed urine: for, if the urine is secured as soon as voided, note may be taken of the *exact length of time* the sediment is in forming. Care should be taken, however, to examine the urine of at least three micturitions, namely as stated above, that voided on rising in the morning, that voided after digestion of the principal meal, and that voided after the principal exercise.

COLLECTION OF SEDIMENT.—The specimens of urine selected for examination should be poured carefully, and without agitating, into cylindrical glass vessels tapering toward the bottom and provided with a lip, and covered, so as to keep out dust. Let them stand in these vessels until the sediment, if any, has formed in each, noting the time it takes, provided the urine were clear when freshly voided.

Remove a drop of the sediment by means of a camel's-hair brush or a pipette. The latter should be made of glass tubing of small diameter, broken into suitable lengths. Glass tubing may be easily and evenly broken if filed with a sharp file at the point where it is desired to break it. Pipettes for work in urinary analysis *should not be drawn out to a point*, but broken squarely off. Close the upper orifice *tightly* with the forefinger, dip the lower orifice into the sediment, remove forefinger from upper orifice for an instant only. Then tightly close again as before and remove pipette from the urine. Have glass slide ready and deposit on it a drop of urine from the pipette. Next put on cover-glass over the drop, proceeding as follows: hold slide in left hand, take cover-glass with small pair pincers in the right. Touch cover glass to edge of drop and slip it gently over the top of the drop, until the latter has spread entirely under it. Remove liquid

outside the cover-glass by use of blotting-paper. Now place slide on stage of microscope.

[A microscope for urinary work may be had for from $45 to $65. It should be provided with two objectives, half-inch, fourth-inch or fifth-inch, and with two eye pieces, "A" and "C." The objectives, or object glasses, are the lenses which are to be placed on the lower part of the instrument near the object. They are so arranged as to screw on and off, and are never to be left on, except when the instrument is in constant use, but are to be kept in the metallic receptacles provided for them. In screwing them on and off, keep the fingers away from the glass, as it may be dimmed even by the vaporous exhalations from the skin]. In the first examination of a sediment, screw on the half-inch objective and put in the A—lowest power—eye piece. Next work the coarse adjustment until the end of the object glass is tolerably near the slide, look through the eye-piece to see if there is a proper amount of light. The instrument should be on a table before a window looking, if possible, in the opposite direction to which the sunlight is coming. If, on looking through the glass, not enough light is seen, manipulate the mirror below until the light is flashed up through the drop of sediment. A little patience will accomplish this object. Next, with the eye not look-

ing through the tube, but close down to the slide, work the adjustment until the object glass almost touches the cover-glass, being careful not to let it touch it nor grind down upon it. Then look through the tube and work the adjustment in the opposite direction, *i. e.*, moving the object glass very slowly away from the cover-glass. As the tube is moved, the objects in the sediment gradually become visible. Continue the movement until the objects are in focus, using the fine adjustment if the microscope possesses one. In studying the sediment with the microscope, move, or cause the slide to be moved—according to the kind of stage the microscope has—until all portions of the drop under observation have been thoroughly scanned. Notice whether the objects seem to have definite geometrical form or not; *i. e.*, whether they are crystalline or not. Then for closer examination remove the one-half inch eye-piece and study with the one-fourth or one-fifth inch, and highest power eye-piece. [Microscopes may be had provided with a nose-piece holding several objectives, each of which may be used as desired].

After the examination has been made, put back carefully the object glasses into their receptacles, take out the eye-pieces and put them away, and cover over the microscope with a pasteboard or glass cover. Wooden cases are

sold as receptacles for the microscope and all its appurtenances, and are handy to have. The eye-pieces can be kept in good order by removing dust from them with a camel's-hair pencil, or by a smart puff of breath, afterwards dissipating any vapor by rapidly moving the glass to and fro through the air. The best material for wiping glass is a piece of soft wash-leather, from which the dust has been well beaten out.

Rotate the eye-piece when looking at an object, and if the object rotates with the eye-piece it is some particle adhering to the eye-piece; remove by use of a clean, dry camel's-hair brush. If any cloudiness or dust is still present after the front and back surfaces have been thus carefully cleaned, unscrew, clean, and screw together again.

Use of Chemicals in Microscopical Work.—It is often necessary to study with the microscope the constituents of a sediment before and after addition of chemical reagents, as, for example, acetic acid. If it is desired to note the changes in the sediment as they take place gradually on addition of some chemical reagent, place a drop of the sediment on the slide, and near it a drop of the chemical solution; put a thin glass cover over the drop of sediment, and insert between the slide and cover glass the pointed end of a slip of blotting paper,

the other end of which is in contact with the chemical. By capillary attraction the chemical solution and sediment will gradually mix.

The change brought about by the chemical may be quickly shown by adding a drop of it to a drop of the sediment, using the pipette or camel's-hair brush.

IDENTIFICATION OF ORDINARY CONSTITUENTS OF THE SEDIMENT.—Notice whether the objects in the sediment seem to have color or are colorless.

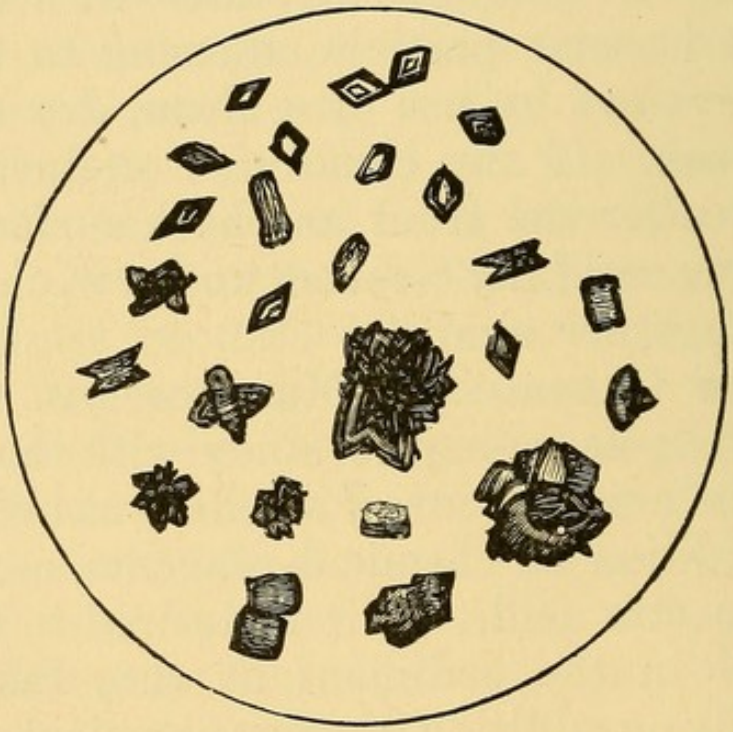


Figure 6.

Uric acid crystals (yellowish-red). X 150.

Uric acid crystals are found in urine *acid* in reaction, and appear to the naked eye like red-pepper grains.

Notice (1) whether they have definite geometrical form, as cubes, prisms, etc., or (2) are without geometrical form; *i. e.*, whether they are (a) crystalline, or (b) amorphous.

1. Objects having noticeable color, and marked geometrical form, are *uric acid crystals.*

Now change the one-half inch objective for the one-fifth inch and "C" eye piece and notice as before :

2. Objects having no color, but of form like the reverse of a letter-envelope or of dumb-bells, are *calcium oxalate crystals.* (See Figure 7).

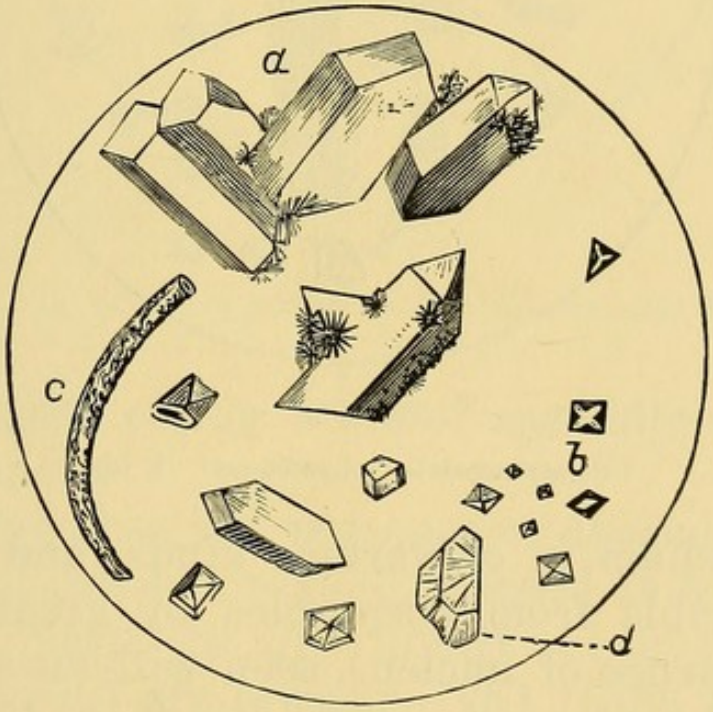
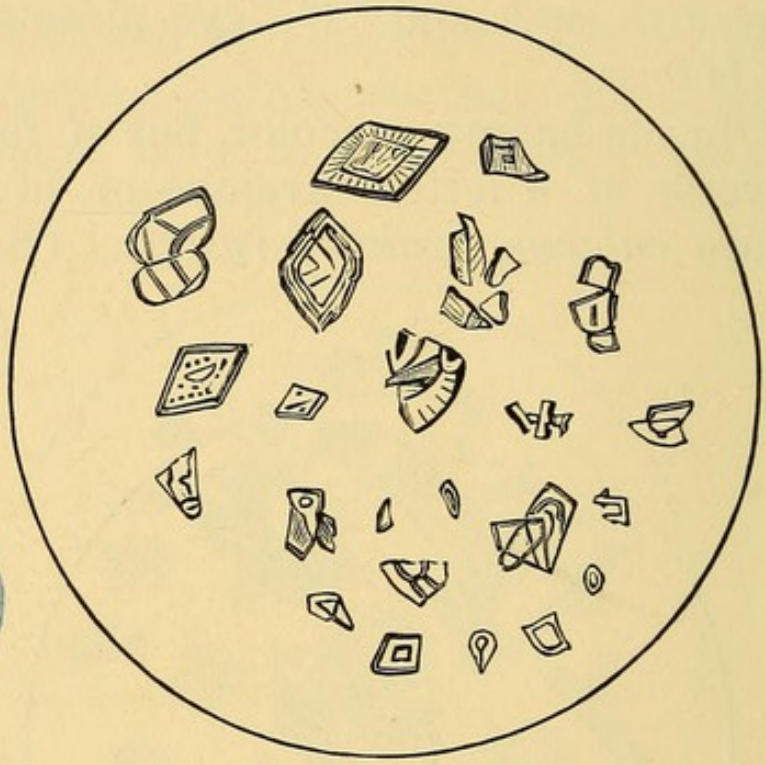


Figure 7.

(a) Triple phosphate (large). (b) Calcium oxalate (small colorless crystals). (c) Linen fibre. X 400. Crystals of triple phosphate are colorless, and found usually in *alkaline* urine.

3. Objects having neither marked color nor regular geometrical form, but of well-defined form, and not disappearing when the slide is warmed or when a drop of acetic acid is added, are probably *corpuscles* or *epithelium.* (See Figures 12, 13, 15).



TON MEDICAL
JAN 25 1917
LIBRARY

Figure 8.

Uric acid crystals (yellowish-red). X 150.

Epithelium is of various kinds, and is distinguishable from corpuscles by greater size and presence of nucleus, seen without addition of a drop of acetic acid. See Fig. 15. Corpuscles (blood) are shown in Fig. 12, and pus in Fig. 13.

4. Objects larger than the above, longer, and with more or less club-shaped extremities, are probably *tube-casts*. (See Figure 9).

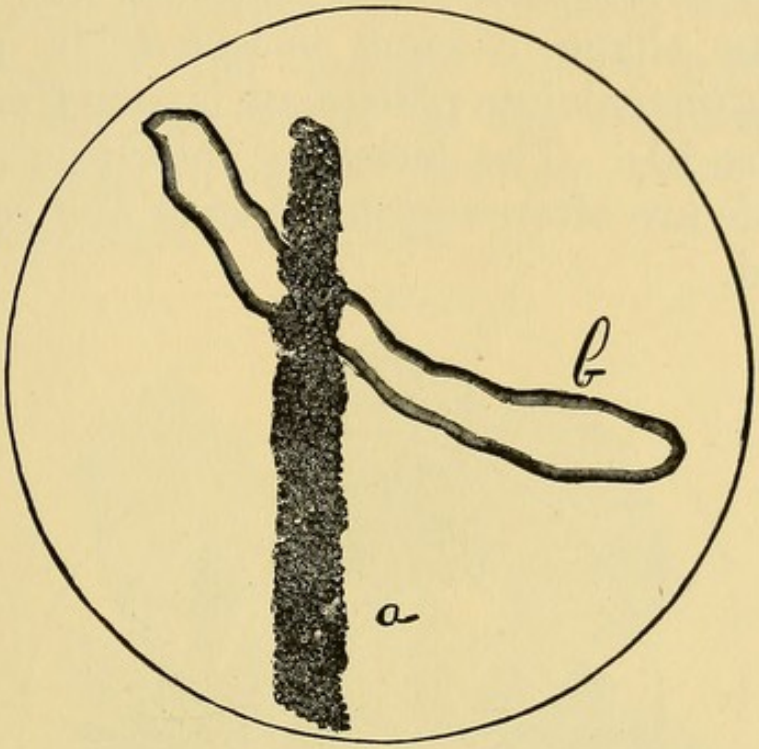


Figure 9.

Tube casts. (a) Long, dark, granular cast. (b) So-called waxy cast. X 400.

The casts of Fig. 9 are of specially unfavorable import.

Having observed presence or absence of uric acid and calcium oxalate, proceed as follows:

(a) Warm the slide gently; if the sediment clears, *urates* are present. (b) If the sediment does not clear on application of heat, take another slide, put on it a drop of the sediment,

then add a drop of acetic acid, removed from its bottle by means of a clean pipette, cover and examine as before ; if the sediment has disappeared on addition of the acid and was without definite shape, *calcium phosphate* is present. *Crystalline* calcium phosphate is sometimes seen. (Figure 10). The latter is colorless, and the crystals are often very handsome and regularly formed.

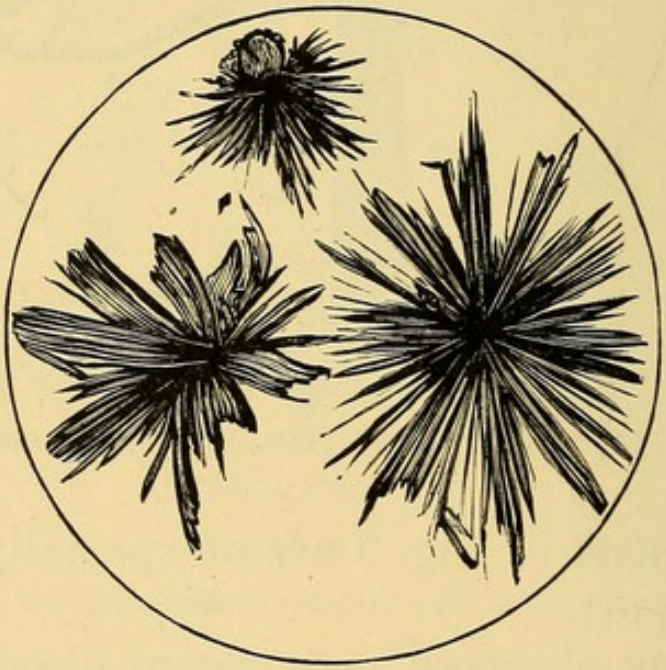


Figure 10.

Crystalline ("stellar") calcium phosphate (colorless), soluble in acetic acid. X 400.

Sometimes it is better to place a drop of the sediment on a clean glass slide, and near it a

drop of the acetic acid; then if a cover-glass be put over the sediment with a thread between the slide and cover, the thread communicating with the acetic acid, and the latter withdrawn by capillary attraction over into the sediment, the changes taking place can be noted as they occur. If the sediment contained large, prismatic crystals, *triple phosphate* is present. (See Fig. 7).

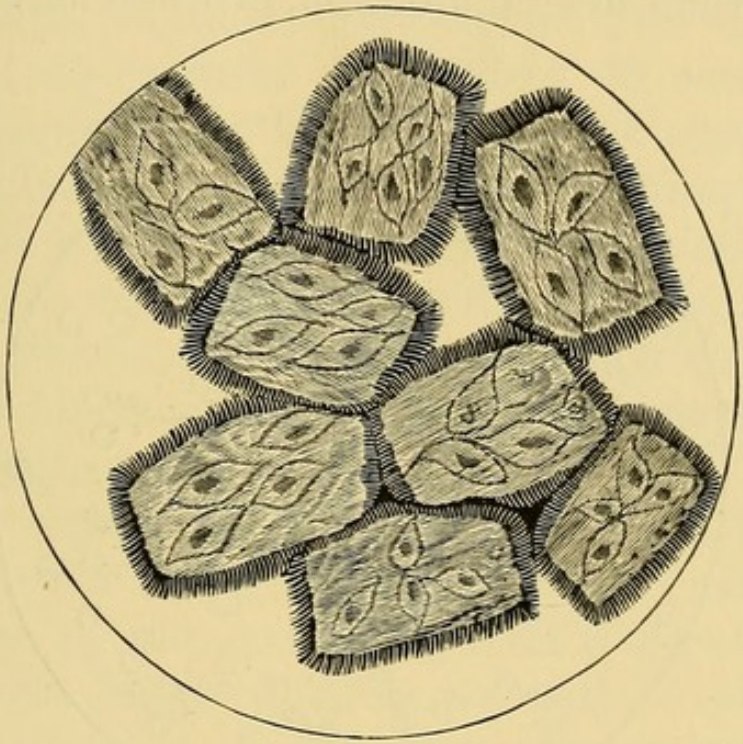


Figure 11.

Large yellowish-red crystals of *Uric acid*, covered with epithelial cells. X 400.

In Fig. 11, epithelial cells are seen covering the surface of the uric acid crystals. The nuclei are very plainly shown.

(c) After information has been gathered concerning presence or absence of urates and phosphates, look for *blood corpuscles;* if the urine is acid, and of normal specific gravity, these may be recognized without difficulty. If it is alkaline, it may be difficult or even impossible to recognize them. Obtain, therefore, a sample of the urine freshly voided, and keep tightly corked, in a cool place, until the sediment has settled, then, after collection, proceed as follows:

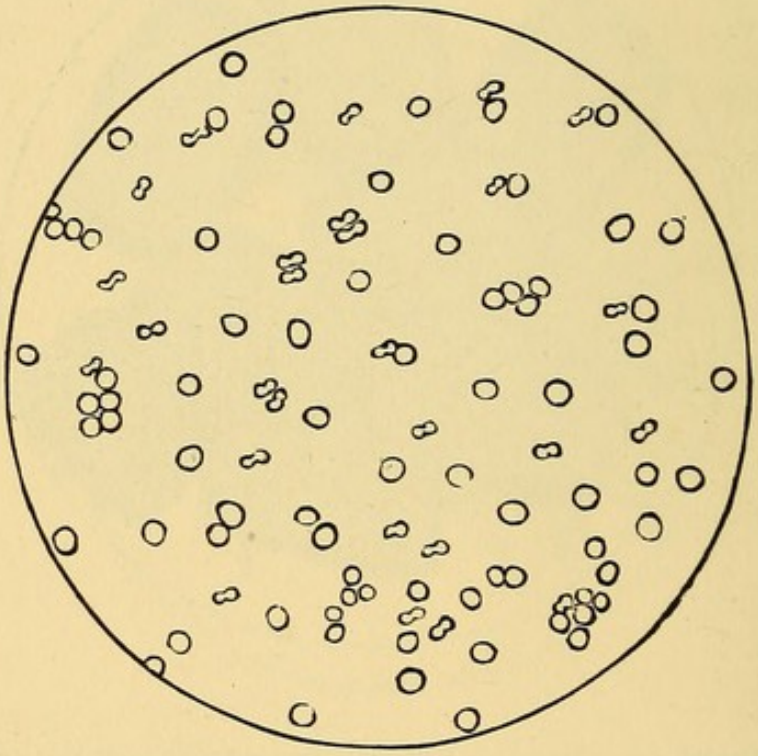


Figure 12.

Blood corpuscles. X 400.

[In order to identify blood corpuscles, a high power, 400 to 600 diameters, should be used].

First, obtain a drop of blood from the hand by the prick of a needle, and on looking at it with the microscope—using the one-fifth inch objective, and "C" eye-piece—a countless number of little, smooth, flat discs, either attached or adhering in rolls, yellow or reddish-brown in color, will be seen. These are called *corpuscles.* Notice that they have not a granular appearance, but, if the adjustment be moved so as slightly to change the focus, that they will change, as regards the shadow of centre and of circumference; that is, they are concave on each side, or bi-concave, and changing the focus will give a dark circumference and a light centre, or vice versa. Set the fluid in motion, and it will be easy to observe with a high power the bi-concave form of those standing on their edges.

Next mix a little blood with a little acid urine, let it stand for a few hours, and draw off some of the sediment with a pipette, and examine. No great changes will be observed except that the blood corpuscles are separate, no longer in rouleaux, and appear paler than before, reddish with a slight greenish tinge. Blood corpuscles remaining for several days in acid urine, if of average specific gravity, are likely to become notched or indented.

Blood corpuscles in urine of low specific gravity swell, become spherical, and lose color.

It is difficult to identify them in such urine. Such urine should be examined as soon as possible after being voided.

The spores of fungi resemble blood corpuscles; a high power will, however, show a "dot" in them called a nucleus; blood corpuscles have not this nucleus.

Examine always the sediment of a specimen of urine not over a day old at the most, and if circular discs or globules, without nuclei, separate, transparent or faintly yellow, with edges either smooth or dentated, are seen, blood corpuscles are present. Add a drop of acetic acid, and the corpuscles will either swell or shrink, and present a raspberry aspect.

(d) Next, or at the same time, look for *pus corpuscles*, using the one-fifth inch object glass and "C" eye-piece. These are spherical bodies, cellular in form, and larger than blood corpuscles. Obtain, if possible, laudable pus from a wound or abscess, and study them as in (c) mixing with urine, etc. They may be distinguished from blood corpuscles (a) by their nuclei shown by a drop of acetic acid, (b) by their size, and (c) their granulations. Blood corpuscles have no nuclei and are smaller than pus corpuscles.

Pus corpuscles are always colorless; they are heavier than blood corpuscles. Let a sediment, containing both blood and pus, settle,

and the pus will lie underneath the blood. In acid urine of high specific gravity, the pus corpuscles appear small and granular. In urine of very low specific gravity, they appear large and swollen, even two or three times as large as in normal urine; the granulations gradually disappear and the nuclei become very distinct. This may be shown by allowing pus to stand in distilled water for a time. In alkaline urine they appear large and swollen, and the nuclei are plainly visible. Pus corpuscles may be colored by iodine dissolved in potassium iodide solution; the corpuscles then appear yellow, and the nuclei darker or brownish-yellow. Dilute acetic acid (twenty per cent.) causes pus corpuscles to swell, the granulations to change and the nuclei to become rapidly distinct. In alkaline urine, after a time, the corpuscles coalesce, forming a homogeneous mass in which the nuclei only are visible. If in acid urine of average specific gravity, small, granular, spherical, or nearly spherical, cells, larger than blood corpuscles, are observed, pus is probably present. Add a drop of dilute acetic acid and notice the change in size and in the granulations and nuclei.

(e) *Mucus corpuscles:*—The description in (d) applies also to mucus corpuscles; these, however, seen with a high power, show usually but a single nucleus, whereas in the pus cor-

puscles, multiple nuclei may be observed. Finding a little albumin in the urine helps us to distinguish pus corpuscles from those of mucus; albumin is found in urine containing pus, not in that containing mucus alone.

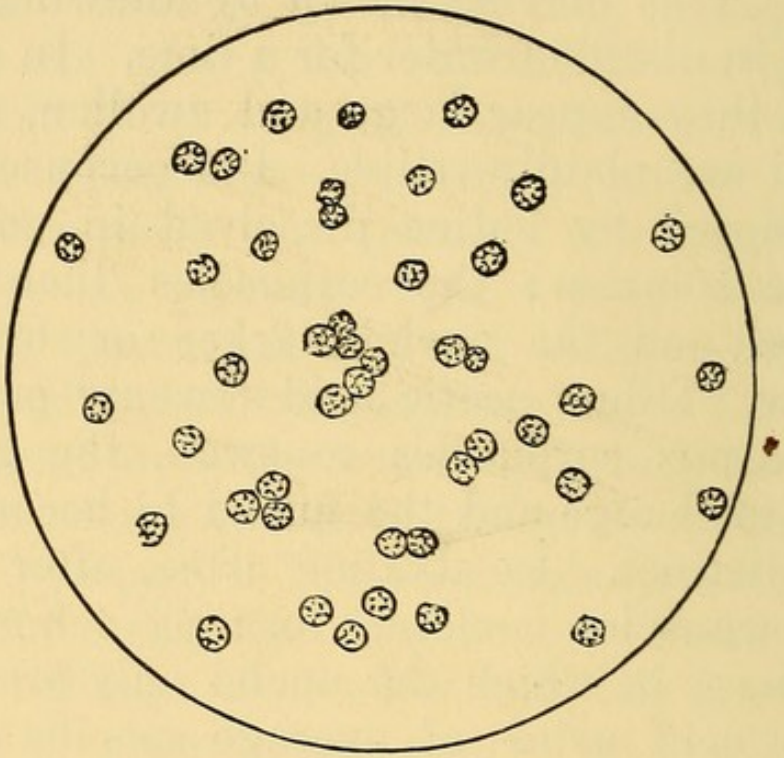


Figure 13.

Pus corpuscles. X 400.

(f) *Bacteria:*—These are the minute objects which give urine the turbidity which can hardly be removed by filtering. They appear with high powers either as (a) little trembling points of

uniform size and rapidly proliferating in putrid urine (micrococci or sphero-bacteria); or (b) minute lines, in length about the diameter of a red blood disk, sometimes at rest, sometimes vibrating (staff-shaped or rod bacteria, micro-bacteria); or (c) filamentous, both straight (bacillus) and curved (vibrio).

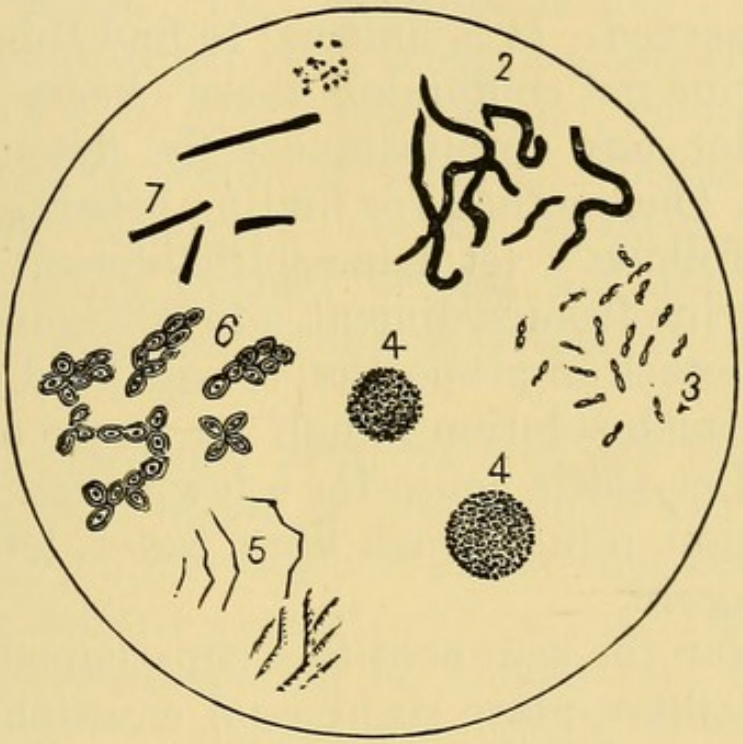


Figure 14.

Bacteria. X 700. 1. Micrococcus ureæ. 2. Vibrio. 3. Bacteria termo. 4. Zoogloea. 5 and 7. Bacilli. 6. Torulæ.

To detect bacteria in *freshly voided* urine proceed as follows: Add one drop of aniline

violet solution to one drop of the urine on an object-glass. Cover with a cover-glass, hold a short time in alcohol-lamp flame, let cool, examine with the microscope. The bacteria are stained violet and thus readily seen. (Fig. 14).

In urine containing pus, blood and granular detritus it is sometimes possible to find fragments of *cheesy* matter insoluble in acetic acid. In these fragments the *tubercle bacillus* has been observed. It is unusual to find this bacillus in urine not containing these cheesy lumps, and under any circumstances the detection is difficult. One method for finding tubercle bacilli is as follows*: let urine settle, decant supernatant urine from sediment, add 20% solution of caustic potash in proportion of six fluid ounces of the potash solution to half an ounce of sediment. Let settle again for a few hours, decant supernatant liquid, wash with water, let settle, decant again.

Transfer the sediment to a cup-shaped glass, stir well, filter, place residue on a watch-glass, crush some of the matter between two cover-glasses, slide one of the glasses slowly off of the other, pass this glass through flame three times slowly so as to fix it, let cool, and float in staining fluid. To make the staining fluid, mix 5 C. c. carbolic acid with 100 C. c. of distilled water. Carefully filter. To 100 C. c. of

*Ehrlich's process as modified by Kirstein and Bayard Holmes.

the filtered water add 11 C. c. of a concentrated alcoholic solution of methyl violet or fuchsin, and 10 C. c. of absolute alcohol.

Warm the fluid and let the cover-glass float in it for an hour. Then take out, rinse with distilled water, wash out color for a few seconds with diluted nitric acid (one part of official nitric to three of water), rinse again with distilled water. The sediment is put into a 1 or 2 per cent. aqueous solution of Bismarck-brown for half a minute to a minute, rinsed, dried, mounted in water or Canada balsam and examined. The pus cells and some of the other bacteria are stained brown, but the tubercle bacilli have taken on a dark blue or red-brown color.

(g) *Epithelial cells:*—These are often much larger than blood or pus corpuscles; they do not resemble crystals at all, having neither color nor definite geometrical shapes. Three kinds of epithelium should be looked for: 1. Round cells; 2. Cylindrical or conical; 3. Squamous.

Derivation:—Round cells may come from the kidney tubules or pelves; they are larger than pus or blood corpuscles, and have a single nucleus distinctly seen without aid of reagents. Sometimes round cells may come from the epithelium of the prostate, in which case "plugs" of pus corpuscles are found with them. Very large round cells may come from the bladder.

Fig. 15 shows various kinds of *epithelial cells*, the more or less oval part in each being the *nucleus*.

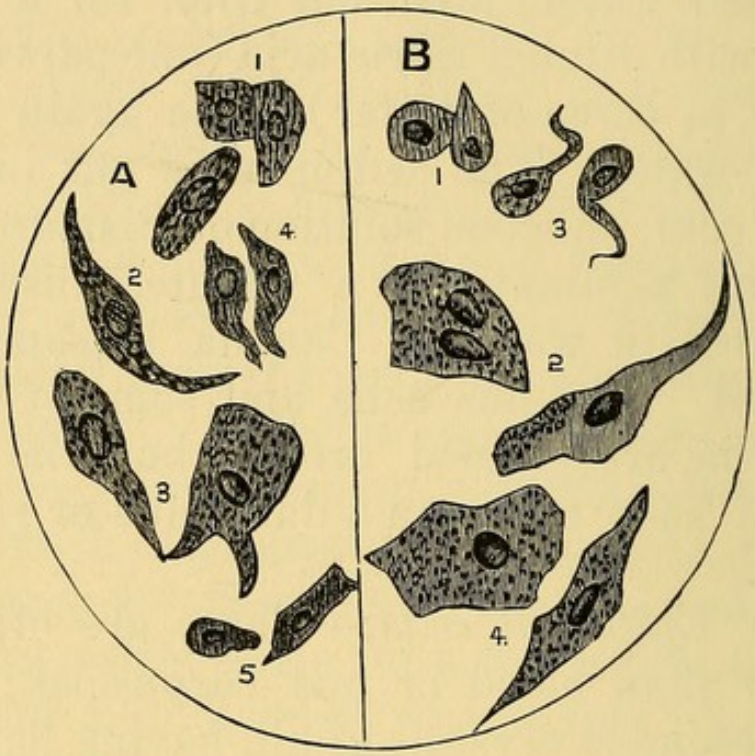


Figure 15.

Epithelial cells. X 400.

A 1 are cells from the straight tubes of the kidneys; 2, from renal pelvis; 3, from bladder; 4, from prostate; 5, from Cowper's gland. B 1 are from male urethra; 2, female urethra; 3, from Littre's glands; 4, vaginal epithelium.

Kidney epithelium:—The forms of epithelium are variable and their size greater than that of blood corpuscles; epithelial cells from the genito-urinary tract may be round, oval, or irregular. A drop of acetic acid renders them pale and brings out their nuclei very distinctly. *Look especially for round cells with a single nucleus distinctly seen without use of acetic acid.* (Figure 15).

It is, however, unwise to assert, dogmatically, that a particular variety of epithelium is from the kidney and no other locality. It is usually possible to make the diagnosis in diseases of the kidneys without being obliged to rely on identification of epithelial cells as a sole means. But the detection of tube-casts and the study of the different varieties of them is of the highest importance.

Tube-casts:—These are cylindrical, voluminous bodies of greater or less length rarely exceeding the 1-50th of an inch, of variable aspect, sometimes indistinctly outlined, generally of round or club-shaped extremities. (Figures 16 and 17).

If in an albuminous urine anything is seen longer than it is broad, with sides more or less parallel and rounded extremities, it is probably a "cast." Use a power of 400 to 500 diameters. I classify "casts" as follows:

I. *Blood plugs*, or blood casts proper: little

plugs of blood corpuscles with parallel sides and rounded ends. Sometimes both large and small blood plugs may be seen. *They are not of common occurrence, but when found are positive evidence of renal hæmorrhage*, though not necessarily of organic renal disease. Do not mistake aggregations of fungus spores for them.

II. *Pus plugs:* Plugs of pus corpuscles found in purulent urine and often seen in chronic pyelitis, sometimes in diseases of the prostate. Pus plugs may be roundish, oval, or even long, as in the case of the purulent plugs of the ductus papillares which are characteristic of chronic pyelitis. In the latter disorder the pus corpuscles are often branched or have tooth-shaped projections, unlike the pus corpuscles of prostatic affections.

III. *Casts not plugs of blood or pus.* I recognize two kinds of such casts.

1. Hyaline casts without epithelial cells, blood corpuscles, oil droplets, or granules, or containing at most one or two of the above. (True "hyaline casts"; when solid in appearance and resembling molten wax,"waxy casts").

Hyaline casts are often without epithelial cells, nuclei, or blood corpuscles, and generally with but few granules or oil drops, although sometimes completely without all the above. They have clear, well-defined margins, delineated by a distinct line. They are usually

curvilinear, though sometimes rectilinear, having their extremities cut like glass and their surface usually polished. They may contain cracks and roughness due to blood globules, epithelial cells, and here and there one or two oil drops. The hyaline cast proper, however, is independent of epithelial cells and is generally believed to be a peculiar fibrinous substance, thrown out of the blood into the uriniferous tubules and thence discharged into the urine.

2. Hyaline casts studded, covered to a greater or less degree with, or entangling, either epithelial cells, blood corpuscles, oil droplets, or granular matter.

If the cast plainly shows the epithelial cells of the renal tubules attached to it or implanted in it, it is customary to call it an "epithelial cast;" if it appear studded with blood corpuscles, it is called a "blood cast" though this term is really improper and belongs to those described in I.

If the cast show only the nuclei of the renal epithelial cells, it is called a "nucleated cast." If the epithelial cells or blood corpuscles in the cast have degenerated, so as to be but partially recognizable or wholly unrecognizable, the cast is called a "granular" one, and highly granular, moderately granular, or slightly granular, according to the amount of granular matter present.

Yellow casts are of the granular variety, their material being derived from broken-down blood corpuscles. They are very easily found owing to their bright color.

Lastly, if the cast show oil drops, either free or contained in its epithelial cells, it is called a "fatty cast" or an "oil cast." Casts are sometimes "cork-screw" in shape, sometimes tubular. Fat or oil globules, when once identified, will never be confounded with any other substance seen under the microscope. They may be studied by strongly shaking freshly voided urine with a little milk, and then examining a drop with a half-inch objective. The fat or oil globules present the form of smooth, roundish, flattened disks strongly refracting light. They show, therefore, a sharp, dark outline.

N. B.—Pale, smooth, delicate films or streaks of mucus are sometimes mistaken for casts. But the outlines of these "mucus casts," so-called, are usually irregular and hard to define, and their extremities irregular and ragged. They are often of great length, twisted on themselves, and terminate in imperceptible lines.

How to find Tube-Casts in Urine.

First, obtain urine *freshly voided*, and, if possible, that voided after the most active exercise of the day, whatever its nature. *It is very im-*

portant to obtain freshly voided urine. Pour the urine at once into a tapering glass, add some antiseptic substance like salicylic acid, chloroform, resorcin (five grains to the fluidounce of urine) or oxynaphthoic acid. The latter, if it can be obtained, is better for use in albuminous urine.

Let the urine settle. If (*a*) there is a sediment, then take a pipette made of quarter-inch glass tubing, cut at right angles at both ends, and not drawn to a point, and remove urine from the *top* of the sediment or from the stratum just above the superior border of it. In using pipette, remove finger cautiously and let urine run in slowly. Place a number of thin drops of the urine on the glass slide, *do not use cover-glass.* Examine first with low power (200 diameters) and, on finding anything resembling a cast, study with higher power (400 to 500 diameters). If no casts are thus found after some twenty drops have been examined, dip the pipette down deeper into the sediment, and examine the urine of different layers. It is sometimes the case that one or two hyaline casts will be seen in one drop of urine and none at all in twenty or thirty drops examined before or after it. After the casts have been found, note whether they are hyaline, epithelial, or granular, then study them more particularly, using cover-glass. If epithelial,

note whether the epithelial cells are well preserved or degenerated; note the *color* of the casts, remembering that if yellow, destruction of the blood corpuscles in the tubules is indicated. Look especially for fatty casts.

If (*b*) there is no sediment after the urine has stood for a few hours, sprinkle with a fine insoluble powder, like light carbonate of magnesium. This by sinking slowly through the urine will carry the floating casts with it. Then, after it has settled, examine as before. Instead of the powder, one-tenth (by volume) of hydrochloric acid may be added which *in time* will precipitate uric acid from the urine. The latter in settling may carry floating casts with it to the bottom of the glass. [It may be profitable to have made to order a tapering glass with lower end drawn out into a fine tube and provided with an india-rubber tube, glass jet, and pinch-cock. After the urine has settled, a drop for examination is obtained by pressing the pinch cock and letting urine flow through jet to slide held beneath]. The author has, however, devised an apparatus of a different nature.

In order to facilitate the collection of urinary sediments, and to retard the decomposition of the urine, I have devised an air-tight collector, use of which will be found especially advantageous in cases where tube casts are to be looked for in urine containing but little sediment. It

is well-known that it is next to impossible to discover tube-casts in alkaline urine, and also that some urines are more prone to decomposition than others. The advantage, therefore, of preventing access of air, dust, etc., to the urine will readily be appreciated. The collector consists of a tapering glass in form of an inverted cone, curved, and expanded to a mouth at the bottom. The mouths may be tightly closed by a rubber cork. The whole may, for convenience, be provided with a foot, joining on at the curved lower part of the instrument. (See figure 4 on p. 42).

In order to fill the instrument, insert the rubber cork into the lower orifice or mouth; remove the cork from the upper orifice, and pour the urine into the collector, preferably from a lipped beaker. Do not fill entirely full, but leave a little space at the top unfilled. Then close the upper orifice tightly with a rubber cork. Tip the instrument until the urine flowing from below fills up the space left empty at the top and recedes from the lower curved portion or mouth, leaving there a small space unfilled. After the sediment has settled, remove the cork from the lower orifice, and take out the sediment with a nipple pipette, or by dipping into it a camel's-hair brush. I have found it a good plan to stain the urine slightly with filtered solution of eosin before setting

aside to settle. The collector should be *thoroughly cleaned* before it is used. It is advisable to wash out with a little Liquor Potassæ, then with muriatic acid, finally with water.

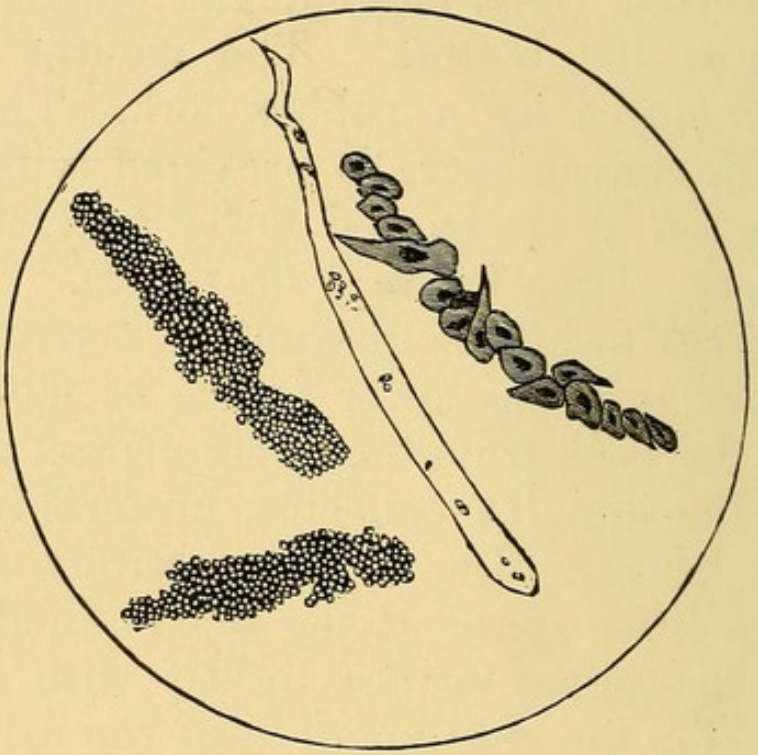


Figure 16.

Various kinds of casts. X 400.

In Figure 16 are seen several kinds of tube casts. At the left, *granular;* in the centre, transparent *mucous* cast; at the right, *epithelial.*

Various casts are also shown in Figure 17.

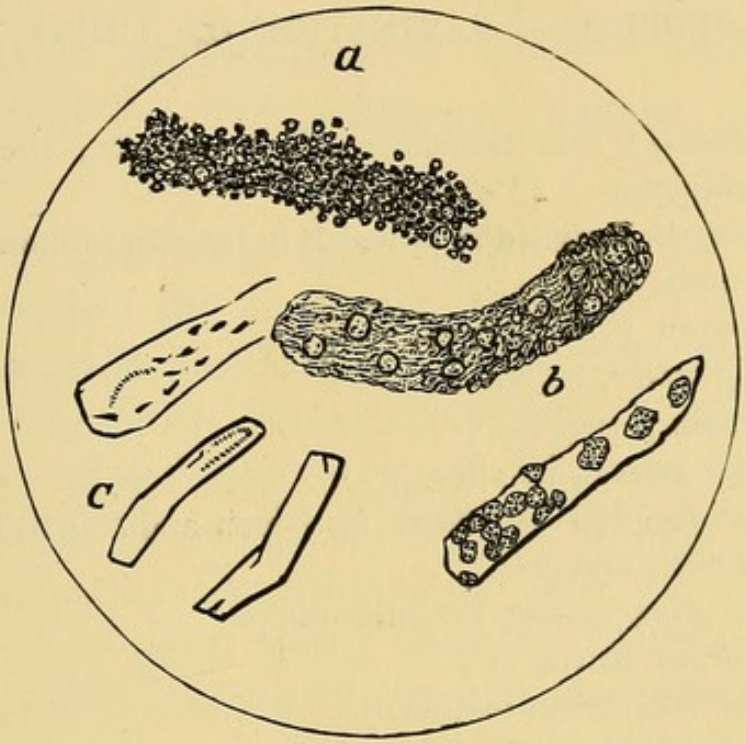


Figure 17.

Tube casts. X 400.

(a) *Blood casts* proper, sign of renal hemorrhage.

(b) *Epithelial casts*, dotted with small, round cells (of very common occurrence in acute and subacute nephritis).

(c) Small hyaline casts. One or two of these found in nearly every case of albuminuria.

List of Reagents and Apparatus for Microscopical Examination of Urine.

Cylindrical glass vessels as, for example, the author's air-tight collectors. (Page 42).

Pipettes, six inches and upwards in length, broken squarely off at the ends.

Two dozen *glass slides.*

Cover glasses, ad lib.

Small pair *pincers.*

Blotting paper, in slips.

Microscope, two *objectives*, half-inch and fourth-inch, two *eye-pieces*, "A" and "C."

Case or *glass cover* for microscope.

Camel's-hair brush.

Piece of soft wash-leather.

Acetic acid, U. S. P., and also 20 per cent.

Alcohol lamp.

Watch glasses.

Solution of *aniline violet*, (concentrated).

Solution of *caustic potash*, 20 per cent.

Carbolic acid, C. P.

Concentrated solution of *methyl-violet*, or *fuchsin*, in alcohol.

Dilute *nitric acid* (1 in 3, see page 61).

Two per cent solution *Bismarck-brown.*

Filtered solution of *eosin.*

CHAPTER III.

Systematic Application of Urinary Analysis to the Diagnosis of Disease.

This chapter has been written to serve as a link between the manuals of urinary analysis, which contain more chemistry than medicine, and the books on diagnosis which contain more medicine than chemistry. I hope to show the practitioner the actual results to be obtained in differential diagnosis, by use of chemical processes, in such a way that the value of chemistry in medicine may be realized even by those who take but comparatively little interest in the former.

It must, of course, be understood that the author is not so visionary as to claim that the diagnosis of disease can be made with unerring certainty by means of examination of the urine alone. What is sought is to arrange the knowledge of the present day in such form that the physician can readily grasp it.

Suppose, now, that a specimen of the mixed urine of twenty-four hours has been examined chemically and microscopically, or, at least, chemically, and that the results are as follows:

1. ALBUMIN FOUND. — Differentiate between (A) *functional albuminuria*,* *i. e.*, presence of albumin in the urine due to disturbance of function of the kidneys, and (B) *organic albuminuria*, *i. e.*, that due to lesion.

How to make the differential diagnosis between functional and organic albuminuria: First, test for *pus* and for *blood.* Examine the urinary sediment for *epithelial casts.*† Estimate the quantity of *urea* in the twenty-four hours' urine —normal amount of urea, 20 to 40 grams, or 309 to 617 grains, 2 to 2½ per cent. Test the urine repeatedly for *albumin* and at different hours of the day. Consult the following table:

TABLE IV.

DIFFERENTIAL DIAGNOSIS BETWEEN FUNCTIONAL AND ORGANIC ALBUMINURIA.

FUNCTIONAL.	ORGANIC.
1. Albumin rarely persistent, though at times may be abundant. None in "night urine," that is urine voided on rising in the morning. None in urine voided while patient is kept in bed.	1. Albumin usually persistent, though not always abundant. Albumin, when present, found at all hours in the day. May be intermittent and yet organic.
2. No dropsy.	2. Dropsy common.

*Vogel, Edlefsen, Tessier, Pavesi, Ralfe, Lepine, and many others are our authorities on functional albuminuria. Great care must be taken before pronouncing a case of albuminuria to be functional. The author has seen relatively few patients with true albuminuria who *in time*, did not manifest signs of organic renal disease.

†A single small hyaline cast may be found in functional albuminuria.

TABLE IV.—CONTINUED.

FUNCTIONAL.	ORGANIC.
3. No epithelial casts.	3. Epithelial casts when nephritis is present.
4. No great diminution in urea, and 24 hours' specific gravity 1015 to 1025.	4. Urea usually diminished,* or sp. gr. of mixed urine of 24 hours not normal.
5. No uræmic convulsions nor changes in the heart and vascular system.	5. Uræmic convulsions or cardio-vascular change.
6. No acute disease; no true gout; no retinal changes.	6. Acute febrile disorders; or true gout; or retinal changes.
7. No pus or blood.	7 Pus or blood present, as in pyelitis, cystitis, etc.
8. Patient under 40.	8. Patient 40 or over.

When a patient who applies for life-insurance has an albuminuria, he should be "passed," if, in all other respects, he is in good health; *provided*, however, he is (1) *under forty years of age*;† (2) there are no tube casts found in the urine after careful and repeated examination (except possibly a single, small hyaline cast in cases of paroxysmal albuminuria); (3) the specific gravity of the 24 hours' mixed urine

*Remember, however, that the total amount of urea in 24 hours is diminished in almost every long continued organic disease, especially if the patient is bed-ridden or takes but little exercise. The average amount of urea in 24 hours, for a healthy man of 147 pounds, is about 33 grammes or 512 troy grains.

†I have not as yet seen a case of albuminuria in a patient *forty or over*, which I could conscientiously pronounce "functional," though I am aware that such cases are constantly reported.

is between 1015 and 1025; (4) there are no signs of hypertrophy of left ventricle or of high vascular tension. The applicant must be free from true gout and show no signs of retinal change.

If, from study of the above table, and from examination of the patient, the albuminuria would appear to be *functional,* it can probably be referred to some one of the following conditions:

(A) CONDITIONS IN WHICH FUNCTIONAL ALBUMINURIA MAY BE FOUND.—The urine may contain albumin in cases of hepatic derangement; vague dyspepsia, after eating largely of eggs and cheese; *after cold baths or exposure to cold; after prolonged study, with mental anxiety; in overwork and ill health;* when masturbation is practiced; after injuries to the head; in epilepsy, tetanus, exophthalmic goitre. In blood poisoning from malaria, jaundice, scurvy, syphilis, etc., and in poisoning by lead, mercury, phosphorus, iodine, etc.* The urine of corpulent people may contain traces of albumin, usually with excess of urea and high specific gravity. *Intermittent paroxysmal albuminuria* may occur in the puerperal state, unattended by dropsy or eclampsia, but often accompanied by *slight jaundice.*

"Albuminuria of adolescence," so-called, may

*Carefully distinguish from *nephritis* due to toxic agents.

be noted in young men. But little albumin may be found in the morning urine, more at noon, less again in the afternoon, none in the evening and night. Sometimes *no* albumin may be found in the urine voided on rising in the morning, or when the patient is kept in bed.

(B) *Diagnosis in cases of organic albuminuria:* (*a*) First note whether the patient is suffering from some *acute febrile disorder*, as diphtheria, small-pox, measles, erysipelas, typhoid fever, pneumonia, etc., in which case the albuminuria, if beginning early in the disease, will probably be of brief duration, and is not necessarily a sign of nephritis. [True nephritis is a comparatively rare complication of small-pox, measles, typhus fever, and acute rheumatism, and, when present, occurs toward the close of the illness. In diphtheria, acute nephritis is sometimes present, but will occur toward the end of the malady. Even in scarlet fever the presence of albuminuria in the *early part* of the disease may not be significant of nephritis]. When albumin is found in the later stages of these disorders, pay attention to the points brought out in Table VI. (*a*), under the head of "Acute Nephritis." [Even if albumin and blood be found together, acute nephritis is not necessarily present, unless there are other signs, such as diminished quantity in twenty-four hours, diminished solids,

presence of casts, and, in the patient, dropsy, etc.; urine will contain blood and albumin in many hemorrhagic forms of small-pox, acute rheumatism, scurvy, purpura, etc., and even in certain intermittent fevers, but no nephritis may exist].

If, however, the patient *has had* scarlet fever, the presence of albumin, together with blood and casts, diminished quantity in twenty-four hours and decreased specific gravity, points toward that form of acute nephritis known as scarlatinal nephritis. The appearance of casts in the urine is among the earliest evidences of this disease, and at first they are mostly hyaline; later, epithelial and bloody; still later, granular and fatty. The patient will be dropsical and much swollen about the face; there is pallor of countenance.

If none of these diseases be present, but (*b*) the patient be *a pregnant woman*, the presence of puerperal nephritis may be suspected. The chief points are the quantity of urine in twenty-four hours and the amount of urea and solids; if these are greatly *decreased*,* even though the albumin be small in amount, the tendency is toward nephritis. Hyaline, granular, and fatty

*Refer to Tables I. and II. in Chapter I. for averages. Remember, however, that a decrease in the quantity of twenty-four hours' urine is often observed during the later months of pregnancy. A *very great* reduction in the quantity is suspicious.

casts, if found, are of positive value in making the diagnosis.

If no febrile disorder enumerated in (*a*) be present, and the patient be not a pregnant woman, but there is pyrexia, dropsy, anæmia, the case is probably one of *acute idiopathic nephritis*, due, in most cases, to moist, cold atmosphere, though possibly to extensive lesions of the cutaneous surface, or to the action of toxic agents, as cantharides, nitre, etc. (See Table VI. (*a*) for variety of lesion).

If the case is clearly not one already recognized, test the urine for pus *and* blood, or, if the latter be not present, for pus alone. If both, or if pus alone is found, pass on to (*d*). If not, (*c*), consider the disorders outlined in Table VI. Become familiar with the *synonyms* of kidney diseases (Table V.), then study the *constructive diagnosis* (Table VI.), then the *differential diagnosis;* and also the *prognosis* in Chapter IV. Study the *treatment* in Chapter V.

TABLE V.—Synonyms of Diseases of the Kidneys.

DISEASE.	SYNONYM.
Acute Nephritis.	Acute Bright's disease. Acute croupous nephritis. Acute tubal nephritis. Acute parenchymatous nephritis. Acute desquamative nephritis. Acute catarrhal nephritis. (Scarlatinal nephritis is a form of acute nephritis).

TABLE V.—CONTINUED.

DISEASE.	SYNONYM.
CHRONIC NEPHRITIS.	"Second Stage of Bright's Disease." Chronic parenchymatous nephritis. Chronic catarrhal nephritis. Chronic tubal nephritis. Chronic diffuse nephritis. Chronic croupous nephritis. Large white kidney; after a year, secondary contraction of the kidney.
CIRRHOSIS OF THE KIDNEYS.	"Third Stage of Bright's Disease." Chronic interstitial nephritis. Granular atrophy of the kidney. Genuine contracted kidney. Contracted kidney. Renal sclerosis. Granular degeneration of kidney. Red granular kidney. Chronically contracted kidney. Gouty kidney.
LARDACEOUS DEGENERATION OF THE KIDNEYS.	Amyloid degeneration. Amyloid kidney. Waxy, amyloid, or albuminoid transformation of the kidney.
ACUTE CONGESTION OF THE KIDNEYS.	Acute hyperæmia.
CHRONIC CONGESTION OF THE KIDNEYS.	Passive congestion. Cyanotic induration.

In order to be able to arrive at the proper diagnosis, go through with the following as far as practicable: measure the *quantity* of urine voided in twenty-four hours; take the *specific gravity* and the reaction; observe the *color*, the quantity and color of the sediment; calculate the amount of solids; estimate the quantity of albumin; test the sediment chemically, or examine with the microscope for urates, uric acid, *blood*, calcium oxalate; look for *blood cor-*

puscles, *tube casts*, epithelium, and oil globules, with the microscope; if tube casts are found, observe whether they are *hyaline*, *epithelial*, *granular*, or *fatty;* observe whether the normal constituents, *urea*, *chlorides*, *phosphates*, etc., are increasing or decreasing. If cirrhosis of the kidney is suspected, estimate total phosphoric acid.

In examining urine, obtain as many specimens as possible, preferably the whole quantity voided in 24 hours. Do not attempt to make a diagnosis from examination of an occasional specimen of urine, and always examine microscopically, in connection with the 24 hours' urine, a sample of freshly voided urine. In using Table VI. do not expect to find your cases *identical* with those described there, but seek to find that particular disorder outlined which resembles most the case you are studying. In making up your mind as to the character of the urine pay attention to the latter as seen in the *majority* of instances.

Be sure to notice *whether*, *as a rule*, *the urine is dark in color or light*, *and whether*, *as a rule*, *blood and blood casts are present in the sediment or not.*

Next consult the following table:

TABLE VI. (*a*)—Acute Nephritis.

Variety of lesion. (Delafield).	Etiology.	Symptoms.	Urine in 24 hours.	Color of Urine.	Sp. gr.	Albumin.	Sediment. (Microscope).
Acute exudative nephritis. (Essentially a transitory lesion).	Idiopathic or as complication of scarlet fever, diphtheria, and many infectious diseases.	Fever, prostration, and perhaps anæmia, cerebral symptoms, and disturbances of circulation.	More or less diminished.	Higher than normal.	More or less increased.	More or less abundant.	Pus-cells, blood-cells, casts mostly hyaline and epithelial.
Acute parenchymatous nephritis. (Secondary nephritis).	*Result* of poisons as mercury, arsenic, phosphorus, or in infectious diseases, scarlet fever, pneumonia, diphtheria, small pox, typhoid, septicæmia, pyæmia; rheumatism, peritonitis, meningitis, tetanus, severe jaundice, severe burns, after surgical operations.	May be no renal constitutional symptoms. Symptoms may be masked by those of the poison or disease. Usually œdema of eyelids and feet; cerebral symptoms, as headache, drowsiness, convulsions, or coma, nausea, vomiting,	Quantity of urine in 24 hours small.	Abnormally high.	Higher than normal 1020 to 1030 but the total quantity of solids is diminished and that of the urea.	Trace to one or even two per cent by weight. In severe cases urine solidifies when boiled.	Early in disease casts abundant, small and chiefly hyaline, epithelial, and finely granular. Later: some coarsely granular, fatty, and larger.
Acute diffuse nephritis.	Idiopathic or as a *sequela* of acute diseases, especially scarlatina. May complicate pregnancy.	Idiopathic: chill, fever, pain in back, etc. Sequela: headache, drowsiness, stupor, pallor, œdema, dropsy.	Very small, 16 fl. oz. to 4 fl. oz. or even suppressed. Micturition frequent and painful.	High and may be "smoky" or blood-color.	Lower than normal 1020 to 1012, with decreased solids.	Albumin 0.3 to 1 per cent or more. Urine contains blood.	Blood and many blood casts diagnostic. Present also hyaline, epithelial, and finely granular casts.

Chronic Parenchymatous Metamorphosis: In this condition there is cloudy swelling, granular and fatty change in the epithelial cells lining the urinary tubules, but merely an œdematous and not an *inflammatory* change in the intertubular tissue. The kidney is enlarged.

Modern writers use the term "metamorphosis" to indicate a certain *change*, not really inflammation as usually defined and understood, but a transformation in which the epithelial cells lining the uriniferous tubules lose the power of eliminating the products of tissue metabolism, are changed by these effete matters, and pass through various retrograde conditions viz. *cloudy swelling* (a change due to imbibition on part of the elements of renal epithelium of a fluid albuminous in nature, the protoplasm becoming turbid) *granular change*, fine and coarse, in which the epithelium is not only cloudy but infiltrated, and *fatty transformation* in which the destroyed protoplasm is replaced by fat globules. [These changes do not satisfy our definition of inflammation in which we expect to find, first, a determination of blood to the part, then stasis, escape of liquor sanguinis, migration of white corpuscles, etc.]

The lesions described in Table VI. (*b*) are forms of *large white kidneys.*[1]

1 In acute parenchymatous metamorphosis enlargement is usual but not invariable.

TABLE VI. (*b*).—Chronic Parenchymatous Metamorphosis of the Kidneys.

Lesion.	Etiology.	Symptoms.	Quantity Urine.	Color of Urine.	Specific Gravity.	Albumin.	Sediment.
I. Chronic parenchymatous nephritis, proper. Tubular change. Large white kidney.	Acute attacks often unrecognized. Hepatic disorders. Repeated attacks of acute diseases. Poisons, as alcohol. Over-feeding. Over-work.	Headache, nausea, vomiting; œdema eyelids and ankles. Later, dropsy and dyspnœa. Lastly, cerebral symptoms: stupor, delirium, etc.	24 hours' quantity decreased: 10 to 25 fluidounces. 300 to 750 C. c.	Very high.	Higher than normal, 1018 to 1030; *total* solids, (urea, etc.) diminished.	Abundant. 1 to 3% by weight. One-third to three-fourths by volume.	No blood casts. Large hyaline. Coarsely granular and fatty casts. Cast debris and degenerated epithelium abundant.
II. *Chronic* nephritis of pregnancy. Tubular change. Large white kidney developed.	Pregnancy: increased nervous irritability and increased work required of the kidney.	Occipito-frontal headache, œdema of eyelids, dimness of vision. Later, cerebral symptoms: patient nervous, anxious, almost delirious.	Slow but steady decrease in quantity for some time, followed by sudden decrease at times, especially before convulsions.	Varies with quantity, the less urine the higher color.	Varies with the quantity. Solids (urea etc.) usually diminished in total quantity.	Variable. May be only a trace or very plenty.	No blood casts except when renal obstruction very great. Otherwise as in I. Blood not found, except a few corpuscles.
III. Chronic diabetic nephritis.	Diabetes mellitus.	First, those of diabetes. Later, loss of appetite, failure of digestion, uræmic symptoms.	First, as in diabetes; later, decreased or even suppressed.	First, as in diabetes; later, very pale.	First, as in diabetes; later, low.	First, none; later, a trace.	First, no casts, but late in the disorder a few hyaline and fatty sometimes granular.

N. B.—The change in the kidneys occurring in the course of wasting diseases is omitted as having little or no clinical bearing.

Diffuse Nephritis, Chronic: In this condition there is not only change in the tubular epithelium, but also in the intertubular tissue. The latter is infiltrated with new cells and thickened. Exudation of all the constituents of the *blood* into the renal substance takes place. In one form the large white kidney is found; in two forms the kidneys are diminished in size, one small kidney being accompanied by hyaline thickening and expansion of the afferent Malpighian vessel, the other not. (Porter).

In chronic diffuse nephritis, it should be noticed, there is a true *inflammation* of the interstitial tissue and not merely an œdematous thickening. The change in the epithelial cells is that known as chronic parenchymatous metamorphosis described before, page 83. [The broad classification adopted by many authors, viz.: *tubal nephritis*, *interstitial nephritis*, and *lardaceous disease* is not in my opinion entirely satisfactory. Cases are seen in which it is possible to make a closer diagnosis of the pathological condition than by referring it by name to one of these three disorders. Urine not typical of any one of these lesions is often seen].

TABLE VI. (*c*).—Chronic Diffuse Nephritis.

Lesion.	Etiology.	Symptoms.	Quantity Urine.	Color of Urine.	Specific Gravity.	Albumin.	Sediment.
I. Large white kidney, with also some intertubular inflammation.	Exposure to changes in temperature and in patients who have eaten much and exercised little. Repeated attacks acute diseases. Often no well-defined cause.	Frontal headache, nausea, œdema, etc.; Sometimes coma, convulsions, or sudden death without other symptoms.	Variable: at times large, at times small. Fluctuation of diagnostic importance.	Usually pale and peculiarly turbid.	1025 to 1005 but usually 1018 to 1010.	Variable in quantity. May be absent or trace; or abundant.	Small in amount and variable in composition. Casts may be absent or abundant. In acute exacerbations blood and blood casts. Casts large or medium.
II. Small white kidney with great intertubular inflammation and vascular thickening.	As in I., but syphilis is usually the cause.	As in I. Hypertrophy of heart usual.	Usually very much increased: 60 to 120 fluidounces; 1800 to 3600 Cubic centimeters.	Pale and peculiarly turbid.	Low. From 1012 down.	Steadily abundant as a rule.	Casts hard to find. Occasionally a few small hyaline or fatty casts discoverable in the scanty sediment.
III. Small white kidney without vascular thickening: tubular and intertubular tissue about equally affected.	As in I. and II.; especially after previous attacks of acute nephritis.	As in I. and II. Dropsy usually considerable.	Decreased. 15 to 40 fluidounces; 450 to 1200 Cubic centimeters in 24 hours.	Pale and peculiarly turbid.	1025 to 1010; usually high.	Steadily abundant as a rule.	Casts continually abundant and of all kinds, though blood casts only occasionally.

Cirrhosis of the Kidneys. In this disorder, known also as *sclerosis*,[1] the lesion is primarily in the intertubular (interstitial) tissue. The kidneys are *diminished* in size,[2] dark in color,[3] and the surface underlying the thickened, adherent capsule is rough and granular.[4] The walls of the afferent vessels are thickened[5] and their lumen is expanded. The epithelial cells of the tubules become atrophied[6] without active lesion.

In sclerosis proper, albumin is rarely found and then only at times, casts being absent or at most one small hyaline cast is discovered. Examination of the urine in a large number of cases has convinced me that it is unsatisfactory from even a clinical point of view to restrict lesions of the kidneys to three in number, viz.: parenchymatous change, intertubular inflammation, and waxy transformation. For example, in several cases after twenty or more examinations of the 24 hours' urine, extending over a period of six or eight months, I have found albumin *constantly* present and tolerably abundant, without casts, with the 24 hours' urine increased in quantity, and the color pale. Such a case, all other things being equal, I regard as belonging to the *diffuse* group.

1 From a Greek word signifying "rough." 2 Owing to contraction of newly formed connective tissue. 3 Small red kidney, so-called. 4 Granular contracting kidney. 5 Owing to a fibrous deposition—capillary fibrosis of Gull and Sutton. 6 From pressure of contracting newly formed connective tissue.

TABLE VI. (*d*).—Sclerosis of the Kidneys.—Interstitial Nephritis.

Lesion.	Etiology.	Symptoms.	Quantity of urine.	Color.	Specific Gravity.	Albumin.	Sediment.
Acute sclerosis of kidneys (rare).	Not well understood.	Dropsy may be marked.				May be absent.	
Chronic sclerosis. (Chronic interstitial nephritis).	Not clearly known. Tertiary syphilis a possible cause. Rheumatism, lead, alcohol, etc. probably only coincident.	Vague dyspepsia, dimness of vision, intractable facial neuralgia, occipito-frontal headache. First symptoms noticed may be uræmic convulsions or deep coma.	Very much increased.	Pale as water.	Low, often from 1010 to 1005	At most a trace. Usually absent in true sclerosis.	Sediment usually absent altogether; sometimes a hyaline cast is discovered.
Gouty nephritis. (Sclerosis with crystals of sodium urate in tubules).	Gout.	Same as sclerosis, and in connection with gout.	Greatly increased.	Like water.	Low.	As above.	As above as regards casts. Crystals of sodium urate and uric acid in sediment.

N. B.—The large quantity of urine in interstitial nephritis is explained by the hyaline or fibroid transformation of the arterioles.

Remark: it is quite possible for deposition of sodium urate crystals to take place in diffuse nephritis and the name "gouty kidney" is sometimes given to such a disorder.

Lardaceous Kidneys; In the so-called hyaline, waxy, amyloid, or lardaceous kidney there is a peculiar metamorphosis, albuminoid (amyloid) in character which has taken place in the walls of the vessels of the kidney, more particularly in those of the Malpighian tuft.[1] The kidneys are large and dark.[2] Capsule normal, non-adherent. Surface of kidney is smooth in uncomplicated cases.

TABLE VI. (*e*).—LARDACEOUS KIDNEYS.

Synonyms.	Etiology.	Symptoms.	Condition of the urine.
Amyloid kidney. Waxy kidney. Albuminoid kidney. Hyaline kidney.	Syphilis the most important and usual factor. May occur in connection with long-continued suppurations, but not invariably. Is often a complication of chronic diffuse nephritis.	Not marked. Symptoms those of primary exhausting disorder. Often diarrhœa, enlargement of liver and spleen. Œdema slight or absent.	Quantity, very large. Color, like water. Specific gravity very low, 1005 and lower. In uncomplicated cases, albumin absent or but a trace. Casts usually absent but occasionally a hyaline one found.

1 The walls of the afferent vessels are thickened and their lumen increased as in sclerosis.

2 A form of large red kidney.

Renal Congestions: Hyperæmia of the kidneys may be (1) active, or (2) passive. In active hyperæmia there is an abnormal influx of arterial blood; in passive hyperæmia some obstruction to the venous circulation is the cause of the engorgement. In active hyperæmia the principal pathological conditions to be noted are merely heightened color in the cut surfaces of the kidney, vessels engorged with blood, and dark red spots where congested Malpighian tufts are located. In passive hyperæmia, however, there is a condition known as "cyanotic induration of the kidney," the organ being extremely hard, dark, and as a rule larger than normal; the large veins are found to be engorged, while in active hyperæmia the arterial capillaries and tufts show the greatest engorgement.

Hyperæmia of the kidneys, more particularly the chronic condition, "cyanotic induration," has been thought to be one of the diseases to which the very general term "Bright's" is given; but the tendency of modern thought is to regard it rather as a *cause* of renal lesion: for death rarely results from cyanotic induration itself but quite usually from the primary disorder (lesion of the heart or lungs) or from a complicating acute nephritis with uræmic attacks, or a series of exacerbations finally proving fatal.

TABLE VI. (*f*).—Hyperæmia of the Kidneys.

Lesion.	Etiology.	Symptoms.	Quantity of Urine.	Color.	Sp. Gr.	Albumin.	Sediment.
Acute Congestion. (Acute hyperæmia). Not properly a form of Bright's disease.	Exposure to cold. Malarial attacks. Irritating diuretics: nitre, cubebs, turpentine, copaiba, cantharides; carbolic acid. Acute diseases as measles, smallpox, scarlet fever, nephritis.	When due to cold or drugs: chill, pain on voiding urine and in loins and hypogastric region. Otherwise, symptoms of disease to which congestion is due.	Diminished. In some cases almost total suppression. Occasionally total suppression.	Very much increased; urine colored by urates, with which it is loaded, as congestion subsides.	Increased. Usually above the normal range.	May be wholly absent or else in proportion due to presence of blood, or due to pressure.	May contain blood. Sometimes nothing but urates. Hyaline casts and even blood casts may possibly be found.
Chronic Congestion. ("Cyanotic induration"). Not properly classified under the head of Bright's disease.	Long-standing obstruction to the return of blood by the inferior vena cava. Conditions in which there is interference with cardiac or pulmonary circulation: valvular disease of the heart, emphysema, etc., etc. Pregnancy. Thrombosis cava or renal veins.	Those of primary disorder. Œdema *begins* in lower extremities and extends *upwards*. Patient sometimes has bluish color of skin, associated with dyspnœa and cardiac disease.	Scanty or very much diminished in quantity. May grow steadily less until uræmic convulsions set in.	Very dark. Urine often colored by large amount of urates.	Specific gravity increased. Ranges often as high as 1035, usually 1020 to 1030.	Small in amount; after excesses or exposure exacerbation may occur and urine becomes highly albuminous.	Mostly urates. Sometimes a few hyaline casts, blood corpuscles or blood casts found. During exacerbations, casts, epithelial and blood, abundant. During remissions casts absent.

Differential diagnosis in diseases of the kidneys: A. First, differentiate between *acute* nephritis and *chronic* nephritis in general. If some well marked acute disease is present or the patient is suffering from metallic poisoning and nephritis is present, it is of the *acute* form and readily recognized. Nephritis occurring as a sequela to some acute disease as scarlatina is recognized as acute by the rise in temperature, diminished quantity of urine, smoky blood color, presence of blood and blood casts in sediment. After scarlatina look for acute nephritis on the 14th to 22d day after invasion. Nephritis from exposure to cold or from unknown cause is *acute* when there is chill, fever, pain in back and bladder, œdema of lower eyelids and feet, difficult frequent micturition, urine diminished in quantity and so on. Consult Table VI. (*a*) for differential diagnosis in the different forms of acute nephritis. The essential point is the presence or absence of blood and blood casts. Presence of the latter in abundance indicates a *diffuse* lesion. Distinguish further between acute nephritis and acute exacerbations of a chronic nephritis. The history of the case must be diligently studied, and effort made to determine whether the patient has been ailing for some period of time, especially if with some obscure disorder in which the urine has been too abundant or not

abundant enough, or in some way has attracted the patient's attention.[1] In absence of any history and with presence of symptoms of acute nephritis, it is probably the latter and not an acute exacerbation. Well recognized symptoms of chronic nephritis [Table VI. (*b*), (*c*), (*d*), (*e*), (*f*),] in the past, with decrease in quantity of urine, increase in albumin, presence of epithelial and blood-casts following sudden exposure to cold, excesses of any kind, or digestive disturbances, point to exacerbations of a chronic condition. A series of exacerbations and remissions may quite commonly be noticed in the course of a chronic renal lesion. Large casts indicate an advanced renal lesion. Mild cases of acute nephritis may present themselves in which pyrexia is not marked and pain not severe. Œdema and dropsy may be the initial symptoms, together with dimness of vision. Waxy pallor, if present, is characteristic of nephritis especially that due to metallic poisoning.

No attention is to be paid to the confident assertion of the patient that he is "perfectly well." The conscientious practitioner can not close his eyes to certain well-marked signs of surely fatal disease.

1 If a patient has been suffering for some time from an obscure puzzling disorder, it will very often be found, on close study, that he has a disease of the kidneys.

TABLE VII.—Symptoms possibly present in Acute Nephritis.[1]

Cerebral.	Gastro-intestinal.	Respiratory.	General.	Febrile, etc.
Occipito-frontal headache.	Loss of appetite.	Difficulty in breathing.	Œdema: *first* in tissue about inferior eyelids; then in lower extremities, upper extremities, and finally general anasarca.	Chill.
Contraction of pupils.	Loathing of food.	Asthmatic paroxysms.	Effusions into serous cavities.	Fever.
Injection of conjunctivæ.	Nausea.		Œdema of glottis possible.	Pain in back and region of bladder.
Dimness of vision, (retinal and optic lesions).	Vomiting.		Waxy pallor.	Myalgia.
Drowsiness.	Diarrhœa.			Frequent and painful micturition.
Stupor.				Suppression of urine.
Delirium.				
Coma.				
Convulsions.				

1 It is not to be supposed that *all* these symptoms will be present in any one individual case. See next table for most common combinations.

TABLE VIII.

SYMPTOMS OF ACUTE NEPHRITIS—GROUPED AS THEY OFTEN PRESENT THEMSELVES.

ACUTE PARENCHYMATOUS NEPHRITIS.			ACUTE DIFFUSE NEPHRITIS.				
I.	**II.**	**III.**	**IV.**	**V.**	**VI.**	**VII.**	**VIII.**
Headache.	Œdema: eyelids and feet.	Nausea.	Chill.	Symptoms as in IV., followed by those as in I; in 24 to 36 hours, death n severe cases.	Symptoms as in I., followed by œdema, dropsy; with headache, drowsiness, stupor. (Sub-acute cases).	Œdema.	Increased temperature.
Dimness of vision.	Diminished urine.	Vomiting.	Fever.			Dropsy.	Headache.
Drowsiness.	Cerebral symptoms as in I. with gastro-intestinal as in III.	Loathing of food.	Pain in back, and in bladder.			Nausea.	Drowsiness.
Stupor.		Diarrhœa, and so on.	Difficult and frequent micturition.			Slight pain in back.	Stupor.
Delirium.			Diminished urine.			Dimness of vision.	Waxy pallor.
Coma.			(Initial symptoms of acute nephritis due to exposure to cold or from unknown cause).			Waxy pallor.	Myalgia.
Convulsions.						Anæmia.	Œdema, face and extremities.
(These may be the only renal symptoms in the course of an acute febrile disorder).	(These are the most commonly observed renal symptoms *in the course of* an acute disease as scarlet fever, diphtheria, typhoid fever).	(These symptoms noticeable in the course of metallic poisoning).				Vomiting.	Anasarca.
						Severe dropsy.	Dropsy.
						Drowsiness.	Great dyspnœa.
						Stupor.	(14th, 20th, 21st or 22nd day after invasion of scarlet fever; in severest cases suppression of urine, coma, and convulsions.
						(Milder cases).	

Acute nephritis is distinguished from acute hyperæmia by the large amount of albumin and abundance of casts.

Acute nephritis is distinguished from chronic hyperæmia in the same way; moreover, in chronic hyperæmia there is often cyanosis, evidence of valvular lesion, more or less dyspnœa. [But exacerbations in the course of chronic hyperæmia resemble acute nephritis as to urine in the presence of abundance of casts, quantity of albumin, etc.; nevertheless, during remissions, the casts may disappear and albumin is diminished to a trace].

The nephritis so-called of *pregnancy* resembles in early stages an acute lesion, later a chronic; it is often, in all probability, a parenchymatous change, and blood, as a rule, is absent from the urine.

B. Having decided that the case is *not* one of acute nephritis but that the disorder is chronic, it becomes important for purposes of prognosis and treatment (Chapters IV. and V.) to differentiate among the various forms of chronic nephritis. Accomplish this by a study of Table IX. If the disorder is chronic diffuse nephritis, ascertain which form is present by study of Table VI. (*c*).

Find whether the disorder resembles parenchymatous change, diffuse nephritis, sclerosis, lardaceous disease, or chronic hyperæmia.

TABLE IX.—Differential diagnosis in chronic renal lesions.

Chronic Parenchymatous Change.		Diffuse Nephritis.	Sclerosis.	Lardaceous Disease.	Chronic Hyperæmia.
URINE:					
Quantity:	Small.	Large or small according to form.	Large.	Large.	Small.
Color:	High.	Pale.	Pale.	Pale.	High.
Sp. Gr.:	High.	Low in two forms, high in one.	Low.	Low.	High.
Albumin:	Abundant.	Absent, variable, or abundant.	Absent or trace.	Absent or trace.	Small in amount.
Casts:	Large, numerous, debris considerable. No blood casts.	Absent, fluctuating, or abundant. Blood casts found.	Absent or but one or two.	Occasionally a hyaline cast.	Infrequent: sediment contains urates.
SYMPTOMS:					
Œdema:	Early and general.	Not usually early but almost always present in due time and well marked.	If any, is late.	Seldom present and not marked.	First in lower extremities, gradually working up.
Uræmia:	Late.	May be found early.	Early.	If any, late.	Late, as urine progressively decreases.
Dimness of vision:	Uncommon; cerebral in origin.	Common and sometimes cerebral, but often retinal.	Common and cerebral or retinal.	Not common.	Not common, except in exacerbations.
Miscellaneous:	Features puffy and pallid.	Waxy pallor sometimes observed.	General condition well-preserved, but patient is dyspeptic, neuralgic, or has persistent dyspnœa.	Cachexia marked. Liver and spleen enlarged. Occurs in connection with suppurative processes where there is a syphilitic taint.	Cyanosis sometimes observed. Occurs in connection with diseases of heart and lungs.

CHAPTER IV.

The Prognosis in Diseases of the Kidneys.

A. *Functional Albuminuria.* If the albuminuria is indeed functional,[1] the prognosis is favorable except that *repeated* functional disorder paves the way for organic renal disease. Grainger Stewart holds that the gravity of mere albuminuria as a symptom has been overrated. Nevertheless I regard every *persistent* albuminuria in a patient over 40 as incipient Bright's disease, provided, of course, the albumin is not due to presence of pus, blood, etc.

B. *Organic albuminuria:* The prognosis depends upon the kind of renal lesion. I. In *acute nephritis* the prognosis is, as a rule, favorable, but depends somewhat on the form. In (a) *acute exudative nephritis* (See Table VI. *a*) which is essentially a transitory lesion, if the patient does not die from the immediate effects of the disease the kidneys return to their natural condition, hence the prognosis is favorable so far as they are concerned, and rests upon the nature and severity of that disease of which the nephritis is a complication.

---

1 Carefully distinguish between functional albuminuria and the *intermittent* albuminuria of certain renal lesions. [See Chapter III, Chronic Diffuse Nephritis (Large Kidney) and also Sclerosis].

In (b) *acute parenchymatous degeneration* on the other hand, the prognosis is grave. If the lesion is due (*a*) to mineral poisoning, death is not always immediate but may take place in a few years from chronic nephritis. If the lesion exists (*b*) as a complication of an acute disease, the termination is usually fatal. For example, in scarlet fever, as is well known, if convulsions occur, the patient seldom lives. Similarly in typhoid fever and other acute diseases, the advent of the parenchymatous lesion is an unwelcome one. It is, therefore, of great importance that the physician be able to recognize this form of acute Bright's disease. (See Chapter III., Table VI. *a*).

In (c) *acute diffuse nephritis*, it is important to note whether the lesion is a sequela or complication of some acute disorder: if either, the prognosis is favorable if the disease is recognized early and is mild in its onset. In some few cases death takes place within a day or two, following very rapidly on uræmic symptoms. If, on the other hand, the lesion is idiopathic, not a sequela or complication of an acute disorder, the prognosis while it may be immediately favorable should be guarded as to the ultimate result, since inflammations with production of new connective tissue are likely to persist, become chronic, and eventually prove fatal. But it is possible by proper treatment

to bring about recovery and to prevent the disorder becoming chronic.

It is readily seen how closely prognosis and treatment are linked to diagnosis in cases of acute nephritis, and that the life itself of a patient rests upon an intelligent understanding of the pathological condition in the beginning. Certainly no field is more attractive to the student of medical science than the one through which we are now wending our way over paths to which the author hopes these pages may serve as a guide.

Favorable signs in acute nephritis are the following: urine less dark colored and less scanty before end of the first week. At end of two weeks, quantity of urine nearly normal and albumin but one or two tenths of one per cent. At end of four weeks, urine nearly normal; may contain small amount of albumin. If there has been much dropsy, the quantity of urine may become very large. Steady increase in total solids with disappearance of casts a favorable sign.

Unfavorable signs in acute nephritis: Severe symptoms in the earliest stages; sudden fall in the quantity of urea[1]; complete suppression[2] of urine. If the urine continues to be scanty

1 If the urea falls much below 16 grammes in 24 hours, it is usually unfavorable.

2 Cases are, nevertheless, on record of complete recovery after suppression of more than two days. (Ralfe).

and with much blood, acute uræmia may supervene at any time; or the patient succumb to various complications in the second or third week or before. If the urine increases in quantity, the blood disappears, the albumin diminishes, but yet casts persist and are of the granular and fatty variety after six or eight weeks, the disorder is to be regarded as chronic.

II. *Chronic nephritis:* the prognosis in chronic nephritis depends on the form of renal lesion present.

In (a) *chronic parenchymatous metamorphosis* early death is, as a rule, to be predicted. The patient may live one or two years at most. Death oftener takes place in a few weeks or a few months. Recovery sometimes seems to have taken place but, after a time, all the symptoms will return. When the patient is finally so ill as to be confined to his bed, recovery is very unusual.

In (b) *puerperal nephritis* the matter of prognosis is a nice one and deserves careful consideration. In general, if the patient escape eclampsia, and if she has had no previous renal disease, the progress is favorable.[1] So long as the severest symptoms are merely nervousness and anxiety, the amount of albumin mod-

1 Reliance can not be placed on an assumption or statement that a patient has had no previous renal disease, unless the urine has been carefully examined during *all* pregnancies.

erate, and the quantity of urine in 24 hours not greatly diminished, the total solids and urea in particular not too low (urea not below sixteen grammes) the prognosis is favorable.[1] Suppose now the patient has convulsions, what is the prognosis? Serious, if convulsions occur before or during labor. But the case may not terminate fatally even if convulsions occur during labor. If the convulsions are violent, frequent, long-lasting, and associated with noticeable coma, the prognosis is unfavorable; if they are not severe, shorter, and if the intervals between attacks grow longer and the patient is conscious throughout, the chances are better.

As a rule the earlier in the course of gestation nephritis arises, the more unfavorable the prognosis, unless abortion occurs.[2]

When nephritis occurs in several pregnancies, the tendency is to the development of chronic nephritis. [Many authors think the latter to be chronic interstitial nephritis, but, so far as my experience goes, I find the urine in some cases like that of chronic parenchymatous change, sometimes like that of chronic diffuse nephritis, seldom like that of sclerosis proper].

1 Nevertheless the patient should be watched and collections of urine made constantly.

2 Purdy.

The *immediate* prognosis in puerperal nephritis is unfavorable when the quantity of urine in 24 hours is reduced with total solids much below normal figure. When, however, the quantity of urine and solids is not far from normal, eclampsia seldom takes place.[1]

(c) *Parenchymatous change associated with diabetes mellitus:* the cases which I have seen, terminated fatally, as a rule, within a short time after albumin and casts appeared in abundance. An increase in amount of albumin and in number of casts, coupled with decrease in quantity of urine and of sugar, is a highly unfavorable sign, and coma may soon be expected. The usual length of time within which death takes place is from six to twelve months after the albuminuria appears, but, according to Roberts,[2] some patients live many years. The care and attention which a patient receives has much to do with the prolonging of life, but, so far as is known, the case will always terminate fatally eventually.

In (d) *chronic diffuse nephritis* (large white kidney) the immediate prognosis is fairly favorable and, while recovery can not be predicted with certainty, patients willing to live like sensible beings may be assured of from ten to twenty years of comparative comfort.

1 Purdy, *Bright's Disease*, 1886.
2 *Urinary and Renal Diseases.*

The prognosis should be based on a knowledge of the patient's character: if he is a man who goes to excess in any direction, over-eats, drinks to excess, or over-works, exacerbations will occur at any time, and the prognosis is then unfavorable. If the patient suffering from the disorder be stricken with pneumonia, the prognosis is unfavorable.

Signs of an exacerbation are decrease in quantity of urine, decrease in urea, presence of blood in abundance, increase in albumin, increase in quantity of casts. Death may take place with awful suddenness after one of these exacerbations.

In chronic diffuse nephritis of the second form, viz.: *small kidney with vascular thickening*, the prognosis is as favorable or more favorable than in the first form.[1]

In chronic diffuse nephritis, third form, viz. small kidney without vascular thickening, the prognosis is unfavorable after the symptoms have become pronounced. This is undoubtedly the most fatal form of the diffuse group.[1]

In (e) *chronic interstitial nephritis* (sclerosis) and in *gouty kidney* the prognosis is unfavorable and the disorders essentially incurable, but the time a patient may live is from ten to twenty years, if the disorder is recognized early. Sudden death, following excesses or

1 Porter, *Renal Diseases*, 1887.

strains of any kind, is common. Death may be due to paralysis of the heart or follow convulsions or coma.

In (f) *lardaceous disease* of the kidneys the prognosis depends on the primary disease,[1] which, as a rule, is fatal. If the primary disease can be treated successfully, the patient will not die from lardaceous disease. Patients have been known to live eight or ten years. Advanced stage of the disease is indicated by decreased urine, increased albumin, and abundance of casts. Uræmia is not so common in this disorder as in some other forms of Bright's disease.[2] Cases—or at least one case—are on record in which lardaceous disease following constitutional syphilis was cured. When lardaceous disease complicates chronic parenchymatous nephritis, the case is usually hopeless.[3] Chronic diarrhœa is an unfavorable sign, as is also general dropsy.

In (g) *acute hyperæmia* the prognosis is, as a rule, favorable. In cases of malarial poisoning or by some irritating diuretic, suppression and uræmia may take place[4] and death follow, unless the patient be relieved.

In (h) *chronic hyperæmia* (cyanotic induration) death from this condition alone is un-

1 Phthisis, caries, suppurative processes with syphilitic taint.
2 According to Saundby lardaceous disease is not properly a form of Bright's.
3 Ralfe.
4 Porter.

usual. But the prognosis is unfavorable, inasmuch as the diseases on which the disorder depends are, as a rule, incurable. So long as the compensatory enlargement of the ventricle[1] is adequate to overcome the mitral defect and to maintain a proper balance between the arterial and the venous circulation, the case will continue in a favorable condition without the appearance of urgent or marked symptoms. Such improved state may last for several months and in some cases possibly two or three years, with but slight fluctuations.[2] Nevertheless in some cases exacerbations occur,[3] one after another, till finally the patient succumbs to uræmic attacks. Or death may result from exhaustion, extreme dropsy, pulmonary apoplexy, or heart failure after the hypertrophy of the ventricle passes into fatty degeneration or dilatation. Reduction in the quantity of urine with increase of the dropsy is, then, an unfavorable sign.

Complications of renal lesions: there are many unwelcome complications in the course of renal diseases, rendering the prognosis unfavorable. The most serious are the following in alphabetical order :

Apoplexy.
Asthma (uræmic).

1 Do not mistake *dilatation* of the heart for compensatory hypertrophy.
2 Purdy.
3 A help in the diagnosis is the *age* of the patient; if young, the case is more likely one of acute nephritis than an exacerbation of a chronic disorder.

Cellulitis.
Dropsy, abdominal, when excessive.
Dyspnœa.
Eczema.
Endocarditis.
Erysipelas.
Fractures.
Gangrene.
Hydropericardium.
Hydrothorax.
Jaundice.
Œdema of lungs or of glottis.
Pericarditis.
Peritonitis.
Phthisis.
Pleuritis.
Pneumonia.
Uræmia.

In gouty patients the chronic nephritis is slowly evolved and generally runs a prolonged course, provided indiscretions in diet, etc., can be guarded against.

When syphilis, struma, or general cirrhosis is associated with sclerosis of the kidney, death takes place more rapidly. The most fatal complication is that of gout with chronic lead poisoning and sclerosis of the kidney. Persistence of uræmic symptoms[1] after treatment is more unfavorable than a decided attack of severe convulsions.[2]

1 Headache, twitchings, morning vomiting.
2 Ralfe, *op. cit.*

In general, extensive and obstinate dropsy, valvular disease of the heart or any cardiac complication, retinal disease, dyspnœa, acute œdema of lung, and all acute inflammatory conditions as pneumonia, pericarditis, and cellulitis are very serious, the last probably always fatal. Uræmic attacks are not always necessarily fatal, if promptly treated. Acute intercurrent nephritic attacks are unfavorable according to the amount of dropsy and presence of cardiac complications.

When the urine falls below normal in quantity, the pulse grows weak and fluttering, and the respirations quicken on slightest exertion, the end is near, the heart being then dilated and usually fatty.

Note that the age of the patient has much to do with prognosis. For example: when chronic parenchymatous nephritis occurs in *comparatively young subjects* and is the result of some morbid condition of the blood, as scarlet fever, syphilis, etc., recovery has been known after albuminuria of a year. This is especially true of cases which survive the first six months.

Miscellaneous.

Bearing of tube casts on prognosis:—Mucous casts are not of unfavorable significance. A few, small, *hyaline* casts occasionally found, es-

pecially after violent exercise, are not ominous. *Waxy* casts, the large, transparent casts, more solid in appearance than hyaline casts and resembling molten wax, are an unfavorable sign. *Granular and fatty* casts, found during recovery from acute nephritis, are not necessarily unfavorable unless they persist for some weeks or months. If found in the urine of adults who have not recently had acute nephritis, they should render the prognosis guarded. *But the prognosis is highly unfavorable if long, large, straight, dark, highly granular or fatty casts* are found. They are the worst possible sign in the course of chronic nephritis.

Albumin and casts with *decreased* urine and deficiency of solids may coexist with heart disease and weakened circulation. If there are signs of the latter, the prognosis should be deferred, until regulation of the heart and supply of fluids show whether the evidences of renal impairment persist or not. Sometimes both albumin and casts may disappear under treatment.

Nephritis without albuminuria: In some cases, well-pronounced renal lesions have been found post-mortem where during life the urine contained neither albumin nor casts. Obstinate vomiting, continuous and persistent, should render the prognosis unfavorable, even if neither albumin nor casts can be found.

Condition of the Heart: In cases of small kidney the condition of the heart, in many instances, is of more prognostic value than information obtained from examination of the urine. In a case which I saw eighteen months before death, there were no tube casts in the urine and but a minute amount of albumin, yet the diagnosis and prognosis were readily made from the history of the case, condition of the heart, etc., etc.

Dr. Tyson's conclusions for the life insurance examiner: Given that albumin is found in the urine of a person applying for life insurance, he should not be rejected, according to Dr. Tyson, provided:

1. In all other respects he presents signs of good health.
2. The albuminuria is unaccompanied by tube casts.
3. The albumin is not large in amount, not habitually over one-fifth by bulk.[1]
4. There is no albumin in the urine voided on rising.
5. The specific gravity of the 24 hours' urine is 1020 or upwards.
6. There are no signs of hypertrophy of the left ventricle, or of high vascular tension shown by sphygmograph.

1 I regard the amount of albumin as large when the reading on the Esbach tube shows one gramme to the litre or more.

7. The patient is under forty.

8. There is no true gout.

9. There are no retinal symptoms commonly associated with Bright's disease.

To these I add the following:

10. There is no hereditary predisposition to renal disease.

Summary of Prognosis.

Acute nephritis: Exudative, favorable; parenchymatous, unfavorable; diffuse (sequela or complication), favorable; diffuse (idiopathic), immediately favorable, ultimately unfavorable.

Chronic (parenchymatous) *nephritis:* Unfavorable; (puerperal), favorable or unfavorable, see page 101; (diabetic), unfavorable.

Chronic, diffuse: large white kidney; chance of life, fifteen years or more; small kidney with vascular thickening, chance of life better still; small kidney without vascular thickening, most fatal of the diffuse group, chance of life doubtful.

Chronic, interstitial (sclerosis): chance of life, at best, fifteen or twenty years.

Lardaceous disease: not of itself fatal but primary disorder usually so.

Acute hyperæmia: favorable.

Chronic hyperæmia: not of itself fatal but prognosis unfavorable, if primary disorder severe and exacerbations frequent and severe.

CHAPTER V.

Therapeutics of Renal Diseases.

The modern treatment of albuminuria consists in close observance of many particulars.

A. Functional albuminuria: I. *Hygienic treatment.* The patient is to cut down hours of work, or rest entirely; avoid stimulants; take change of air if possible[1]; try saline douches of tepid water (85°) daily; eat as little meat as possible; avoid over-eating; wear woollens[2] next to skin. If the patient is a boy, see that he does not masturbate. In the case of corpulent elderly patients with scanty urine, free use of water, as Londonderry Lithia Water.

II. *Medical treatment:* In albuminuria due to gastric or hepatic disorders, the principal remedies are *Nux Vomica*, *Podophyllum*, *Bryonia.*

If the patient is constipated, sallow, irritable, and the urine of high color, high specific gravity, with high percentage of urea, and containing sediments of calcium oxalate, the albumin being noticeably increased after meals,

---

1 A summer at Saratoga with judicious use of Congress water is often all that is necessary, provided the case is not real Bright's disease.

2 Jaeger or Jaros wear.

Nux Vomica second or third decimal, will be found useful. Sometimes *Podophyllum*, if generally indicated, may be given during the day with a dose of *Nux Vomica* at night, before retiring. In some cases of slight febrile disturbance and hepatic symptoms, I have used *Bryonia* in the beginning and followed with *Nux Vomica* later.[1] The phosphate of strychnine has been used successfully in some cases. *Euonymine* has cured cases in the South, some of which seem like genuine nephritis, but may possibly have been functional albuminuria dependent on hepatic derangement, with nausea, headache, etc., etc.

Other remedies may be suggested by the symptoms : *Mercurius*, (B., II., 2) *Iris*, *Acidum Nitromuriaticum* should be remembered.

[Those who advocate vigorous measures rely on nux vomica, and nitromuriatic acid, with saline purgatives every other morning[2]].

B. Organic albuminuria. I. *Acute exudative nephritis:* Subsides usually when the pyrexial stage of the disorder on which it depends is over. See hygienic treatment below.

II. *Acute parenchymatous change:* 1. Hygienic: patient to be put to bed, wearing woollen night dress and wrapped in blankets. Jæger night-clothing and bedding desirable. Patient

1 Both Nux and Bryonia include *scanty red urine* among their symptoms.
2 See Ralfe, *Kidney Diseases*, 1885, p. 541.

to be sponged daily with tepid water containing a little alcohol; each part of the body to be rubbed dry, after sponging, before another part is wet. Room to be about 70° F. in temperature. Thorough ventilation to be secured. Diet: if urine suppressed or nearly so, arrow-root gruel for two days; then if urine more abundant, milk in small quantity mixed with the gruel, rice in thin broth, plain rice pudding. In severe cases, no meat or fish for two weeks, and milk only in preparation of foods. Grapes, oranges, strawberries allowable. After the first day or two give pure spring water freely. Such waters as Poland, Bethesda, Clysmic desirable. Potatoes, especially sweet, allowable. When severe symptoms subside, exclusive milk diet. Try the entire milk, or if not borne, skimmed milk, a few ounces every two or three hours, limewater and milk, milk of magnesia and milk. Or, if constipation, milk and Vichy, milk and carbonic water. Bear in mind also, peptonized milk, peptonized gruel and milk, peptonized milk toast.

2. Medical: patient's bowels moved daily by enemata, except in typhoid, yellow fever, and cholera. If uræmia threatens (shown by headache, nausea, twitchings, scanty urine), try *hot air bath:* patient on chair with perforated seat, wrapped in several thicknesses of blankets, which inclose the chair also; under chair, alco-

hol lamp, its flame inclosed with piece of sheet iron. [If patient confined to bed, use curved metallic tube leading from heat reservoir of metal[1]]. In moderate cases, give the hot air bath every other day, and for twenty minutes. Hot drinks, as hot lemonade (without sugar), to be given during the hot air bath. In case of faintness give a little brandy or aromatic spirit of ammonia. In severe cases, hot air bath daily, and, if necessary, free diaphoresis to be maintained for an hour, with hot drinks, and hot flax-seed meal poultices to the lumbar region.

Inasmuch as this lesion occurs *in the course of* severe febrile disorders as typhoid fever, diphtheria, etc., the urine should be examined constantly during those maladies and the patient watched as closely as possible.

If the urine is found to be as described, page 82, in Table VI., *a*, (Acute Parenchymatous Change) give *Belladonna* when *cerebral* symptoms appear quickly and at the beginning of the disorder, as in Table VIII., Group I., page 95. When *gastro-intestinal* symptoms are prominent at the beginning of the disorder, the remedies are *Mercurius, Arsenicum, Argentum Nitricum, Acidum Nitricum, Cuprum*, etc.[2] These

1 These, ready-made, may be purchased of instrument makers.

2 A number of drugs may be thought of according to the prominence of the various symptoms. I mention the names of a few often indicated.

remedies are suited to the symptoms of Group II., in Table VIII., page 95, and to those of Group III., when not the result of actual mineral poisoning. When gastro-intestinal symptoms *precede* the cerebral symptoms, *Mercurius* is often of service: *Mercurius Corrosivus* when there is pain in the back and febrile disturbance is marked; [*Mercurius Solubilis* when febrile disturbance is not prominent, hence seldom of value in acute parenchymatous degeneration].

[*Arsenicum* is recommended when gastro-intestinal symptoms are found in the beginning of the disorder, and when there is great prostration with remittent type of fever and especially if hydrothorax be present and if there is tendency to coma].

Argentum Nitricum, when there is no marked prostration and no severe pain in the back but early in the disease obstinate vomiting or diarrhœa, with pallor, œdema, violent headache, and, later, cerebral symptoms as delirium, coma, or stupor.

It is possible that there is a field of usefulness for such remedies as *Euonymine*, *Podophyllum*, etc., in this disorder; *Mercurius Dulcis* is also to be thought of.

In the treatment of nephritis from poisoning, the essential points are rest, warmth, attention to the skin and diet; elimination of the poison-

ous substance is to be favored by judicious administration of diluents, the bowels to be opened by enemata, and the skin kept active and moist.

[There are those who advocate vigorous measures in the treatment of acute parenchymatous degeneration, occurring in febrile disorders: for example, in the early stages, one drachm of digitalis infusion every six hours. For prompt diaphoresis, pilocarpine, hypodermatically, in doses of one tenth to a sixth or fifth of a grain.[1] For the liver, inspissated ox-bile in two to three grain doses. When uræmic symptoms are severe, dry cups to the loins, followed by warm poultices].

III. *Acute diffuse nephritis.* The subject will be discussed as arranged in Table VIII., Groups IV., V., VI., VII. and VIII., page 95. [For distinction between acute parenchymatous degeneration and acute diffuse nephritis, see Table VI., *a*, page 82].

Acute diffuse nephritis *not* following scarlet fever but *idiopathic* and due to exposure to cold and wet, or from unknown cause, (bacterial?) is to be treated as follows:

1. Hygienic treatment: rest, warmth, non-nitrogenous diet: as fruits, vegetables, cereals; oysters, light animal broths usually allowable.

1 I believe that philœarpine should not be used in this particular renal lesion, occurring as it does in connection with severe disorders already mentioned.

Often fish, fowl, and game. Milk may be given freely. Also pure spring water. Woollens next to skin. When the urine is very scanty or completely suppressed, the diet should be rigidly non-nitrogenous, and carried out as described, page 114.

2. Remedial measures : the patient's bowels are to be kept open daily. If uræmia threatens, hot air baths, with hot drinks, and hot fomentations to the loins. In critical cases when no time is to be lost *pilocarpine*, hypodermatically, one tenth to possibly one quarter of a grain[1] according to age of patient. Give first some stimulant as aromatic spirit of ammonia (thirty drops in water), or gin and water. No pilocarpine when the respirations are abnormal, for fear of œdema of the lungs.

The remedies of value are as follows : in Groups IV. and V. of symptoms in Table VIII. page 95, *Mercurius Corrosivus* takes first rank when the nephritis has been preceded by coated tongue, sluggish bowels, thirst, sallow complexion, pain in the back, followed by chill or fever, and albuminous urine, etc. In other words, when gastric and hepatic symptoms are first noticed, followed by fever and albuminous urine.

Terebinthina is to be given when at the outset gastric and intestinal irritation is extreme

1 One sixth of a grain is usually sufficient at most.

(vomiting, diarrhœa,) and dyspnœa is marked. Headache. Cerebral symptoms rapidly increasing in severity: coma, delirium.

Argentum Nitricum: Gastric symptoms also, but œdema greater than when *Terebinthina* is indicated, cerebral symptoms not so severe.

[When *prostration* is a marked feature, *Mercurius* will usually be found useful; *Merc. Cor.* when there is marked febrile disturbance; *Merc. Sol.* when febrile disturbance is not marked]. See Table X.

Ferrum[1] is indicated when gastro-intestinal symptoms are prominent, with œdema, prostration, and remittent type of fever.

Rhus Tox. is indicated when there is chill, tearing pain in the region of the kidneys, fever, and later, cerebral symptoms. *Rhus* is useful usually when the nephritis is due to exposure to wet; there is usually general œdema.

Aconite is to be thought of in early stages of cases due to exposure to cold and rapidly followed by dropsy.

Solania is advised in cases due to cold and wet.

Sub-acute Nephritis (Groups VI., VII., p. 95) will be discussed after post-scarlatinal nephritis.

[1] *Ferrum* has been found superior to *Arsenicum* by Dr. Woodward in both forms of acute nephritis when the symptoms pointed to these remedies.

Acute post-scarlatinal nephritis. The treatment is as follows:

1. *Preventive:* it has been held that a milk diet throughout, in scarlet fever, with avoidance of exertion, and of taking cold, in the third week, is sufficient to prevent the onset of acute nephritis. If, however, at that time the temperature again rises and the urine begins to diminish, with headache, œdema, etc.:

2. *Hygienic:* rest, warmth, milk diet, pure water. Woollens. Entire skin washed in tepid water daily, or in milk and water.

3. *General:* patient's bowels to be opened daily. For cerebral symptoms, when there is high arterial tension, hot air bath, hot applications to lumbar region.

4. *Radical:* The remedies to be employed are these:

Merc. Cor. should be given, even before albumin appears in the urine, provided there are the usual indications for its use. (See Table X). The patient may complain of frequency of micturition and of scalding urine, before albumin can be detected.

Terebinthina, indications already given. Useful sometimes as soon as blood appears in the urine, and to be continued for some days, the second decimal dilution preferred. Is probably of more service in idiopathic than in post-scarlatinal cases.

Ferrum is often of great value in post-scarlatinal and diptheritic nephritis.

Ferrum Phos. is often used.

Ferrum Iod. has proved wonderfully curative in some cases[1] of post-scarlatinal nephritis.

Digitalis is useful where there are cardiac complications. The œdema and dropsy occur early, are very noticeable, and followed by signs of heart failure; gastric symptoms later and not so severe as when *Terebinthina* is indicated; prostration not marked.

Digitaline is often used, but complaints are made that it is uncertain in action. [When prompt action is desired, *infusion* of digitalis is the most reliable. The latter should not be given persistently after the flow of urine has been re-established. *Amyl nitrite* is useful when the patient has been drugged with digitalis].

Apis is indicated when headache is severe and early, with generally œdematous condition of the whole body, especially of the face and limbs; dyspnœa is distressing. Gastro-intestinal symptoms and backache not severe. Urine high colored, containing much albumin and blood, together with heavy sediment of urates. Frequent urgings to urinate.

Apium virus is conveniently administered in tablet triturates.

[1] See *North American Journal of Homœopathy*, 1889, p. 122.

Miscellaneous remedies: There are those who in the beginning of acute nephritis (post-scarlatinal) give *Aconite* before albumin shows itself. [Dr. Mahomed detects traces of hemoglobin in the urine, *before* albumin shows itself in scarlatinal nephritis, by use of the ozonized ether and tincture of guaiacum test, which, modified by Stevenson, is as follows: To a drop or two of urine in a small test tube, add one drop of freshly prepared tincture of guaiac and a few drops of freshly prepared ozonized ether. Shake, and let ether rise. If the ether is colored *blue*, hemoglobin is present, provided the urine be free from saliva, nasal mucus, or compounds of iodine, all of which strike a blue color with guaiac].

When blood appears, *Terebinth.* is the remedy for several days. When serous effusions are evident, *Arsenicum, Bryonia, Senega.* Others give *Acidum Carbolicum* and *Kali Bichromicum* in the early stages, following with *Mercurius Corrosivus*, or *Cyanatus*, and using *Apis* in the later stages.

Rheum has been recommended in post-diphtheritic nephritis, as has also *Apis.*

When micturition is frequent with scalding urine and bronchial, laryngeal, or intestinal symptoms, *Cantharis* is advised.

Other remedies for which success is claimed

are *Crotalus, Lachesis, Secale, Phosphorus, Nitric Acid, Coccus Cacti, Cuprum Aceticum, Scilla.*

Most cases of acute nephritis need merely attention to diet, hygiene, etc.; in some cases remedies are needed, *but vigorous measures and active treatment* (*diuretics, etc.*), *tend to precipitate convulsions.*

Some *one* of the remedies named in Table X will often be all that is necessary. *Merc. Cor.* is now-days prescribed in a routine way, and often where another remedy should be used. Study the characteristics of the drugs in Table X., and in prescribing make careful selection.

When the albuminuria has been preceded by marked signs of disturbance of digestion, loss of strength, and backache, *Merc. Cor.* is indeed to be preferred to such remedies as *Apis* or *Digitalis*. When together with the gastro-intestinal symptoms there is marked dyspnœa, *Terebinth.* is preferable to *Merc. Cor.*

When the gastro-intestinal symptoms are soon followed by œdema, *Ferrum* is to be thought of.

When high temperature is noticed early with œdema and dyspnœa, and without history of gastro-intestinal disorders in the start, the choice is between *Apis* and *Digitalis*, the former being especially indicated if from the beginning of the case *headache* is severe, the latter when cardiac disturbances are present.

TABLE X.—Choice of Leading Remedies in Acute Nephritis.[1]

Mercurius Cor.	Terebinth.	Ferrum.	Digitalis.	Apis.
Gastro-intestinal symptoms prominent early.	As in case of Merc. Cor.	As in case of Merc. Cor.	Not prominent and later.	Like Digitalis.
Prostration and backache prominent early.	Not marked and not early.	Considerable pain and prostration.	Of little prominence till late.	Moderate only.
Chills or fever following gastric and hepatic symptoms.	High temperatures. Fever a prominent symptom.	Remittent type of fever following gastro-intestinal symptoms.	High temperatures and marked cardiac disturbances.	Chills and fever very prominent symptoms.
Œdema not early nor prominent.	As in case of Merc. Cor.	Œdema following gastro-intestinal symptoms.	Œdema early and very prominent.	Œdema, especially of face, early and prominent.
Dyspnœa not early nor prominent.	Dyspnœa marked and a prominent symptom.	Dyspnœa not marked.	Dyspnœa early and severe.	Dyspnœa distressing.
Cerebral symptoms not marked.	Headache marked. Cerebral symptoms increasing rapidly in severity. Coma, delirium.	Cerebral symptoms not marked.	Cerebral symptoms not marked.	Headache severe and early.

(1) Based on suggestions from Prof. A. W. Woodward, M.D.

5. *General palliative treatment in Acute Nephritis:*—In some few cases where emergencies arise, more vigorous measures may possibly be necessary:—

Purgatives:—Elaterium, one-twelfth of a grain, repeated if necessary; or elaterin, one-twentieth to one-eighth grain every four hours, till free watery stools are produced; sulphate of magnesium, on the first two days, 60 grain doses every hour till 480 grains have been taken, or the bowels have moved (Delafield).

As enema, glycerine and water.

Diuretics:—In the early stages, digitalis; dose of the infusion, 40 to 60 minims; of the tincture, 1 to 4 minims, every six hours; discontinued after it ceases to increase the flow of urine. Dr. Hale recommends syrup of wild cherry as a vehicle for tincture of digitalis.

Diaphoretics:—Pilocarpine muriate, hypodermatically, in one-tenth to one-fifth grain doses.

To reduce œdema, alcohol sweats may be required. A method is as follows: flannels saturated with fifty per cent alcohol are wrapped round a jug of hot water, and also round hot bricks. The water-jug is placed under the patient's flexed limbs and the bricks at his sides, not near enough to burn. All, including the patient, are wrapped in blankets.

Miscellaneous:—In severe cases, leeches to the lumbar region; in lingering cases, *counter-irritation* to the lumbar region, by means of a mixture of one part croton oil to three or four parts of olive oil. If counter-irritation is used, it is more humane to apply to the sides in the concavities above the crests of the iliac bones, as suggested by Purdy.

Cerebral symptoms:—In acute exudative nephritis and acute diffuse nephritis Delafield advises that, in treating cerebral symptoms, attention should be paid to the condition of the heart and arteries:—for example, if the heart is laboring and the arteries contracted, drugs should be used which dilate the

arteries, as chloral hydrate, opium, amyl nitrite, and nitro-glycerine; or the quantity of blood is to be diminished by venesection, sweating, or purging. With feeble heart and relaxed arteries, use digitalis, caffein, convallaria, or strophanthus.

Heart-failure:—In acute renal dropsy, when the pulse-beat is short and easily arrested, temporary dilatation and weakness of the left ventricle is indicated (Broadbent). *Low tension* is certainly occasionally observed, and some writers insist on recognition of the dangers of this condition. Broadbent recommends iron, sulphate of magnesia, nux vomica, and digitalis. Maguire, nux vomica and iron, in low tension.

For anæmia, one meal daily of solid food, meat with bread and butter; during the rest of the twenty-four hours, milk. Bowels to be opened daily by enema or simple laxative. Oxygen gas to be given for 10 or 15 minutes twice a day. Internally, *Ferrum Sulphuricum.* [Delafield advises six to twenty-four of Blaud's pills daily. The late Dr. N. F. Cooke had great confidence in Boudreau's pills]. Patient to rest and not attempt work.

Acute Exudative Nephritis. Weinbaum has called our attention to an acute nephritis in which there is exudation of blood serum, and consequently large quantities of albumin in the urine. Delafield distinguishes four forms of exudative nephritis, (1) a mild form; (2) a severe form; (3) a form in which there is much pus; (4) a protracted form. It is often difficult, clinically, to distinguish an exudative nephritis from a diffuse lesion (Tyson). Nevertheless,

the form in which there is an excessive production of pus deserves mention, as the prognosis in this case is, as a rule, unfavorable. According to Delafield, such cases occur both in childhood and in adult life. The nephritis may be primary, or follow scarlatina, diphtheria, or measles. The invasion is sudden. Symptoms are marked fever and prostration, restlessness, sleeplessness, delirium, headache, stupor. The patients lose flesh and strength, and pass into the typhoid state. Dropsy is absent altogether, or is very slight. The entire clinical picture resembles that of acute meningitis. The urine is not much diminished in quantity; its specific gravity is not decreased; albumin, casts and blood may be present, but sometimes not until late in the disease, and sometimes they are entirely absent.

The remedies in this disorder would be, among others, *Glonoin, Belladonna, Hepar Sulphur, Mercurius Corrosivus, Rhus Tox.* Palliative measures, if necessary, as before.

SUB-ACUTE NEPHRITIS.

This disorder may be either idiopathic or a sequela of scarlatina and diphtheria. Whereas the duration of acute nephritis is about four weeks, that of sub-acute may be for months or even years. The symptoms are chiefly anæmia,

dropsy, loss of strength, nausea, vomiting, diarrhœa. The urine is not likely to be greatly diminished; it may even be increased, but the amount of solids as compared with that of the water is deficient; i. e., the *quality* of the urine is poor. The arteries are usually relaxed, but sometimes contracted; there may be inflammation of the retina. (Delafield).

1. *Hygienic treatment.* Removal of patient to suitable warm climate, where out-of-door life is possible, as Southern California, the Bermudas, the Arkansas springs, Thomasville in Georgia, Tallahassee in Florida. High altitudes, rough ocean voyages and long railway journeys to be avoided: if the patient goes to California, he should do so by easy stages, and take vestibuled trains when possible. If Bermuda be chosen, the voyage should be arranged, so far as possible, in calm weather, as this particular trip is a very rough one, and uræmia from seasickness is to be thought of and guarded against.

If the patient reside in a cold climate, he must be kept in-doors in stormy weather and observe every precaution about catching cold; wear woolens, etc.; diet need not necessarily be limited to liquids, except in acute exacerbations. Patient may take as much solid food (of a non-nitrogenous character) and fats as he

can digest. *Excessive* use of mineral waters of doubtful utility. The patient should void enough urine daily to excrete the normal amount of urea (32 grammes, or 500 grains); and when dropsy is to be overcome, the amount of fluids taken by the patient should not exceed the amount of urine voided.[1]

The same general hygienic treatment pertains to *protracted* forms of acute nephritis. The patient may have to be kept in bed for a time, but should be given fresh air as soon as it is prudent.

2. *General treatment.* The patient's bowels should be kept in order and the skin moist and active. Massage is helpful, also inhalations of oxygen gas, when there is anæmia. See "Anæmia" under "Acute Nephritis."

3. *Radical treatment.* The *remedies* especially adapted to the sub-acute form are *Apis, Digitalis, Ferrum, Mercurius Cor.* Where *Apis* is indicated, *headache* is particularly noticeable. (See indications already given in Table X). *Digitalis* is useful when œdema and dropsy, together with cardiac failure, are prominent early in the case. There is some nausea, but the pain in the back is but slight. Indications for *Ferrum* have already been given, as have those for *Merc. Cor.* (See Table X.).

[1] Delafield, *Med. Record*, March 23, 1889.

I have found in some cases where malarial history was obtainable, that *Fer. et Chin. Citr.* in the third decimal did good work, after *Merc. Cor.* had failed. In one case thus helped, the amount of albumen was indeed a mere trace, but the sediment contained blood corpuscles and numerous *yellow* casts. *Chin. Arsen.* is undoubtedly of service in malarial districts. Care should be taken not to give it too low when urea is deficient. Other remedies which have been advised are *Kali Hyd., Kalmia, Picric Acid.*

4. *Palliative Treatment.* In extreme cases of dropsy, purgatives, diaphoretics, as already mentioned under acute nephritis, palliative treatment. Puncturing the skin and tapping serous cavities may be necessary; in such cases there is usually but little hope.

For high arterial tension,* nitro-glycerine, chloral hydrate. For coma, without increased tension, strophanthus, sparteine, etc.

According to Delafield, some patients with sub-acute nephritis continue to get worse every way, and die within one or two years; some get better after a few months, then become ill again, and so go on for years. Very few recover permanently.

CHRONIC NEPHRITIS.

1. *Hygienic*† *Treatment.* The chief points

*Some practitioners are in the habit of giving small doses of calomel, in connection with free use of saline cathartics, to reduce high tension.

†As the hygienic treatment applies in general to all forms of chronic nephritis, I shall not discuss each form separately, but note exceptions as they occur.

are in regard to *diet, place of residence, care of the skin, air and exercise*, and *psychical influences*.

Diet.—The patient may take the following:

1. What he does take frequently, but little at a time.

Soups: Vegetable, sago, or vermicelli.

2. Oysters (raw only) and fresh fish, which should not be fried.

3. Meats: Tender beefsteak and mutton chops once a day, but not in very severe chronic cases. The fat portions of steaks and chops to be preferred. White meat of poultry.

4. Vegetables: Green vegetables, except beans and peas; vegetable salads.

5. Farinaceous food: In general, properly cooked farinaceous foods are allowed. Well-risen bread, well-cooked rice, tapioca, arrow-root, etc.; bread and milk.

6. Desserts: Rice pudding, milk pudding, tapioca pudding. Fruits: Those which are laxative and those not too acid, as ripe peaches, pears, grapes.

In some cases where the symptoms are not urgent, fruit, as, for example, an orange first at breakfast, followed by oatmeal and cream, are advisable. At the noon meal, tender steak or chops; at night, skim milk and "zwieback."

7. Drinks: *Distilled water*, flavored with lemon juice; such mineral waters as are free

from organic matter and do not contain a large amount of solids; Salutaris; Poland water; Bethesda water; Buffalo lithia water. *Distilled water* is more valuable as a solvent of the waste products in the organism.

Londonderry lithia water is serviceable in cases where much uric acid is found in the sediment soon after the urine is voided. In general terms, however, the patient should not take any more liquid than is necessary to cause him to void his 33 grammes (500 grains) of urea in 24 hours. In interstitial nephritis, in the later stages, it is not advisable to pour cold water into the patient, or waters rich in carbonic acid gas, for fear of apoplexy, after marked changes in the blood vessels have taken place.

The question of *alcohol* requires more than passing comment. Those to whom it is no great struggle to give up liquors should certainly do so, and especially in chronic parenchymatous change. To a man who has been an inveterate drinker, a little brandy and water or good whisky, well diluted with Salutaris or imported Vichy, may be allowed. Fothergill holds that moderate quantities of light wines, claret and light French and German wines, and of cider do no harm. [Alcoholic stimulants, brandy and whisky, are sometimes imperatively called for in the course of chronic nephritis when there

is exhaustion, or in uræmia when there is profound cerebral anæmia, when the heart is beating rapidly and feebly]. Beer, ale, and porter are strictly tabooed; also Moselle, Madeira, and Champagne.

Oxygenated water[1] is sometimes greatly relished by patients, and on that account serviceable in cases where the patient dislikes to drink ordinary water. It should be thought of in cases where the urine is below normal in quantity, as in *chronic parenchymatous metamorphosis.*[1]

Pulque is highly recommended by A. W. Parsons, of Mexico, and R. N. Foster, of Chicago.

Milk may be given freely to those with whom it agrees. It will often be borne better if skimmed, boiled, or peptonized. If milk be given freely, other albuminous foods should be discontinued.

In obstinate cases milk diet to the exclusion of other food has certainly done great good in many cases, though I am aware that certain authorities are opposed to it. The "milk treatment" of the late Dr. T. A. McBride, of New York, was as follows:

The patient is to use *skimmed* milk, and *skimmed* milk alone; no other kind of nourishment.

[1]It is very gratefully taken by children with post-scarlatinal nephritis.

The patient is to take three or four times daily, and at regularly observed intervals, from two to six ounces of skimmed milk.

This must be taken slowly, and in small quantities, so that the saliva may be well mixed with it. The reaction of the milk to test paper must be neutral or alkaline.

The first week is the most difficult to get over, unless the patient has a strong will.

During the second week two ordinary quarts may be consumed during the day. The milk must be drunk four times daily; at 8 a. m., at noon, at 4 and 8 p. m. The hours may be changed, but regular intervals must be maintained.

If the patient comply with these directions, he will complain neither of hunger or thirst, although the first doses appear so very small.

The daily quantity may be increased to eighty or more ounces.

If after having attained this quantity or more, the patient gets worse, diminish the amount to the quantity used the first week, and increase more slowly.

Constipation at the beginning is a good sign. This may be remedied by warm water injections, or by the use of castor oil, rhubarb, addition of sugar of milk to the milk, or by taking some bicarbonate of soda at bed-time. If the constipa-

tion be obstinate, a little coffee may be added to the morning dose of milk, or towards 4 p. m., stewed prunes or a roasted apple.

If, on the other hand, diarrhœa results, and rumbling of the bowels is frequent, the milk is too rich or is being taken in too large doses.

Feverishness is no contra-indication to its use. If the patient be thirsty, he may drink Clysmic, Bethesda, Poland, or Vichy water. If he have a strong desire for solid food at the end of the second or third week, he may have a little stale white bread or toasted bread with salt in the morning, and again at 4 p. m. Once a day he may have some soup made of milk and oatmeal.

After continuing this treatment for five or six weeks it may be modified, by allowing the milk only thrice daily, and once a day steak or a chop. Raw meat digests most easily, and should be used in preference to the cooked when possible.

It may be necessary to add a little salt to the milk in some cases, and in others to have the milk drunk when very hot. If the patient become flatulent, buttermilk is often beneficial in small quantities.[1]

There is no doubt in my own mind but that in *some* cases, usually when there is or has been marked lithæmic tendency, milk will do more

[1] *Journal of Reconstructives.*

harm than good, the urine becoming intensely acid. If it cause *obstinate* constipation, it is certainly harmful. In such cases the milk should be given as suggested by Saundby with bread or farinaceous food or with puddings. Sometimes *alternation* of milk diet with mixed diet does well, using milk for two or three months, then mixed diet for three or four weeks. Exclusive milk diet, in general, is to be abandoned when too great an excretion of urine is observed, or symptoms of anæmia and exhaustion; particularly is this the case if, in addition, the quantity of albumin is but a small fraction of one per cent by weight. In such cases it is allowable and desirable for the patient to take farinaceous and vegetable food. If the patient still loses strength, a small amount of broiled or roasted meat, once daily, at an early dinner must be allowed (Robinson).

When great irritability of the stomach is present, small quantities of cold, skimmed milk at short intervals are best given. Sometimes the only way in which milk can be borne is *iced*, in *small* quantity, in which case other articles of diet should be given. When there is incessant vomiting, the patient's strength must be kept up by nutritive enemata, until the vomiting subsides. The various mixtures of milk described under "Acute Nephritis" must not be forgotten.

In the *diffuse* forms of nephritis which border on the sclerotic, and in sclerosis itself, the diet should consist of milk, cream, vegetables, and a very *small quantity* of meat except in advanced cases when the exclusive milk diet may be preferable, the milk being diluted with Vichy. But the patient should avoid taking large quantities of *cold* waters charged with *carbonic acid gas.*

In sclerotic cases during stage of heart failure the diet should be more liberal than during the stage of cardiac hypertrophy. (See "Sclerosis.")

In *lardaceous disease* the diet should be suited to the cause of the disorder. For example, if phthisis be the cause, milk, cream, meat, and good wine[1] are desirable. But when the disease at the bottom of the renal change has disappeared, the diet should then be that of chronic nephritis in general.

In regard to what the patient must *avoid* in diet, the following may serve as a guide :

The patient should avoid the following :

1. Overloading the stomach; all animal soups.
2. Cooked oysters and fried fish.
3. Meats : all smoked and seasoned meats; ham, tongue, corned beef, sausages, pork; all hashes and stews; turkey, lamb, gravies, eggs.

[1] Beverly Robinson, *Med. Record*, 1889.

4. Vegetables: beans and peas.

5. Farinaceous food: heavy, soggy bread; batter-cakes.

6. Dessert: pies, cake, ice cream.

7. Beer, ale, porter, coffee, ice water. Hard waters not to be taken, if purer waters can be obtained; the solvent power of hard water is not as great as that of soft.

In general it may be stated that starchy, saccharine, and oleaginous articles of food are to be preferred to nitrogenous ones, and, if the patient can do without meat, it is advisable for him to drop it, or, if he craves it greatly, to eat fat meat only.

It must be admitted that there are some patients who do not do well on any one-sided diet, but for whom ordinary mixed diet is the best thing. Schreiber actually recommends that patients, under ordinary mixed diet, eat in addition eggs, either raw or boiled, and meat. Some physicians report success from the use of raw eggs and milk.

The fundamental principle underlying all diet should be, it seems to me, *to keep up the patient's strength*, while at the same time the excretion of urea and daily quantity of urine are not allowed to diminish.

Place of Residence:—The desideratum is *dryness* accompanied by *warmth* or, at any rate,

evenness of temperature. *Dry soil* is necessarily included. Upper Egypt is probably the best locality. Next to it, the dry plateau north of Cape Town in South Africa. In this country, Southern California and portions of New Mexico and Texas, when the altitude is not too great, possess climatic advantages. I believe that New Mexico will eventually be shown to combine the requisites. *Continuous residence* in some one of these localities is better than mere temporary sojourn. In this country the following towns are often visited by subjects of chronic nephritis during the *winter:* Arkansas: Eureka Springs. Florida: Tallahassee. South Carolina: Aiken. Georgia: Thomasville. Mexico: Saltillo. Southern California: Pasadena, Santa Barbara. Texas: San Antonio.

Abroad the following are recommended as *winter* resorts: France: Pau, Cannes. Italy: Rome, Naples. Besides these Malta, Malaga, and the Madeira Islands are highly spoken of.

During the *summer* the patient may visit in this country such places as Saratoga, Nantucket, Newport, Block Island. Nantucket is often very dry in July and August. I have seen six weeks pass by there without rain other than very light showers. Fogs are not usually cold or long continued. The soil is exceedingly dry. Easterly storms may appear after the middle of

August. If the patient be in the North during the summer, he should find out the character of the season at the various health resorts and govern himself accordingly. For example, it is sometimes very dry in Nantucket and wet within 100 miles of it, and *vice versa*. I deem Nantucket an advantageous place to visit when the patient lives far inland, especially if he reside in the Mississippi Valley and suffer from malarious affections. Many of the cases of Bright's disease which I see in Chicago are undoubtedly of malarial origin, acquired in the country about the Western rivers.

In England, the desirable summer resorts are Folkestone, Bournemouth, Torquay, St. Leonards, and the south of the Isle of Wight; in Scotland, the higher part of the Highlands as Braemar in Aberdeenshire; in Switzerland, the Engadine. A patient after spending the summer in these resorts may, as winter approaches, take the sea voyage to Cape Town and find summer there also, thus avoiding winter altogether. *It is probable, however, that a climatic cure is effected only by continuous residence in a favorable spot*, the patient removing from the unfavorable climate before the disease has made great headway.

Holland, Denmark, Scandinavia, and the shores of the Baltic are to be avoided, as is also

Great Britain, except as mentioned above during the summer.

In this country the patient should *avoid* even in summer the New England coast north of Boston, and the White Mountains; the country about the Great Lakes, particularly the west shore of the Lakes; also all localities where *malaria* is rife, inasmuch as places may be found where without malaria there are the advantages of warmth and evenness of temperature. Shun, therefore, the valleys of rivers, especially where the latter empty into the sea. It is doubtful whether anything is gained as a rule by visiting most of the Southern States owing to the unfortunate location and surroundings of the towns, and the lack of first-class accommodations in any save very few localities. Aiken, South Carolina, has a first-class hotel. South Georgia and the table lands of Texas are probably the best localities. If the patient is to take a sea voyage, the month least likely to be stormy in the North Atlantic is July. To go to the Bermudas, January is usually (not always) the best winter month. September, November, December, February, and March are likely to be bad months on the Atlantic Ocean. The voyage to the Bermudas is often exceedingly rough and should not be attempted by those who have shown uræmic symptoms or, in general, when

the amount of urea voided is less than thirteen grammes in 24 hours. Violent sea sickness has been known to cause death from uræmia. If the patient go to Saratoga, he should avoid promiscuous drinking both at hotel bars and mineral springs. Altitudes higher than 5000 feet are to be shunned and in general those not over 3000 feet are desirable. In changing from lower to higher level, patient to be careful about exerting himself at first. Localities where "mountain fever" abounds should be avoided.

Those not desperately ill and to whom sea air is known to be beneficial, may take a long sea voyage,[1] provided it be on board a first-class steamer, where it is possible to regulate diet. The trip from San Francisco to Australia and return has often been recommended. In all traveling by rail, fatigue must be carefully guarded against. Deaths immediately due to the fatigues of travel have been known to take place in cases of albuminuria. (This applies more particularly, also, to cases of diabetes). Those afflicted with albuminuria should, wherever it is possible, travel in what are known as "vestibuled" trains.

[1] Particularly desirable in case of patients in the Mississippi Valley.

Those who are obliged to attend to their business, and cannot afford to leave it permanently, must observe certain precautions as to residence, which should be as near as possible to their place of business. Long rides in vehicles of any description are to be avoided—especially cold ones. *Running for trains* absolutely forbidden. Observation of Sunday as a day of complete rest a necessity, wherever the residence may be. An intelligent physician will direct his patient to live in such a part of town as is easiest to reach from the place of the patient's business. I doubt whether the fresh air of suburban towns makes up for the worry of catching trains and the fatigue of the twice daily rides, though this depends largely on the nervous system of the patient and the business in which he is engaged. Whenever possible, the patient should remain at home during cold north-east storms, whether of rain or snow, *and rest in a recumbent position.* It is well known that those suffering from diseases of the kidneys are worse in cold, damp weather.

Psychical influences:—Too little attention is paid to what are called, for want of a better term, "psychical influences." But I will guarantee that your patient will not improve if he is harassed and worried by business or social cares. It is needless to say that "powerful

emotions" will increase the albumin in the urine. Freedom from worry in Americans is as essential as anything else in the hygienic treatment. Obstinate cases, where all precautions are observed and no improvement noted, are sometimes unexpectedly relieved by a change in the psychical conditions. The physician must make it a business to see that his patient is not worried by the thousand and one annoyances of modern life. Uncongenial friends or even relatives must be cleverly got rid of and sent to visit some one else. One of my cases showed diminution in albumin of nearly one-half, in two days after a tiresome person left the patient's house. Care must be taken that nurses and attendants generally are to the patient's liking. These precautions are of course not always necessary, but in nervous, "cranky" patients they must not be forgotten.

Care of the skin :—It has been said with truth that it is of the greatest importance to promote uniform activity of the skin in all forms of albuminuria. The albuminuric patient should shun cold applications to the skin, whether of air or water. He should avoid draughts as he would contagion. All authorities which I have seen, whatever be their theories, unite in advising the use of woollen garments for albuminuric patients. This is especially advisable for those

compelled to live in the northern states. Beaumetz advises, in addition, that the patient wear wild-cat skin (with the fur) over the region of the kidneys. Semmola believes in keeping patients in a warm, well ventilated room, all winter long. Purdy points out that confinement in bed for a time often produces marked improvement. Some care must be observed in regard to *baths*, as the least negligence may do much harm to the patient. But warm baths followed by frictions, and great precautions against chilling afterwards, may prove beneficial. It is generally admitted that the *dry hot-air bath* is best of all, but may in some cases weaken the patient if taken too often.

Fresh air and exercise:—It is universally agreed that fresh air is a positive necessity in chronic nephritis. Attention should be paid, therefore, to ventilation. Numerous appliances are now to be had which favor ventilation without chilling the patient. Inhalations of oxygen I deem of positive value to any albuminuric, and especially to the housed patient. [It is well known that in desperate cases almost moribund, life has been prolonged for weeks by the administration of oxygen. While it is not a "specific," oxygen is at least a valuable adjuvant if methodically and persistently given. See Medical Treatment].

The patient's exercise should be carefully looked after. Fatigue of any kind must positively be avoided. On sunny days, short walks on a level may be taken unless the patient's business requires walking or much movement, in which case these will be sufficient for him. To housed patients, passive exercise is to be recommended. In mild cases, where the amount of albumin is a small fraction of one per cent and the urea not much below normal, I have found gentle exercise beneficial. In one case where previously no regular exercise had been taken a diminution in the albumin followed, which I attributed to the general improvement in the patient's health. But I could always detect albumin in the urine voided after exercising, while it gradually disappeared from the urine voided at other times.

I hold that frequent quantitative examinations of the urine are of more importance than procedure according to any set theory. The quantity of urine in 24 hours, the quantity of urea, and the quantity of albumin are what the physician needs most to know, and particularly what the *quality* of the urine is, *i. e.*, the ratio of the solids to the water, of the urea to the salts, etc.

THE QUALITY OF THE URINE.

Call the average specific gravity of urine 1020 and the average quantity in 24 hours 1450 cubic centimeters. By Trapp's formula $\frac{1450}{1000} \times 20 \times 2$ we have 58 grammes of solids in 24 hours. (Hæser's formula, page 7 (4), would give 68 grammes as the average; but I regard this figure as too high. Hæser's formula is probably more correct in urines of high specific gravity). If 58 grammes is the average in 1450 c. c. of urine, there should be in 1 c. c. of urine 58÷1450 gramme of solids or 0.04 gramme. To ascertain the quality of the urine as to total solids, therefore, divide the total solids by the total amount of urine and compare result with 0.04 the normal average.

To ascertain the quality of urine as regards urea in particular, divide the total urea by the total urine of 24 hours. In normal urine the quantity of urea in 24 hours is about 33.5 grammes, 33.5÷1450 equals .023 gramme.

The normal ratio of urea to the salts is about $1\frac{1}{3}$ to 1.

The total solids in urine being 58 grammes and the total urea 33.5 grammes, the difference between them represents approximately the quantity of salts (phosphates, chlorides, sulphates, urates, etc.), in 24 hours—58 minus 33.5 equals 24.5. Urea then is to salts as 33.5 is to

24.5 or as 1.36 is to 1. In regard to *phosphoric acid* in particular, it is probable that about 3 grammes of this substance are found on an average in the 24 hours' urine. If in 1450 c. c. there are 3 grammes, in 1 c. c. there should be 3÷1450 gramme or 0.207 nearly.

The more recent analyses of Yvon-Berlioz show the following:

	Male.	Female.
Quantity in 24 hours	1360 c.cm.	1100
Sp. Gr.	1022.5	1021.5
Urea, per litre	21.50 gm.	19.0
Urea, per 24 hours	26.50	20.5
Uric acid, per litre	0.50	0.55
Uric acid, per 24 hours	0.60	0.57
Phosphoric acid, per litre	2.50	2.40
Phosphoric acid, per 24 hours	3.20	2.60
Ratio of uric acid to urea		1:40
Ratio of urea to phosphoric acid		8:1

[Merz states that the average quantity of urine for children of eight years is in boys 700 c.c., in girls, 600 c.c. At ten years, for boys, 750 c.c., for girls, 700 c.c. At 12 years, for boys, 1000 c.c. for girls, 800 c.c.]

Taking the tables of Yvon-Berlioz as a minimum standard, and those of Parkes as a maximum, I have devised a method of indicating for clinical purposes results of analyses compared with normal standards. These tables were published in part in the *Hahnemannian*

for March, 1890, and more fully in the *Era* of April and May.

Suppose a male patient is voiding 15 grammes of urea daily. By comparison with the standard (Yvon-Berlioz) we see that his urea is about 55 per cent. of normal. It is more convenient to represent the amount of urea by 55, assuming 100 as normal, than to say that it is 15 grammes, since the former figure shows at once the falling off from the normal average, while the figure 15 grammes must be compared with the average, and if the reader is unfamiliar with French measures must be expressed in English.

In my tables, which are suited to both French and English measures, the comparisons with normal have been made for all cases, and will be found exceedingly useful for reference in keeping record of a case. For example, call normal average 100; a number of analyses yield figures which by reference to my tables express the quantity of urea for five successive days as follows: 40, 35, 20, 15, 5. It needs no knowledge of anything but the simplest arithmetic to see what the condition of the patient is with reference to the excretion of urea.

The following analyses are those of urine of *poor* character. The patient was a man suffering from sclerosis of the kidney:

ORDINARY METHOD.

	First analysis.	Second.	Third.
Quantity in 24 hours	1980 c.c.	1530	2130
Specific gravity	1012	1012	1012
Total solids (Trapp's coeff.)	48 grammes	37	51
Urea, per litre	9	9	9
Urea, total	18	14	19
Phosphoric acid, per litre	0.8	0.54	0.47
Phosphoric acid, total	1.58	0.80	1.00
Ratio of urea to phosphoric acid,	11 to 1	17 to 1	19 to 1

Comparing the urea and phosphoric acid with the averages of Yvon-Berlioz, and expressing them on the scale of normal=100, we have the following:

NEW METHOD.

	First analysis.	Second	Third.
Urea, per litre	40	40	40
Urea, total	70	50	70
Phosphoric acid, per litre	30	20	20
Phosphoric acid, total	50	25	30
Ratio of urea to phosphoric acid	130	210	235

The second table shows at a glance the deficiency of the urine in phosphoric acid, and the general poor quality, as regards both urea and phosphoric acid. (Results are given in the nearest multiple of 5.)

The results may further be classified roughly as follows: any percentage from 100 to 75 may be classified as A, any from 75 to 50 as B, from 50 to 25 C, and from 25 down, D. In this way we should obtain the following from the last figures given:

	First.	Second	Third.
Urea, per litre	C	C	C
Urea, total	B	B	B
Phosphoric acid, per litre	C	D	D
Phosphoric acid, total	C	C	C

The urine should be collected and measured frequently, and its quality carefully watched. The patient should not be worried with the details of his case, but the physician should make observations of the condition of the urine with as much care as the captain of a vessel takes soundings when approaching a dangerous coast.

2. REMEDIES IN CHRONIC NEPHRITIS.

Recoveries from chronic nephritis have certainly taken place, or, at any rate, patients have lived for many years and succumbed to other disorders than those usually recognized as following in the wake of renal lesions. It will be convenient to discuss the field of usefulness of remedial agents in each lesion separately.

REMEDIES IN CHRONIC PARENCHYMATOUS CHANGE.

The three great causes of this lesion are:

I. Previous acute attacks.
II. Alcohol and other poisons.
III. Associated hepatic disorders.

Treatment should, therefore, in the *first* place be hygienic, to prevent further acute exacerbations; next, alcohol and all substances interfer-

ing with hepatic function should be avoided; all forms of rich, greasy food and pastry, all highly seasoned food to be strictly forbidden. Great care should be taken that the patient does not overeat, or over-work. If the lesion is the result of poisoning, systematic treatment to counteract the general effects of the poison should be undertaken.

This form of chronic nephritis is the one most commonly observed as a result of acute poisoning by salts of the metals, and corrosive agents in general. Effort should be made in any case where there is history of poisoning, to ascertain the character of the poison, and to suit the treatment accordingly. [The reader will find directions for treatment of poisoning in the author's "Physician's Chemistry." Among the larger works on poisons may be mentioned Wormley's "Micro-Chemistry of Poisons," Woodman and Tidy's "Forensic Medicine and Toxicology." Besides these, the works of Murrell, Taylor, Blyth, Reese, and Tanner, will be found useful.]

Lastly, if the disorder be associated with prolonged disturbance of hepatic functions, as is claimed in some cases, consult the following table for selection of a remedy:

TABLE XI.—Choice of Leading Remedies in Chronic Renal Degeneration if Dependent upon Hepatic Disorder.

Mercurius Cor.	Acidum Nitricum.	Argentum Nitricum.	Kali Bichromicum.	Iodine.
Gastro-intestinal or hepatic symptoms early and prominent. (See page 118).	Ditto.	Ditto. (See page 116).	Ditto.	Ditto.
Pain in the back and prostration early and marked.	Pain and prostration not prominent.	Pain and prostration not marked till late.	Pain and prostration moderate.	Pain and prostration late.
Pallor, œdema, headache not marked at first.	Pallor, œdema, headache early and marked.	Pallor, œdema, headache early and marked. Headache violent.	Pallor, œdema, headache not marked at first.	Pallor, œdema, headache not marked at first.
Respiratory or circulatory troubles not marked till late.	Ditto.	Respiratory or circulatory symptoms not prominent.	Cardiac and respiratory symptoms early and marked, following gastric, etc.	Ditto.
Coma, delirium not prominent.	Mental symptoms prominent after œdema, etc.	Ditto.	Coma, delirium, etc., not marked.	Ditto.

(1) Based on suggestions from Prof. A. W. Woodward, M.D.

In addition to the remedies mentioned in Table XI., there are others which may prove of value.

Euonymine is a remedy to be thought of in this lesion, since by its use a "restoration of the integrity of the functions of the liver" may be brought about. It must be given in appreciable doses, from a quarter to half a grain, care being taken that the *elimination* of urea is not checked in any way.

Ammonium Chloride may be tried in torpid conditions of the liver, jaundice, etc. It is given for these conditions in doses of from two to five or ten grains.

Dr. Hale suggests *Carduus* and *Thlaspi*. Dr. Woodward thinks *Thuja* of possible value.

Inasmuch as œdema is often early and marked, *Apis* and *Digitalis* should not be forgotten.

Mineral waters:—In this lesion *Buffalo Lithia* water, when there is torpidity of the liver, acid dyspepsia, etc.; *Vichy*, when debility is not great, but urine is acid and the functions of the liver are disturbed to a marked degree.

Carlsbad, when there is fatty liver, enlarged liver, gall-stones, etc. Carlsbad and Buffalo waters are useful in anæmic cases, since they contain iron.

It is possible that there are two stages in this lesion, viz.: first, chronic degeneration proper; and, second, chronic nephritis following the degeneration.

If the patient be tided over the early stage of chronic degeneration (while the albumin and casts are yet present in but small quantities),

he may recover, or at any rate live for a considerable period of time. But after the amount of albumin and casts has become large, treatment can only be directed toward prolonging life and warding off acute exacerbations. Recovery, however, in the case of young patients has sometimes been noted when least expected.

There is clinical testimony in favor of the following:

Ferrum Sulph. for the anæmia with exhaustion and lassitude. It will be found useful in the remissions after acute exacerbations.

China, also for exhaustion and lassitude.

Nux Vomica, for heaviness and stupor.

Helleborus, dropsy with diarrhœa.

Cantharis, when, in addition to the scanty urination, and high colored urine, there is scalding, irritation of the bladder and urethra, aching in the loins or testicles; especially when there is history of stricture and prostatic disease.

Digitalis, when the quantity of urine is diminishing to a dangerous degree with cardiac symptoms, etc.

Phosphorus, for cases arising during suppuration.

Agaricus and *Nux Vomica*, in cases due to alcoholism.

Miscellaneous Measures:

Hot air baths are particularly useful in this

lesion, unless the patient be too weak or arterial pressure too great. In the latter case, *Glonoin* may be used, especially when albumin is abundant and the patient dropsical. It may be given conjointly with *Ferrum Muriaticum* in the lower dilutions.

When the patient becomes very dropsical and the measures previously described have failed, it will be necessary to prolong life so far as possible by more vigorous measures.

Palliative treatment:—This consists essentially in producing diaphoresis, catharsis, and diuresis.

Diaphoresis :

Muriate of pilocarpine, in doses subcutaneously from one-fifth of a grain to one-half a grain (even two-thirds or three-fourths of a grain, if in desperate cases, when the patient is almost "water-logged."—Porter). Stimulants to be given in advance of the pilocarpine. The hot air bath may be tried, or alcohol sweats, as already described.

Catharsis: when there is tendency to uræmia, with excessive and persistent œdema, small and repeated doses of *elaterium*, or the official triturate of *elaterine* in sugar of milk (dose $\frac{1}{20}$ to $\frac{1}{8}$ grain), may be given for the time being

[See treatment of Uræmia under head of "Complications."]

Diuresis:—Application of dry cups to the loins, followed by warm poultices with digitalis infusion internally (page 117). Free use of mildly alkaline waters. Ordinary coffee. When there are cardiac symptoms try *caffeine.* [Caffeine in combination with digitalis and strychnine is recommended by Porter.] Caffeine should never be used with pilocarpine.

Caffeine (citrate) is also given in connection with paraldehyde, the former in doses of from two to four grains (sometimes four to eight grains) three times daily, and the latter in capsules, 30 to 45 drops, in two or three doses at evening.

When ascites is a prominent feature, Millard advises *Apocynum Cannabinum.* An infusion of a drachm of the root to eight ounces of water may be used, of which the dose is a dessertspoonful two, three, or more times daily, unless it cause nausea and vomiting, or too free action of the bowels and consequent prostration.

Miscellaneous:—The number of crude drugs which have been prescribed with claimed success in chronic nephritis is large. Lack of space forbids even an enumeration. Many rely on bichloride of mercury, which is given sometimes in doses of 1/8th of a grain, three times daily.

REMEDIES IN CHRONIC DIFFUSE NEPHRITIS.

See pp. 85 and 86 for diagnosis.

In treating this and other disorders of the kidneys, bear in mind the three great causes of renal disease:—

I. Syphilis.
II. Gout.
III. Malaria.

In lesions which border on the sclerotic type bear *syphilis* in mind. Gouty conditions show themselves both in the history and in the urine, the latter loaded with urates and uric acid, of intensely acid reaction, etc., etc.

Malarial origin often escapes notice. Look carefully for history of chills and fever. Con-

sider the locality in which the patient lives. In the cities, syphilitic and gouty cases are more common; in river valleys, look for malarial cases.

The object to be attained by treatment is to bring the disorder to a stand-still, even when complete cure is impossible.

I. In syphilitic cases *Merc. Iod.* or *Kali Iod.* are beneficial. *Merc. Cor.* will help many cases and is prescribed in a routine way. It fails, however, in some cases which *Merc. Iod.* and *Kali Iod.* will help.

In cases where the etiology is obscure, try the two remedies, *Merc. Iod.* in the first decimal, *Kali Iod.* in three grain doses of the crude drug, well diluted, three times daily after meals. Dr. Delamater gives *Kali Iod.* in some cases immediately before a meal, the patient taking a dose of *Bismuth* after the meal. Or if *Kali Iod.* prove irritating, the sodium compound may be tried. If there is clearly a history of syphilis and the amount of albumin in the urine is large, the patient dropsical, etc., it is advisable to use first the hot air bath, etc., especially if there is indication of uræmia. As soon as the quantity of albumin is reduced and the amount of urine in 24 hours increased, then the iodides may be given steadily for weeks or

even months. [Beale advises administration of iodide of potassium for a fortnight and then, for a like period of time, syrup of iodide of iron or Blanchard's pills, one or two at 11 and 4 daily for a fortnight.]

II. In gouty cases, when the urine is scanty, acid, loaded with urates and uric acid, Londonderry Lithia water, by increasing the quantity of urine and diminishing the acidity, proves useful. Carlsbad salts, three times weekly, will help matters if there is gastric catarrh. *Lithium benzoate* may also be temporarily employed with benefit. *Euonymine* should be remembered in cases where the bowels are sluggish.

III. In malarial cases, *Arsenicum* and *Ferrum* should be tried. *Arsenicum* in the second decimal, or *Chin. Arsen.*, provided urea is not too greatly diminished. *Ferrum Muriaticum* 1x when *Ferrum* is indicated.

[There are those who claim that Fowler's solution combined with solution of ferrous malate is of service in malarial cases. As large doses as five minims of Fowler's solution and thirty of ferrous malate have been given three times daily in severe cases.]

Merc. Cor. has also proved beneficial in malarial nephritis. In some cases *Arsenicum* in alternation with *Terebinthina* has done good

service. *Ammonium Muriaticum* is advised when Arsenicum fails. *Euonymine* should not be forgotten. Patients with nephritis due to malarial poisoning have been helped by the waters of La Bourboule, in France, Department of Puy de Dome. These waters contain arsenic and iron, and are alkaline. La Bourboule has an elevation of 2400 feet.—(Millard.)

IV. General treatment.

The remedies called for on general principles in diffuse nephritis are most often the following:—*Apis*, *Terebinthina*, *Digitalis*, *Merc. Cor.*, *Ferrum*. Indications for their use have already been given. See Tables X and XI. Recent experiments tend to show that *Cantharis* may possibly have a field of usefulness in diffuse nephritis.

Miscellaneous:—Oxygen gas is sometimes of service, especially if the patient be anæmic. Where there is constant and early formation of uric acid crystals in the urine it is possible that enemata of oxygen gas may do good. Jaccoud gives ten litres of oxygen three times daily in chronic Bright's disease with the simplest possible diet, promoting tissue change with the inhaled gas by systematic application of douches, followed by friction.

The Japanese *loofah* is good material for friction. Cod-liver oil,[1] maltine, and hypophos-

[1] Some good article as, for example, Möller's.

phites are often better for the anæmia than the various preparations of iron. *Ferrum* should not be given too low or too persistently when nervous symptoms are prominent.

REMEDIES IN SCLEROSIS.

This condition is usually referable to syphilis, and, if the etiology is obscure, treatment should be instituted on the theory of syphilitic origin. If, however, there is gouty history, or if lead poisoning is the cause, *Mercurius* must not be given too low or too persistently. Nor should large quantities of mineral waters be allowed, when the patient is already voiding much more urine than normal.

RADICAL TREATMENT OF SCLEROSIS.

Plumbum is the stand-by in this disorder, if not due to lead poisoning or to syphilis. Mercurius Vivus 3x when due to lead poisoning.

Nux Vomica for the disorders of the stomach.

Nitric acid for gastro-intestinal disorders.

Cactus for the over-action of the heart.

Aurum Muriaticum, when there are nervous symptoms, irritability, hypochondriasis, vertigo.

Lithium Carb. and *Lithium Benzoate* in gouty kidney.

Lithium benzoate may now be had in the granular effervescent form, which is a most agreeable preparation.

For sclerotic kidney of syphilitic origin, *Mercurius Corrosivus* is the remedy. It has been given in doses as strong as the one-sixtieth to one-thirty-second of a grain. When *Merc. Cor.* fails, *Merc. Iod.* and the *tannate of mercury* are sometimes of service. In rheumatic cases, or those due to lead poisoning, persistent use of mercury in appreciable doses is not to be allowed.

In the treatment of forms bordering on the sclerotic type, and in sclerosis itself, regard should be paid to the condition of the heart.

Before cardiac hypertrophy and signs of high tension:—Diet limited as to nitrogenous foods; general hygienic precautions: if urine below normal, digitalis and salines, if necessary, allowable. Bowels to be opened regularly.

Lastly, during heart failure, diet should be more liberal and a moderate amount of meat allowed daily. Such drugs as strophanthus, etc., allowable, if necessary; also hot-air baths. Strychnine and iron may be useful.—(Purdy.) The urine should be watched and any sudden reduction in quantity (coupled with change for the worse in *quality*) should be noted.

Miscellaneous:—Cod-liver oil is often exceedingly serviceable in sclerosis. To diminish the nocturnal urination, *chloride of gold and sodium*, in doses of from one-fiftieth to one-thirtieth of a grain is recommended. Symptoms indicating

an unfavorable termination are scanty urine, heart failure, much œdema, albuminous retinitis, intense constant headache, urinous odor of the skin, and prurigo, coma, or excessive lethargy. —(Millard.)

REMEDIES IN LARDACEOUS DISEASE.

Many cases occur in the course of tertiary syphilis. The patient's strength should be supported by a liberal and nutritious diet. The *iodides* are the leading remedies: In syphilitic cases, *Kali Jod.* has proved useful in appreciable doses, as suggested before. In cases *not* due to syphilis, the iodides of *iron* and of *arsenic* are often serviceable. Cod-liver oil and the hypophosphites are sometimes beneficial. If there is dyspepsia, *Nux Vomica*, *Pepsin.* Patients may often take a good wine with benefit. *Wine of pepsin* may be of help. In tuberculous and strumous conditions, *Calcarea Carb.* and *Phos.* must not be forgotten. [Calcium chloride in appreciable doses (5 to 20 grains in milk, largely diluted) has been used where there is enlargement of the lymphatic glands.]

Acidum Phosphoricum has been a leading remedy in this disorder.

Nephritic complications are sometimes noticed and will require treatment, as described under the head of the different forms of ne-

phritis. It is not advisable to give cathartics in lardaceous disease. Diuretics and hot-air baths are the best palliatives in nephritic complications.

If, however, lardaceous disease is dependent on suppuration, the latter should be treated. Removal by surgical operation of the exciting cause should be attempted, if the suppuration is at a point where the necessary surgical procedure is not certain to be attended with fatal results, for amyloid change, with its exciting focus of suppuration still present, becomes absolutely fatal.—(Loomis.)

REMEDIES IN ACUTE HYPERÆMIA.

This disorder is often overlooked. See pages 90 and 91 for diagnosis. It occurs mostly in the pyrexial stage of acute diseases, but may arise independently of any specific fever, simply from exposure to cold. Since both albumin and blood may be found in the urine, it is sometimes difficult to distinguish the condition from acute nephritis or from an acute exacerbation of a chronic disease. It is the *catarrhal nephritis* of Virchow. In my opinion there is more danger of mistaking a genuine nephritis for acute hyperæmia than acute hyperæmia for nephritis. If the patient be feverish, complain of pains in the loins, frequent micturition, and

albumin, blood, and casts are present in the urine, but there is no dropsy or anasarca, the disorder may doubtless be merely acute hyperæmia, especially if the patient be young. Cases are not very common, and too decided an opinion should not be given at first. Rest in bed should be required of the patient, and, in general, the hygienic precautions described under the head of "Acute Nephritis" (Page 117). *Mercurius Corrosivus* is an excellent remedy, when gastric and hepatic symptoms, with pain in the back, precede the fever and albuminous urine. In one case which I am quite certain was acute hyperæmia and not acute or chronic nephritis, *Merc. Cor.*, third decimal trituration, brought about a speedy recovery. *Helonias* has also been suggested.

Indications for other remedies mentioned under the head of "Acute Nephritis" may be found in cases which come under observation. The disorder usually yields to radical treatment; palliatives are not only unnecessary but, as a rule, undesirable.

Sometimes if there is obstinate constipation, elaterium may be needed in $\frac{1}{8}$ grain doses every twenty minutes till $\frac{3}{4}$ grain has been given or the patient's bowels have moved.

[After the tension of the blood has decreased, the acme of the disorder has been reached. Porter advises tincture of digitalis in ten minim doses every three hours until

the renal secretion is started, and then less frequently. If uræmic convulsius, etc., appear, pilocarpine muriate may be needed as in acute nephritis]. When there is much pain in the back, dry or wet cups followed by warm poultices may afford relief.

REMEDIES IN CHRONIC HYPERÆMIA.

This disorder is always secondary to mechanical interference with the circulation of the blood. Delafield declares the usual causes to be the following:—Chronic endocarditis, pericarditis, dilatation of the ventricles of the heart, aneurism of the aorta, pulmonary emphysema, fluid in the pleural cavity, and tumors. To these I add *cirrhosis of the liver*, in which disorder there may be pressure on the inferior vena cava in the groove of the liver which it traverses. I have seen several cases in which I suspected an hepatic cause for chronic hyperæmia, and, in one case, a post-mortem examination confirmed the suspicion. In this particular case, cirrhosis of the kidneys was not shown by the condition of the urine, which from first to last was that characteristic of chronic hyperæmia. The *remedies* are necessarily those which tend to remove, if possible, the cause of the congestion or to mitigate the sufferings of the patient.

Phosphorus may sometimes be indicated. *Convallaria majalis* when the heart is rapid,

irregular, and there is anasarca and ascites in mitral insufficiency from cardiac dilatation and hypertrophy. *Digitalis* will sometimes reduce the pulse and increase the flow of urine, when other remedies fail.

Dr. W. A. Wakely[1] prescribed *Arnica* 3x with most satisfactory results in cardiac dropsy when the patient felt "bruised as if beaten." Copious urination took place and at end of a week great improvement was evident.

In cardiac dropsies, *Adonis Vernalis* in 2 drop doses every 2 to 4 hours is recommended by Dr. T. F. Allen. Purdy gives digitalis in connection with adonis. Adonidin is sometimes used. Hale prefers tincture of digitalis with tincture of strophanthus in syrup of wild cherry as a vehicle.

Brunton calls our attention to the value of *beef tea* as a cardiac stimulant. When digitalis fails, *caffeine* may be employed to advantage; dose of caffeine citrate, 3 to 5 grains. Used in connection with paraldehyde. In cardiac dropsies See claims that by use of two ounces of milk sugar in two quarts of water, all other liquids being suppressed, marked diuresis is obtained. *Coronillin* and *pyridin* are two heart stimulants lately employed.

[1] *N. A. J. of H.*, Nov. '89.

THE HEART IN RENAL DISEASES.

In chronic diffuse nephritis, especially in the forms bordering on sclerosis, regard should always be paid to the condition of the heart. In general, in all cases where renal lesion is suspected, not only note the character of the pulse, but examine the heart as well.

Apex beat:—This is normally in the fifth left intercostal space, well to the inner side of a line drawn vertically through the nipple.

Hypertrophy and Dilatation:—Displacement of the apex beat to the left, when not due to pulmonary disease, spinal deformity, or pressure from intra-abdominal structures, is generally indicative of enlargement of the left ventricle. The cardiac impulse may then be situated outside the nipple line, an inch or more in extreme cases, and in the sixth or even seventh interspace. Commonly, the hypertrophy is what is known as eccentric hypertrophy, or increased thickness of the ventricular wall, together with dilatation of the corresponding cavity. The character of the apex beat varies according as either hypertrophy or dilatation predominates. If the former, then the impulse is forcible, heaving, diffused, and the apex beat itself is broad and thrusting. When, on the other hand, dilatation exceeds hypertrophy, the

cardiac impulse may be wholly absent, or so feeble as to be scarcely perceptible either by eye or hand. When the true apex beat can be made out, it is very localized, feeling more like a gentle tap than a strong thrust. In some instances the cardiac impulse gives a faintly diffused sensation, as of a soft body tumbling against the chest wall. Percussion generally reveals an increase in the area of praecordial dullness corresponding to the side of the organ enlarged. When it is the right ventricle that is hypertrophied or dilated, there is, in addition to visible and palpable epigastric pulsation, an increase of dullness on towards or even across the body of the sternum at the level of the fourth costal cartilages.

The character of the heart sounds depends upon the state of the cardiac muscle. When hypertrophy is pronounced, the first sound at the apex is of low pitch, prolonged and loud, in a word "booming," and the second sound in the aortic area is accentuated. When, however, the muscle of the heart is weak and the ventricle dilated, the first sound is shorter, weaker, and more valvular in quality.

The pulse of hypertrophy is slow, full, and strong, while in the weakness of dilatation it is more or less rapid, weak, and compressible, and in rhythm either regular or extremely inter-

mittent and variable in both force and volume. In hypertrophy there may be no symptoms referable to the heart, whereas in dilatation there is usually a feeling of bodily weakness and breathlessness on even slight exertion, with or without a subjective sense of palpitation. Signs and symptoms of pulmonary engorgement are also present in many cases, as well as evidence of general venous congestion.

Sufferers from weak heart, when not associated with valvular disease, are usually past middle age and will be found on careful search to manifest more or less evidence of atheroma. Hence peripheral arteries should be examined with special care. Should there be more or less evidence of arterial degeneration, distinct attacks of angina pectoris, and should the patient's general condition reveal no satisfactory cause for the increasing heart failure, it may be suspected that the cardiac weakness is due to degeneration as a result of sclerosis of the coronary arteries.*

Cardiac failure from this cause may be acute, subacute, or chronic. Acute cases may appear and end fatally in a few minutes, hours, or days, while chronic forms may last for years.

Renal lesions, secondary to cardiac dilatation,

* Babcock, Sclerosis of Coronary Arteries, etc. *North American Practitioner* for Jan. 1889.

differ. In many, the kidneys give post-mortem evidence of chronic hyperæmia, while in long standing cases there may be actual degeneration. Marked hypertrophy of the left ventricle is usually produced by renal cirrhosis. When from the age of the individual, as well as from other conditions, the dilatation of the heart is likely to be due to degeneration of its walls, digitalis, so useful in dilatation of valvular disease, should be employed with great caution. Its effect is to increase arterial tension, while at the same time augmenting the force and effectiveness of cardiac contractions; hence it is at once apparent that there is real danger of its occasioning rupture of the degenerated heart muscle, or at least of increasing rather than lessening the dilatation by reason of the peripheral resistance produced by the drug.

Analysis of urine in a case in which there was considerable dilatation of both ventricles, and marked evidence of general venous stasis:—Volume in 24 hours, 720 C. C. Sp. gr., 1022. Solids by Trapp's coefficient, 32 grammes. Urea per litre, 18½ grammes. Urea total, 13 grammes. Phosphoric acid per litre, 1.9 gramme. Phosphoric acid, total, 1.33 gramme. Albumin, plain trace. Sediment: Hyaline and hyalo-epithelial casts, though not plenty. Death in six weeks from time of this analysis.

Mitral Diseases.—Differential diagnosis as follows:

MITRAL OBSTRUCTION.	MITRAL REGURGITATION.
(1.) Murmur is praesystolic, limited to mitral area, not transmitted to the axillary region, often accompanied by praesystolic thrill.	(1.) Murmur is systolic, not limited to mitral area, but transmitted to left into axillary region, and often to inferior angle of left scapula.
(2.) No enlargement of left ventricle.	(2.) More or less enlargement of left ventricle.
(3.) Increase of praecordial dullness to right, epigastric pulsation, accentuation of second pulmonary sound and reduplication of second sound at junction of fourth left costal cartilage with sternum.	(3.) Praecordial dullness increased to right, epigastric pulsation and accentuation of second pulmonary sound, but these secondary signs not so marked as in mitral obstruction.
(4.) Pulse small, regular or irregular in time, force, and volume.	(4.) Pulse regular or irregular in time, force, and volume.
(5.) Symptoms of pulmonary engorgement, such as breathlessness, and often more or less cough.	(5.) Symptoms, too, of pulmonary engorgement, not apt to be so great as in mitral stenosis.
(6.) Found most commonly in young subjects.	(6.) Found in young and in old subjects alike.
(7.) As a rule not complicated by lesions of other valves.	(7.) Often found in connection with aortic disease.
(8.) Prognosis as to time often very bad.	(8.) Prognosis as to time often very fair, and better in young adults than youth or age.

Mitral obstruction and regurgitation are generally combined, but in differing proportions, and the blending of the murmurs with the sounds, produces a characteristic rolling rhythm. Change of patient's position from erect to re-

cumbent, and rapid or quiet action of hearts will generally occasion alternation in character, quality, or time of murmur.

AORTIC OBSTRUCTION.	AORTIC REGURGITATION.
(1.) Simple hypertrophy of left ventricle, as shown by well defined, thrusting apex beat, situated somewhat to left of normal position.	(1.) Hypertrophy, with dilatation of left ventricle, as shown by powerfully heaving and diffused apex beat, situated considerably outside of and below nipple. Often strong pulsation throughout entire praecordia.
(2.) No epigastric pulsation or other signs of right-sided enlargement.	(2.) No epigastric pulsation or other signs of right-sided enlargement.
(3.) Pulse small, firm, hard, regular, as a rule.	(3.) Pulse abrupt and jerking or collapsing, rendered more pronounced by elevation of arm; in marked cases visible pulsation of peripheral arteries, particularly temporals.
(4.) Rough systolic murmur, having maximum intensity in aortic area, propagated upward into vessels of neck.	(4.) A rough or blowing diastolic murmur, with maximum intensity over body of sternum, and propagated downward along sternum, or in some cases towards the apex of the heart, not into vessels of neck.
(5.) Weakening of second aortic sound.	(5.) Second aortic sound generally masked by murmur.
(6.) Absence of signs and symptoms of pulmonary and general venous engorgement, unless complicated by mitral disease.	(6.) In uncomplicated cases no signs or symptoms of venous engorgement.

Aortic constriction and incompetence are frequently combined, in which event a double or "to and fro" murmur is heard in aortic area, and both apex beat and arterial pulse are modified.

Mitral regurgitation and aortic stenosis both have a systolic murmur; but in mitral regurgitation the murmur has maximum intensity in mitral area and is propagated to the left, it may be to the inferior angle of left scapula, while the murmur of aortic stenosis has maximum intensity in aortic area and is propagated upwards into vessels of neck. The murmurs of mitral stenosis and aortic regurgitation are diastolic, but in mitral stenosis it is praesystolic and of maximum intensity at or just within the apex beat; while that of aortic regurgitation occurs with second aortic sound, has maximum intensity in aortic area, and is propagated down the sternum or towards apex beat.

Tricuspid Incompetence:—Organic tricuspid disease is extremely rare, but, when observed as a congenital defect, presents marked signs and symptoms of general venous hyperæmia.

Tricuspid regurgitation occurs as a functional or relative incompetence from over-dilatation of right ventricle in last stages of mitral or certain pulmonary diseases. There is a soft blowing murmur, systolic in time, and limited to lower end of sternum, tricuspid area, and there

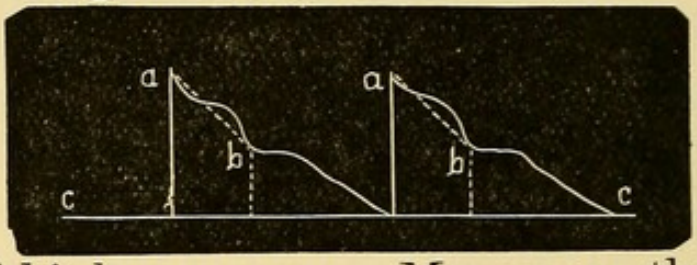
is generally a visible and palpable jugular and hepatic pulsation. Dropsy is a prominent symptom.

General Arterio-sclerosis, Atheroma:—This condition, common after middle age, is characterized by hardening and loss of elasticity of the arterial coats. The affected vessels are resisting to the finger, feeling like a cord, and often so infiltrated with earthy salts as to appear like a row of fine beads. The vessel is tortuous and in early stages of the disease this may be the most marked condition noticed. The heart may or may not be weak from degeneration. The second aortic sound is accented. The results of this condition are arterial anæmia and general venous hyperæmia.—(Bramwell, Fothergill, and others.)

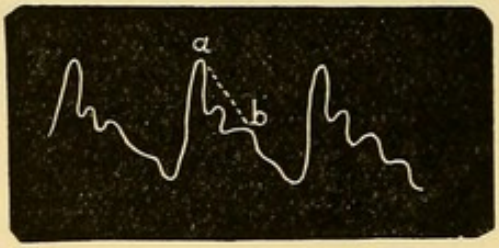
High arterial tension:—The signs of this condition are hard, full pulse, sense of fullness in the head, with perhaps vertigo. The compressibility or non-compressibility of the pulse can be best estimated by placing the forefingers of both hands side by side upon the artery, gradual pressure being made with the proximal finger, while the distal finger notes the effect upon the pulse. The sphygmographic tracing of the high tension is characteristic.

Dr. Mahomed's method of gauging high arterial pressure is as follows:[1]

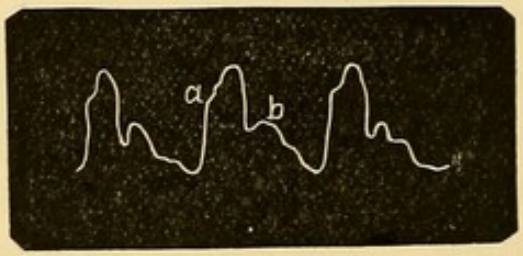
Draw a straight line from the apex of the up-stroke of the tracing a, to the bottom of the notch b, preceding the dicrotic wave, and if any part of the tracing rise above this line, then the pulse



is one of high pressure. Moreover, the height of the notch may also be taken as an indication of the pressure; the higher it is from the respiratory line c c, the higher the pressure.



The above figure represents a normal pulse tracing; a is the apex of the up-stroke, b the dicrotic notch.



The above figure represents a tracing in con-

[1] Purdy, *Op. cit.*

tracting kidney with cardiac hypertrophy and high tension.—(Saundby).

Low arterial tension:—Pulse beat *short* and easily arrested has been noticed in some cases of acute nephritis.

Treatment with reference to the heart.

Treatment in cases of renal disease should to a certain extent be regulated by the condition of the heart. If there is not as yet any cardiac hypertrophy, diet may be moderately liberal, and, if absolutely necessary, diuretics like digitalis, salines, etc., administered. On the other hand, during the stage of cardiac hypertrophy diet should be low, patient not allowed to over-eat, bowels carefully regulated, and glonoin given unless uræmia impend. Digitalis and iron not now to be given. Hot baths not allowed.

THE ALBUMINURIAS OF PREGNANCY.

General treatment:—First, determine, so far as possible, whether the albuminuria is functional or organic, and, if the latter, whether due to vaginal sources, to cystitis or pyelitis, or whether to renal organic disease. If the albuminuria is functional, see treatment of "Functional Albuminuria;" if to pyelitis or cystitis, see consideration of these subjects.

If the albuminuria is plainly renal in origin, identify it so far as possible with the groups given in Table VI. If there is pus in the urine, consult the chapter on "Pyuria," and carefully

make distinction, if possible, between mere cystitis or pyelitis and suppurative nephritis. If the latter is the condition, see remarks on "Treatment of Suppurative Nephritis."

Symptoms of renal insufficiency in pregnancy are headache, slight œdema of the face, change of temper, drowsiness, ringing in the ears or photopsia, dimness of vision more or less marked, possibly blindness of one or both eyes, dizziness, dyspnœa especially on exertion, nausea, vomiting, involuntary twitchings, general prostration, urine scanty, albumin several tenths upwards, urea from half normal down to a few grammes in 24 hours. The essentials of treatment in most cases are as follows:—Non-nitrogenous, or better still, if possible, a milk diet, when there is much albumin. Bowels opened once daily. Fatigue and excitement avoided. Woollens next to skin, unless too much irritation from them. Free action of skin by use of warm baths. Alcohol sweats, if œdema is marked and increasing. Beverages: Pure spring water, hard water to be avoided. In some cases, milk, together with Vichy water, when milk alone is not tolerated. Uniform temperature and avoidance of draughts or exposure to cold even for a moment.

Remedies:—These are to be given according to the symptomatology. Consult, however, the

remedies mentioned under "Acute Nephritis," "Chronic Parenchymatous Change," "Diffuse Nephritis," "Sclerosis," and "Chronic Hyperæmia," for help in differentiating. *Merc.Cor.*, *Apis*, *Terebinth*, *Helonias*, *Euonymus*, *Kalmia* are often indicated. Add to these *Arsenicum*, *Antimonium Tartaricum*, *Apocynum*, *Cantharis*, *Glonoin*, *Helleborus*, *Sepia*, *Lachesis*.

For the nervous symptoms and vascular excitement Dr. L. L. Danforth advises selection from the following: *Aconite*, *Belladonna*, *Coffea*, *Chamomilla*, *Gelsemium*, *Hyoscyamus*, *Ignatia*, and *Veratrum Viride*. (See "Indications for Use of Remedies.")

Clinical Testimony:—*Merc. Cor.* 3x given every two hours for three months was useful in one case reported in *Hahnemannian*, Nov., 1889. Dr. F. F. Laird of Utica uses pilocarpine systematically in *every* case of albuminuria, from the lightest to the most severe. Hypodermic dose 1-6 grain increased to 1-3 if necessary, once a week on an average, unless headache or dimness of vision are complained of, in which case dose repeated every third day. In fifteen cases of albuminuria no convulsions have thus far occurred.

Convulsions:—[The reader is referred to an interesting article by Dr. Wm. G. Willard in the *Medical Era* of November, 1889.] The

essentials in treatment are as follows: Patient to have, during the spasm, some soft object as a cork or folded towel between the teeth. Chloroform to be given not *during* a spasm, but in sufficient quantity to anticipate a spasm. During period of relaxation, patient's bowels to be opened and diaphoresis induced by alcohol sweat. Chloral per rectum or morphine hypodermically to prolong the quiet induced by the chloroform. *Belladonna, Cuprum, Gelsemium, Hyoscyamus,* or *Veratrum Vir.* either by the mouth or beneath the skin. In severe cases when all other means have failed, large doses of morphine, hypodermically, have been administered with favorable issue. It is said that as a last resort a single hypodermic injection of one and one-half grains of morphine has been used successfully in two cases[1].

Dr. E. P. Hurd[2] sums up the treatment, when the patient is in danger of convulsions, as follows:

The patient must refrain from work, be put on a diet of milk, with or without Vichy water, and fruits, with a minimum of animal food. Saline diuretics, as cream of tartar or acetate of potassium, may be prescribed, and tincture ferri chloridi in full doses three times a day; a full dose of Glauber salts in the morning to promote free elimination by the bowels. It may even be expedient to give at bedtime a full dose of fluid extract of jaborandi to produce profuse sweating, or

1 Willard, *Era*, Nov., 1889.

2 *Therapeutic Gazette*, Nov. 15th, 1889.

administer hypodermically $\frac{1}{8}$ of a grain of pilocarpine, or even resort to the wet-pack or hot bath. If, in spite of these efforts to relieve the engorged kidneys and protect the irritated nerve centres, the patient becomes worse and convulsions seem imminent, premature labor should be induced.

Induction of Labor—Tyson's Conclusions :— Dr. James Tyson, of Philadelphia, in a paper before the American Medical Association, June 27, 1889, offered the following conclusions :

The occasions justifying the induction of premature labor are

1. In Bright's disease complicating pregnancy, where puerperal convulsions attended nephritis in a previous pregnancy.

2. In all primiparæ where Bright's disease had existed prior to pregnancy. Here premature labor should be induced as soon as the fœtus is viable.

3. In cases in which we have not the knowledge acquired in previous cases.

[All will not agree with Dr. Tyson and especially in regard to primiparæ, but the subject does not properly come within the province of this work and will not be discussed here].

I have shown[1] that albumin in the urine may be found from various causes during pregnancy and that such condition should not be confounded with true Bright's disease, as under-

1 *Hahnemannian*, Jan., 1890.

stood by Dr. Tyson in formulating his conclusions. I subjoin two analyses of urine in a case in which the patient went to the seventh month, had convulsions, *but recovered* after delivery.

Both analyses were made before delivery.

First Analysis.	Second.
Volume, 1400 c. c.	1020 c. c.
Sp. gr., 1020.	1021.
Solids, 56 grammes.	43 grammes.
Urea, in 1000, 17.	20 "
Urea, total, 24 grammes.	20 "
Salts, not including urea, 32 gra's.	23 "
Sediment :—Much mucus, vaginal and vesical epithelium, triple phosphate.	*No casts whatever.* Vaginal and vesical epithelium.
Albumin :—Faint trace.	One and one-half tenths.

The second analysis was made a few days before convulsions, but some six weeks after the first analysis. In this case it will be seen that in both specimens urea was not seriously deficient and tube casts were not found at all.

Puerperal Convulsions:—Dr. E. J. Doering, in a paper on this subject read before the Gynæcological Society of Chicago, summarized the treatment under three captions:

1st. For convulsions before delivery: The hot bath, morphia and pilocarpine hypodermically, chloral and bromide of potassium by mouth or rectum, veratrum viride to reduce heart's action and lower arterial tension, possibly bleeding, induction of labor.

2nd. For convulsions during labor: The hot bath, morphia, chloral, anæsthetics; a rapid delivery with all precautions.

3rd. For convulsions after labor: Control eclampsia by anæsthetics and promote rapid elimination by all the emunctories.

TREATMENT OF COMPLICATIONS OF RENAL DISEASES.

Ascites, Abdominal Dropsy. See "*Dropsy.*" In extreme cases paracentesis abdominis. *Aneurism :* Death without uræmic symptoms from rupture of aneurism. Sometimes shown by hematemesis.

Apoplexy :—There is often danger in those past middle age that there will be changes in the blood from the renal lesion and that the cerebral vessels will suffer, especially when at the same time, as is usually the case, there is associated cardiac hypertrophy. Preventive treatment: Bowels to be opened regularly at least once daily, together with the usual eliminative measures. Dr. Hale advises *Arseniate of Strychnine.*

Try also *Arnica, Belladonna, Nux Vomica, Opium*, according to indications. [Ice to the head, purgatives, bleeding. —(Purdy).].

Asthma :—Amyl nitrite, second decimal. Palliatives: Porter advises pilocarpine muriate, elaterium, fluid extract of quebracho, all in full doses. Leech advises ethyl nitrite in half drachm doses of a 3 per cent solution. Roosevelt, cobalto-nitrite of potassium in half grain doses every two to four hours. Ozonic ether is also recommended.

Bronchitis :—Merc. Cor., Arsenicum 3x, *Kali Bich.* 3x. Other remedies may be indicated. (See "Indications for Use of Remedies.") Guard against exposure to cold as preventive, but when established, keep patient warm. Dash the chest with cold water and rub briskly with towel.

Cardiac Lesions :—In *chronic parenchymatous change* and in cases of the *small, soft kidney* (chronic diffuse nephritis without vascular thickening), expect to find a *soft, small, atrophied* heart, due to progressive and general mal-nutrition.

In *chronic diffuse nephritis with vascular thickening*, and in *sclerosis*, expect to find compensatory *hypertrophy* of left ventricle to overcome the general vascular resistance.

Valvular lesions may precede chronic hyperæmia. (See "Treatment of Chronic Hyperæmia").

Valvular lesions may be brought on by endocarditis (caused by the deteriorated condition of the blood in renal diseases), in which case the prognosis is more serious than when either the valvular lesion exists without the renal, or the renal without the valvular.

In the treatment of the *atrophied* heart, Dr. E. M. Hale suggests *Digitalis*, *Strophanthus*, and *Baryta Mur.*

For the *compensatory hypertrophy* no treatment is necessary, save removal of the condition for which it compensates. Dr. A. L. Loomis calls attention to the fact that it is *cardiac degeneration* which is to be feared rather than hypertrophy : *heart failure* in other words. (See "Acute Nephritis, Palliative Treatment").

For *Endocarditis* due to renal disease, Dr. Hale suggests *Arsen. Iod.* and *Salol.* He finds *Arsenicum* in some form indispensable. In *Angina Pectoris*, which is a common symptom in sclerosis of the coronary arteries, Babcock[1] advises prompt inhalation of amyl nitrite, or a glassful of hot whisky. If sub-sternal pain be dull and persistent, nitro-glycerine in doses of one-hundredth of a grain may be administered thrice daily. The body should be kept warm and absolute rest enjoined.

Cardiac Asthma is promptly relieved by stimulants. Hypodermic injections of one sixth or one eighth grain of morphine combined with one-twentieth as much atropine are highly praised by Dr. R. H. Babcock.

Sclerosis of the coronary arteries :—Treatment of angina pectoris and cardiac asthma as above. General treatment :—Body warmly clad, only gentle exercise to be taken, constipation carefully guarded against, nutritious food taken, daily

[1] *Op Cit.*

use of alcoholic stimulants and strychnine are advised. In order to overcome visceral hyperæmia, Turkish baths may be cautiously employed, diuretics, and even pilocarpine, if the indication is urgent. But digitalis is dangerous in these cases.

Constipation :—Obstinate, chronic constipation, especially in sclerotic conditions: *Plumbum.* See also, "Indications for Use of Remedies." If constipation threatens the patient's life with distress from accumulation of gas, suppression of urine, etc., etc., Porter advises us to give a full dose of pilocarpine muriate, hypodermically, preceded by stimulants. Ordinarily, elaterium will prove sufficient. Sometimes nux vomica and belladonna in ponderous doses bring about the desired result. [In milder cases and when the liver is at fault, aloes or podophyllin at night, with a glass of Hunyadi in the morning]. Insert a rectal tube if there is great accumulation of gases.

Diarrhœa:—Often a natural effort at elimination, which should not be too quickly checked.

When there is dropsy with diarrhœa, *Helleborus* is often indicated. (See also "Indications for Use of Remedies").

Salol is now used extensively in treatment of diarrhœa.

If diarrhœa persist to an alarming extent, eliminative treatment may be necessary. In lardaceous disease diarrhœa is often very troublesome. It may be due to intestinal catarrh.

Try *Calc. Carb.*, and *Phos.*, *Phosph. Acid.*, *Arsen.*, *Merc. Cor.*, *Sulphur.*

[If the diarrhœa is due to intestinal ulceration, Purdy advises sulphate of copper $\frac{1}{8}$ to $\frac{1}{4}$ grain in pill form every four or six hours, and deodorized tincture of opium by the rectum. For the diarrhœa of the late stage of *sclerosis*, Purdy declares against the use of opium and relies on tannin or gallic acid, combined with sulphate of copper].

Dropsy:—In *Chronic nephritis* (*not* sclerosis) try *Digitalis* (tincture or infusion), combined with *Adonis Vernalis* (10

drops of fluid extract), occasionally substituting *Convallaria Majalis* for both or either.—(Purdy).

Scoparius, tincture, in 15 drop doses, diluted with water, every three hours.—(Henry Sherry). Not in acute or sub-acute stages.

Scoparius, infusion, is made by steeping an ounce of broom tops in a pint of water for half an hour; dose, one to two fluid ounces four times daily.—(Purdy).

[Loomis recommends Fothergill's pill, in which there is one grain each of squill, digitalis, and calomel. Porter recommends a pill containing three grains of caffeine, one of powdered digitalis leaves, and one-twentieth of a grain of strychnine].

Alkaline mineral waters. If the patient is not too anæmic and there is no diarrhœa, saline cathartics, or elaterium. If the patient is not too weak, occasional hot-air baths and pilocarpine muriate. Digitalis fomentations to the loins. Success is claimed even in renal dropsies from the use of *caffeine citrate*, combined with *paraldehyde*. The caffeine in 4 to 8 grain doses during the day, the paraldehyde in capsules 30 to 45 drops in two or three doses at evening.

Scilla 1x, *Ferrum Mur.* 1x, *Apocynum* in watery infusion, have been given with successful results. Saundby advises convallaria in 15 minim doses of the tincture in the dropsy of chronic (lithæmic) nephritis when there is heart failure with aortic regurgitation, but digitalis takes first rank; either may be combined with a grain of caffeine citrate, 5 minims of liquor strychninæ, one minim of one per cent. solution of nitro-glycerine, and an ounce of infusion of broom-tops. Sée has confidence in sugar of milk.

In the dropsy of the advanced stage of sclerotic conditions, remedies of the digitalis group. In severe cases, salines effective and allowable, even if diarrhœa is present.—(Purdy). Saundby, however, remarks that these cases, where there is

dropsy from heart failure, are eminently unsuited for purging, and it is sufficient to keep the bowels open. The end is very near and may be more easily precipitated than averted. Sudden reduction of dropsy, especially by purgation, has been known to precipitate convulsions or coma.

Empirical treatment with ponderous doses of various drugs is a last resort, and in some cases hastens the death of the patient rather than prolongs his life. Nevertheless, there is always the hope that if he be tided over a crisis nature may tip the balance in his favor.

Epistaxis:—Plug nostrils with cotton wool saturated with solution of ferric chloride or solution of the sub-sulphate of iron. Gaucher treated an obstinate case in interstitial nephritis by milk diet and a mixture of the extracts of cinchona and rhatany. Saundby advises *Ergotin*, subcutaneously, two or three grains, or ergot by the mouth. An *icebag* to be applied locally. Success is claimed for the local application of lemon juice, solution of alum, or hot water alone. Dropping a large, cold, iron key down the back of the neck often succeeds.

Erysipelas:—Not a common complication, but may follow puncturing or incising for relief of œdema, or be secondary to erythema or eczema. Sometimes it develops spontaneously. To prevent erysipelas after incisions, the incised member should be wrapped in hot, moist flannels, which should be changed at first every two or three hours, and at every change the legs, and especially the incised parts are to be thoroughly sponged with warm water and the flannels cleansed before reapplying. Drainage tubes have been used to avoid the danger of erysipelas.

Gangrene:—Rapidly fatal. Pack affected part in Fuller's earth to overcome odor.

Gastric Symptoms: — Nitric Acid 1x. Nausea, slimy mouth, yellow tongue, bitter, acid taste in mouth; alterna-

tion between diarrhœa and constipation, piles, anorexia. [Nausea, with much mucus expectoration, *Pulsatilla* 1x, *Ipecac*].

Arsenicum in the lower decimals when dyspeptic symptoms are prominent.

Nux Vomica for gastric symptoms accompanied by heaviness and stupor. Patient is to avoid green vegetables and fruits temporarily, when gastric catarrh is a symptom. Saundby thinks well of a teaspoonful of *Carlsbad Salt*, dissolved in a tumbler of hot water each morning before breakfast, and *Euonymine* before the principal meal of the day, or at bedtime.

Vomiting:—Ice, carbonic acid water, milk, Kreasote 3x. Vomiting is often a natural effort at elimination, which should not be too quickly checked.

It is often the case that the gastric symptoms persist and yield to nothing but the ordinary palliative treatment in renal diseases, viz., diuresis, catharsis, and diaphoresis.

Headache:—

Glonoin is often useful. Hot air baths may relieve. Applications of hot water, or of cold, or both, alternately.

Ferrum and *China* are sometimes useful.

Porter advises local application of a cloth saturated with the following:—

℞ Chloroformi et
Tincturæ aconiti - - - - aa ℥i
Chloralis Hydratis et
Pulveris Camphoræ - - - aa ℥i
M. Sig. External use.

If the headache persist, it may be necessary to promote elimination as already described.

Hydrothorax:—*Arsenicum* is the remedy in this affection. If it persist, eliminative treatment may be tried.

Hydropericardium:—Always a serious complication, often fatal, especially if spontaneous, without previous dropsy.

Arsenicum is the leading remedy.

At the same time in critical cases catharsis, diuresis, and diaphoresis may be necessary. Stimulants, as ammonia or alcohol, are often useful.

Jaundice:—Attention should be paid at once to this complication, since by derangement of the liver more work is required of the kidneys. The remedies are *Natrum Phosphoricum*, *Podophyllum*, *Chelidonium*, *Mercurius*, *Euonymine*.

Porter claims that there is great relief in some cases from a few grains of inspissated bile. It may be inclosed in a gelatine capsule.

Nervous and mental derangements:—Convulsions, coma, delirium, sometimes becoming insanity, headache, dyspnœa, failure of vision and hearing, paralysis, neuralgia, itching, sometimes cutaneous eruptions, dead fingers, rarely symmetrical. Gangrene may, according to Dr. R. T. Edes, follow acute and chronic diffuse nephritis. Eliminative treatment is necessary. The headaches of renal disease are often relieved by hot air baths. The characteristic headache of the pre-albuminuric stage of Bright's disease is, according to Seguin, occipital, extending often into the cervical region.

Oedema — Glottis:—Symptoms: sudden inability to inhale air, cyanosis. Patient is able to perform the expiratory act. Scarification of the œdematous aryteno-epiglottean folds, tracheotomy, intubation of the larynx.

Remedies:—Apis. Ice to suck.

Lungs:—Symptoms: rapid, shallow breathing, dyspnœa, cyanosis.

Pilocarpine must not be given when there are pulmonary complications. Dry cups to the chest, ammonia internally, followed by general eliminative treatment. Purdy gives dig-

italis and ergot (20 to 30 minims of the fluid extract (Squibbs), every four hours if the stomach will tolerate it). *Ipecac* for the irritable, dry cough.

Palpitation of the Heart:—Glonoin.

Pericarditis:—Arsenicum 3x is recommended. Very active treatment is hardly judicious. Poultices or hot fomentations locally.

Peritoneal Effusion:—May be removed by tapping.

Pleuritis:—In connection with renal diseases the subacute form with serous exudation is the most common.

Arsenicum is a prominent remedy. Active treatment not judicious. Poultices or hot fomentations locally. Pleural effusions should not be rashly interfered with (by tapping) especially if not recent.—(Saundby). A fly blister on affected side, with catharsis and diuresis, is the treatment of those believing in vigorous measures.

Pneumonia:—This, in all its forms, may precede or complicate renal diseases. Acute pneumonia is often a direct cause of acute nephritis (parenchymatous change). Pneumonia in chronic renal diseases is often fatal.

Remedies:—Iodine, Phosphorus, Chelidonium. [Purdy advises ergot and digitalis to be given early]. Too active measures are not advisable. Dry cups to the chest and loins. Warm poultices to the loins. Stimulants are advised by many but the reaction is often serious.

Retinal Lesions:—For retinal hemorrhage during stage of cardiac enlargement Purdy advises purgatives and ergot to begin with, followed by small doses of mercury, or iodide of potassium. Retinal hemorrhage during advanced stage of cirrhosis should be treated, according to Purdy, by leeching the temples, followed by use of ammonium hydrochlorate in aqueous solution, in doses of three to ten grains, its taste disguised by addition of extract or syrup of licorice-root. If

the retinal lesion is degenerative, iron, quinine, strychnine, after first reducing any inflammatory action.

Septicæmia:—It has been shown by W. W. Sherman[1] that renal lesions are often developed by surgical operations. Hence Porter advises that *before* all operations, the kidneys should receive attention. Fluids and non-irritating diuretics should be administered. After an operation the urine should be watched, and if signs of acute parenchymatous change appear, active eliminative treatment should be observed. The so-called septicæmia is more correctly an uræmic toxæmia.

I believe that the time is not far distant when no surgical operation will be undertaken until a thorough analysis of the urine has first been made. Careful operators already see the necessity of more thorough knowledge of the condition of the urine than is obtained by merely "testing" the urine.

URÆMIA.

The reader is referred to an interesting monograph by Landois,[2] who claims that the various theories of uræmia in the past are not correct. He has lately introduced into the cerebral substance of animals various substances found in the urine, as urea, kreatin, kreatinin, etc., and reasons from the effects produced that uræmia is due to irritation of the psycho-motor centres in the cortical substance of the brain. Kreatin proved to be the most active irritant.

Landois also found that if the animals were narcotized at the beginning of convulsions that

[1] Porter, *op. cit.*, p. 78.

[2] *Die Uræmie*, Vienna, 1890.

the latter immediately decreased in violence; moreover, during narcosis none of the phenomena of convulsions from irritation could be called forth.

Dr. E. P. Davis[1] calls attention to the fact that in puerperal eclampsia the *liver* is particularly at fault. The eclampsia is due not merely to retention of urea and of the potassium salts, but also to some of the compound albuminoids which should have been acted on by the liver. This is undoubtedly true in many cases. Under such circumstances the urine will resemble in general features that of acute parenchymatous change, Table VI. (*a*), in the earlier stages, and later, possibly, that of chronic parenchymatous change, Table VI. (*b*), II.

The term *acute* is given to uræmia when the symptoms are decisive and marked from their onset. The term *chronic* is used when the symptoms are indefinite, vague, and various, becoming more and more pronounced as the renal lesion progresses.

Acute uræmia:—Symptoms may be, in the beginning, convulsions causing death, convulsions followed by coma, or coma without convulsions, speedily causing death. Uræmic convulsions present the following features:—No initial cry;

[1] *University Medical Magazine*, Nov., 1889.

marked pallor and convulsions, followed by coma; urine albuminous; convulsions equal on both sides; no hemiplegia; patient unconscious; temperature usually above normal; peculiar uræmic odor of breath.

Dr. Horace F. Ivins, of Philadelphia,[1] has observed paralysis of the muscles moving the left vocal band, as a manifestation of uræmia.

Uræmic Coma:—It is not always a simple matter to make the diagnosis of uræmic coma, especially in a case the previous history of which is not known. The physician is often summoned in great haste to attend a patient previously unknown to him, and may possibly arrive at a juncture when the diagnosis presents considerable difficulty. The conditions for which uræmic coma may be mistaken are (1) apoplexy, (2) epilepsy, (3) alcoholic stupor, (4) opium coma. Attention in all cases should be paid to the character of the respiration and stertor. In uræmic coma the stertor is labial, causing a *peculiar hissing* sound.

Dr. Chas. W. Purdy has published[2] a table of differential diagnosis, in cases where uræmic coma is suspected, which brings out very clearly the essential points. His diagnosis is as follows:

[1] *Hahnemannian*, Feb., 1890, p. 105.

[2] Journal of the American Medical Association.

	Uræmic Coma.	Apoplexy.	Epilepsy.	Alcoholism.	Opium Coma.
Age	Most common in the young.	Almost confined to middle and advanced life.	Most common under 30 years of age.	Common at all adult ages.	Most common in the young.
History	Previous attacks rare. Bright's disease present.	Previous attacks rare. Heredity marked; granular kidney common.	Previous attacks the usual feature.	Previous attacks common.	May be habit or accident.
Appearance	Pallid, cachectic.	Normal.	Dusky, purple, gradually becoming pale.	Features suffused, bloated, lips livid, expression vacant.	Features shrunken, pallid, cyanotic, expression ghastly.
Temperature	Increased from beginning, 100° to 102° F.	Lowered 96° F. or lower.	Increased slightly; 99° F.	Lowered somewhat.	Somewhat lowered.
Pulse	Increased 90 to 120 per minute.	Slowed: 60 per minute; full.	Slightly increased, small, feeble, and dicrotic.	Increased, feeble, small.	Usually slowed, feeble.
Pupils	Tend to dilate.	Unequal.	Normal.	Dilated.	Contracted.
Respirations	May be hastened or not; stertor labial.	Slow, stertorous, guttural.	Stertorous, guttural, unsteady.	Deep, slow, stertorous, intermittent.	Slow, shallow, feeble.
Special Features	Unconsciousness not complete; peculiar odor of breath; convulsions recurring; frequent pulse; temperature increased; albuminuria.	Slow pulse; complete insensibility; unequal pupils; hemiplegia, guttural stertor.	History of former attacks; Unconsciousness not complete; coma of brief duration; great muscular relaxation	Alcoholic breath; vomiting present; injected conjunctiva; swollen features: supra-orbital pressure rouses the patient.	Contracted pupils, opium breath, slow respirat ons: cyanosis; expression ghastly.

Figure 18 represents highly granular and fatty casts and masses from the urine of an

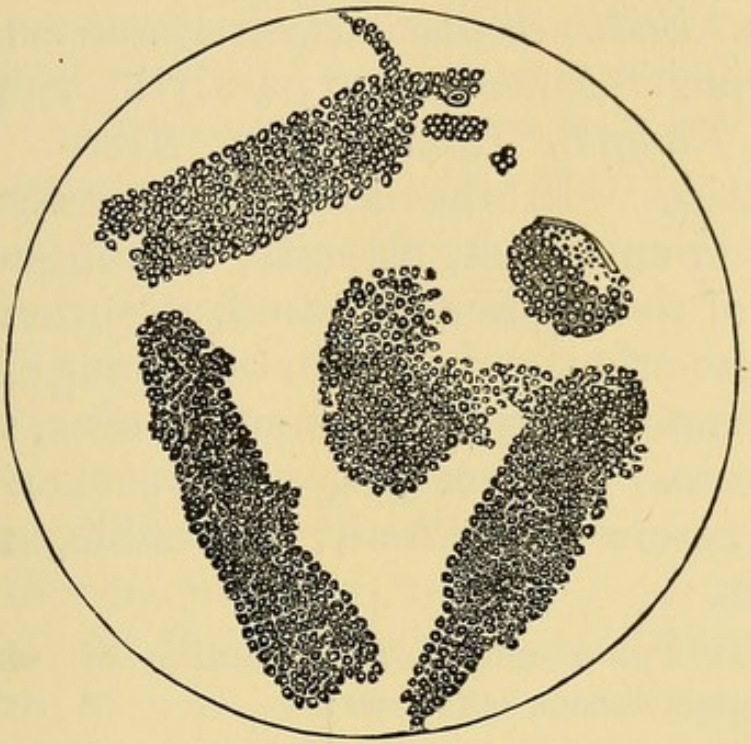


Figure 18. Granular Casts. X400.

adult male patient who died of uræmic coma. These casts were found in the urine two days before death.

Treatment of acute uræmia must be vigorous and prompt. Dry hot-air baths, alcohol sweats, cupping of the loins, followed by warm poultices, pilocarpine, elaterium, digitalis. Benzoate of soda has been used in 2 to 5 grain doses hourly. Pilocarpine not advisable when respirations are abnormal.

Remedies which may be given are as follows:

When there is cerebral hyperæmia, *Apis*, *Bell.*, *Conium*, *Glonoin*, *Gelsemium*, *Stramonium*, *Veratrum Vir.*; when there is sopor, *Agaricus*, *Anarcardium*, *Bell.*, *Acidum Hydrocyanicum*, *Lactuca*, *Opium*. Anæmia and paralytic symptoms: *Arsen.*, *Camph.*, *Chin.*, *Chin. Arsen.*, *Phos.*, *Phos. Acid.* In the intervals between the attacks, simple diet, as milk, thorough disinfection of the alimentary canal, attention to the hepatic function, and care that nutrient enemata do not contain nitrogenous substances, salts of potash, etc. Oxygen gas, passive exercise, or gentle exercise in open air, if possible, are also desirable.

Dr. James Tyson[1] outlines the treatment of convulsions due to Bright's disease, as follows:

The first step is undoubtedly to bleed from the arm, and if the convulsions continue, chloroform may be inhaled. The same effect is often as well obtained by chloral. Indeed, the action of this remedy is often magical in controlling a convulsion (grs. lx, by enema). Pilocarpin (gr. $\frac{1}{4}$, hypodermically) or a hot bath may be used in convulsions of Bright's disease. A steam bath may be extemporized by filling bottles with hot water and wrapping them in cloths wrung out of hot water, placing as many as possible alongside the body and between the legs. The sweating thus induced may be kept up as long as the convulsions last or recur. An enema should also be administered, if it is known that the bowels have not been recently moved.

[1] *University Medical Magazine*, Jan., 1890.

[Elaterin in $\frac{1}{20}$ to $\frac{1}{8}$ grain doses, every four hours, till free watery stools, but when it produces vomiting or sharp irritation, Purdy has found Hays' suggestion valuable, to-wit: an ounce of magnisium sulphate, or Rochelle salt, in an ounce and a half of water early in the morning, the patient to take no fluids for twelve hours before or six hours after].

Dr. William G. Willard, of Chicago, sums up the question of treatment, where uræmia threatens, during *pregnancy*, as follows:

The continuance of symptoms of renal disease, and their aggravation early in pregnancy, must be looked upon with much concern. To put the patient upon a strict milk diet; secure a free movement of the bowels every day; give her frequent alcohol sweats; guard her from all exposure to cold and mental excitement; prescribe such remedies as are indicated; and to note daily the effect upon the anasarca and the urine, would be sound treatment. If, under such regulation, her general health improves, anasarca diminishes, and the condition of the urine becomes more normal, pregnancy need not be interrupted. But should these measures not have the desired effect, and especially if headache, impairment of vision, or gastric derangement appears, the interest of the mother will call for the induction of labor.

Chronic Uræmia:—This disorder is far more common than generally supposed. It is important that in all obscure disorders the rela-

tion of the weight of the patient to the amount of solids in the urine be noted. The accumulation of toxic products in the blood and tissues is often very slow, and prompt treatment in the beginning is of the utmost value. The medical profession is rapidly awakening to the importance of estimations of the total solids in urine, the ratio of urea to the salts, etc., etc. The number of cases in which I find deficiency of solids, and particularly of urea and phosphoric acid, as compared with the weight of the individual, is simply remarkable.[1]

The effects of defective renal functions are seldom pronounced at first, and the patient declares that he is "perfectly well." I have known patients who voided less than a quart of urine a day to declare that their urine was "copious." Life insurance companies are beginning, in some localities, to recognize the value of quantitative analysis as compared with mere testing of urine for albumin. Much dissatisfaction is expressed at the results of albumin testing in life insurance examinations. This is due partly to the fact that good risks are rejected, some of the newer tests for albumin giving a haze with nearly every specimen of urine examined.

What is wanted is knowledge of the power of

[1] *Medical Era*, 1888 and 1889.

the kidney to do its work; and this can not be determined except by weighing the applicant and determining the ratio of his urinary solids to his body weight, giving due consideration to any idiosyncrasies of diet, etc., etc.

Dr. N. B. Delamater, of Chicago, has called my attention to the number of cases in which, reasoning by exclusion, after quantitative analysis of the urine, various vague and distressing nervous symptoms are to be ascribed to a condition none other than chronic uræmia. Albumin and casts need not be present. Patients who have suffered from these symptoms for months, or even years, have been greatly helped by eliminative treatment when other measures failed. Increase in the quantity of urine is, as a rule, in these cases followed by not only absolute but relative increase of urea. If the urine is sufficiently abundant, increase in the quantity of urea is desirable. In the first class of cases, Lithium Benzoate and Londonderry water have been of service. In the second class of cases I have found Euonymine of service.

The general principles of treatment in chronic uræmia are well laid down by H. W. Carter:—

1. Cut off the urinary poisons at their source, by limiting the quantity of potassium salts both in food and in medicine.

2. Employ the simplest and most easily assimilated food, as milk.

3. Disinfect the bowels.

4. Maintain at best the functional activity of the liver.

5. If nutrient enemata are required, take care as to their nature.

6. Directly or indirectly withdraw or dilute the poison (by the usual eliminative measures).

7. Burn up the poison by active exercise and administration of oxygen and oxidizers.

8. Antagonize the poison, or, at least, overcome special symptoms.

When the patient begins to feel the effects of uræmia in renal disease, and to complain of headache, nausea, and diminution of urine, the general treatment is as follows: Rest in bed; non-nitrogenous diet; room well ventilated, and not over-heated; inhalations of oxygen gas; diluent drinks, copiously administered; hot-air baths, if not too debilitating; pilocarpine, except in post-scarlatinal nephritis, and in last stages of chronic nephritis, when the heart is dilated and weak; pilocarpine should not be given when respirations are abnormal.

While eliminative treatment is being carried out, it is wise to give copious draughts of fluids, in case there is dropsy. I have previously remarked that sudden reduction of dropsy by

eliminative means may precipitate convulsions or bring on coma.

SYPHILIS OF THE KIDNEY.

SYPHILIS, as already shown, is, properly speaking, a cause rather than a complication of renal disease.

If albuminuria and the various manifestations of Bright's disease occur in the first months of syphilitic infection, the prognosis is favorable. Graver the slower the disease, and becoming the graver the more the disease is prolonged.[1] Clinically, syphilis of the kidney in the early form presents itself in two different aspects:

1. More frequently simple albuminuria, more intense and persistent and characterized by presence of albumin alone. If treatment is neglected, true albuminous nephritis may result.

2. In other cases less common, the disease is introduced with the symptoms of acute scarlatinal nephritis.[2]

There is still another form of renal syphilis in which, upon a chronic condition, there supervenes an attack of acute diffuse nephritis, accompanied often by hematuria. The course is rapid and patients rarely recover.

---

[1] Tommasoli in *Ann. of Univ. Med. Sci.*, 1889, quoted by Tyson.
[2] Jaccoud, *Ann. of Univ. Med. Sci.*, 1889, quoted by Tyson.

The *treatment* is as follows: In the simple albuminuria occurring early in syphilis, the mixed treatment, mercury and iodide of potassium. In the acute form, introduced by symptoms of acute scarlatinal nephritis, viz.: albuminuria, fever, lumbar pains, anasarca, pulmonary œdema, etc., etc., the treatment should first be that of acute nephritis, and subsequently the mixed treatment used, together with milk diet.

GENERAL INDICATIONS FOR THE USE OF REMEDIES IN NEPHRITIS, WITH CLINICAL NOTES.

Aconite:—Great and sudden sinking of strength without jerking, or twitching, or unconsciousness. Patient sleepless, restless, tossing about; scanty, high colored urine after taking cold. Patient likely to be uneasy, to worry, and never bears his sickness with calmness and patience. Patient anxious, has feeling of apprehension, is not delirious.

Antimonium Tartaricum:— Complexion of bluish tint, respiration rapid, gastric derangements prominent, also bronchial: great rattling of mucus in the bronchia with scanty expectoration. Urine dark, brown-red, scanty, turbid, of strong odor. Dyspnœa, pulmonary œdema. To be thought of in cases where also there is inflammation in the neck of the bladder.

Antimonium Crudum: — Patient peevish, irascible. Aggravations from cold drinks or cold applications. White tongue, gastric symptoms. Dysuria, strangury, mucous discharges from urethra.

Apis:—Absence of thirst. Patient tired as if bruised all over. Erysipelatous, rosy appearance of the anasarcous limbs; or red pimples. Urine scanty, high colored. Pains of a stinging character.

Useful in acute exacerbations, when œdema of eye-lids is a prominent symptom. Suppression of urine.

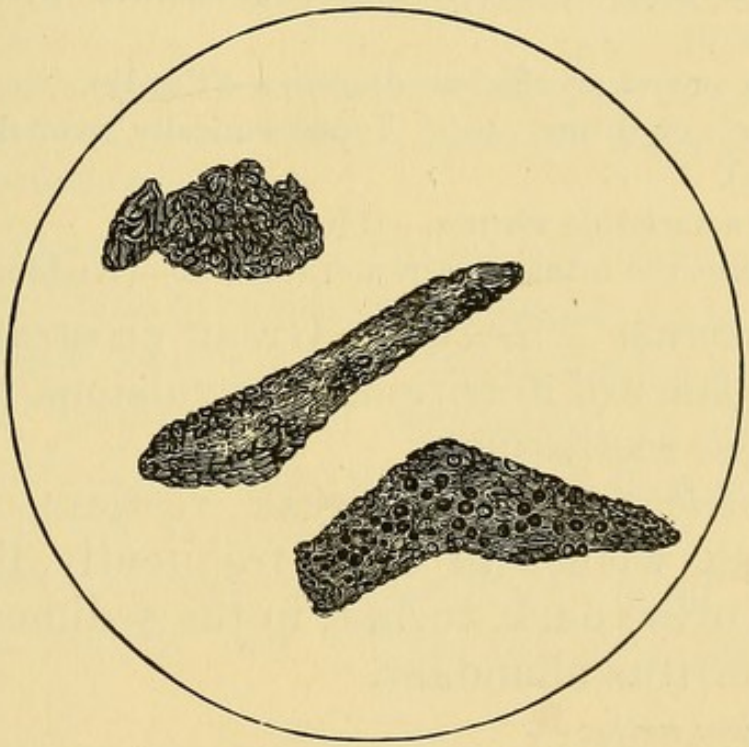


Figure 19. Yellow Casts. X400.

Figure 19 represents yellow casts partly covered with blood corpuscles, and found in the urine during an acute exacerbation of chronic diffuse nephritis. *Apis* was useful in this case.

Apocynum:—No pain or uneasiness in region of the kidneys, but urine scanty; in dropsical conditions, with sense of general but transient debility.

Used in form of aqueous extract to increase the flow of urine.

Clinical notes: —

An excellent diuretic.—(Millard).

A positive remedy for dropsy.—(Scudder).

I have relieved severe cases of ascites by apocynum. —(Millard).

Often acts as an efficient diuretic.—(Purdy).

Will check dropsy, used hypodermically over the kidneys. —(Hale).

Has remarkable virtues.—(Hughes).

Restores the urinary secretion rapidly.—(Ruddock).

Argentum Nitricum:—Great prostration and disturbance of nutrition. Convulsions, preceded by great restlessness.

Arsenicum:--Patient weak, restless, in great anguish, wishes to drink frequently, little at a time; urine dark, turbid; in the sediment, casts and detritus abundant.

Clinical notes: —

Useful as an aid to *Terebinth;* best in nephritis of malarial origin.—(Hughes).

When there is tendency to hydrothorax.—(Woodward).

Post-diphtheritic nephritis: Arsenicum and Phosphorus. —(Blackley).

Complete cure in a case of chronic nephritis, the result of cold, accompanied by nausea and anasarca, in a young man of twenty. The treatment consisted exclusively of Fowler's solution, five drops, three times daily, and drachm doses of tincture of cinchona.—(Millard).

Has sometimes proved beneficial in diminishing albuminuria and in relieving headache and nausea.—(Millard).

Aurum Muriaticum:—In the dropsy of nephritis, as a diuretic.

Clinical notes: —

When Arsenicum is indicated but fails.—(Hughes).

Has proved of great value in chronic interstitial nephritis especially when patient has nervous symptoms, hypochondriasis, irritability, and vertigo. Dose, 1–100 to 1-10 of a grain. —(Millard.)

The chloride of gold and soda (dose, 1-30 to 1-20 of a grain) in cirrhosis, when there is excessive nocturnal urination.—(Bartholow, Purdy).

Belladonna:—Useful to allay nervousness, especially during pregnancy, when there is much jerking and twitching of the muscles and remarkable quickness of sensation or motion. Pains reach their acme and vanish in a second. Burning of the skin, urine dark colored.

Calcarea Carbonica:—Disorders from living in damp places. In "fair, fat, and flabby" patients.

Cantharis:—*Internal* pains: In the kidneys, loins, abdomen; with incessant desire to urinate;

micturition painful before, during, and after flow of urine. Urine scanty, turbid. When pleurisy complicates. Very severe tenesmus.

Clinical notes:—

I have found it of use in alternation with the mercurials in acute nephritis with diminished or suppressed urine, the result being diminished albuminuria and increased urine when neither mercurial (*Merc. Cor.* or *Merc. Dulcis.*) would produce it.—(Millard).

As a diuretic, I employ it more as the case recedes from the acute character.—(Millard).

In chronic (croupous) nephritis has often been of use in diminishing albuminous secretion and promoting the secretion and flow of urine.—(Millard).

Carbolic Acid:—Dr. Wm. Owens, Sr.,[1] in an article entitled "Therapeutics of Post-Scarlatinal Nephritis," writes as follows of *Carbolic Acid.* "It gives us, first, copious flow of urine followed by diminished flow, passing on to enuresis. The color of the urine is dark green, or very highly colored, bloody and smoky. The urine may be alkaline or slightly acid. Of other symptoms we have: frontal headache, sensation as if a rubber band were drawn tightly across the forehead and temples; disinclination for all mental work; pale face, livid countenance; cold clammy sweat; loss of appetite; a desire for whisky or stimulants."

1 *American Homœopathist,* July, 1889.

Chelidonium:—Used chiefly when pneumonia is a complication.

Colchicum:—In cirrhosis of the kidney due to plumbism, in gouty diathesis, where there is amaurosis.—(Ruddock).

Convallaria Majalis:—

With digitalis, in scarlatinal nephritis, when symptoms of cardiac hypertrophy become more marked. (Fluid extract of leaf, 3 to 10 drops).—(Purdy).

With digitalis and adonis vernalis in cirrhosis, when there is dropsy from failure of cardiac power.—(Purdy).

Cuprum:—Strong metallic taste in the mouth. Vomiting, stupor, convulsions of uræmic origin

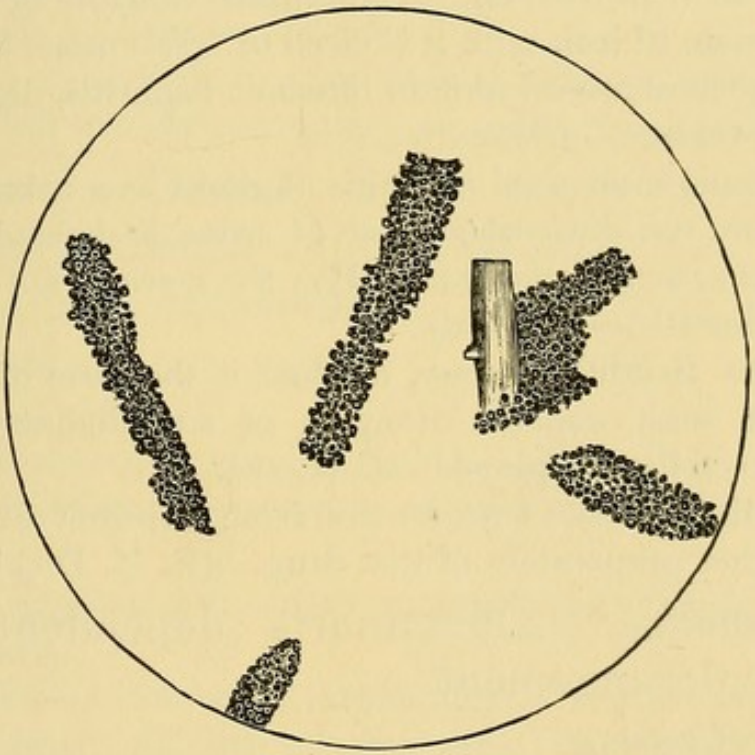


Figure 20.

Granular Casts and a Crystal of Uric Acid. X400.

Cuprum aceticum, together with diaphoresis, in uræmia.—(Hughes).

Digitalis:—Scanty urine with slow pulse, greatly accelerated on rising. Hydropericardium.

Figure 20 represents granular casts found in the scanty urine of a patient with chronic nephritis. The quantity of urine was increased by Digitalis.

Clinical notes:—

Quarter-grain doses of extract with water, as hypodermic injection, cured uræmia from contracted kidneys, the symptoms being drowsiness, insensibility, and frequent convulsions. —(Ruddock).

In acute nephritis one of the most valuable of diuretics. The muriate of iron with it is often of great use.—(Millard).

As a general prescription in lithæmic nephritis, digitalis and sodium benzoate.—(Saundby).

In chronic interstitial nephritis, digitalis is a valuable diuretic where the diminished flow of urine is dependent upon enfeebled action of the heart. Has the merit of not being an irritant diuretic.—(Millard).

In acute Bright's disease, digitalis in the form of infusion, combined with copious draughts of an alkaline water, is always to be first employed.—(Loomis).

In cardiac dropsies I prefer the fresh infusion of digitalis to any other preparation of that drug.—(E. H. Dickinson).

Euonymine:—Albuminuria dependent upon hepatic derangement.

Clinical notes:—

Dr. W. H. Holcombe has used euonymine successfully several times: One where there was chronic catarrh, dyspepsia,

sick headache, and albuminuria; another where there was dyspepsia, depression of spirits, pains in the back and head, and albuminuria.

Eupatorium:—In cases due to malaria; chill in the morning, with great pain in the bones.

Glonoin:—(One part of nitro-glycerine in nine of alcohol for the tincture). Throbbing headache, aggravated by stooping or jarring and by heat about the head.

Clinical notes:—

Useful where there is great vascular tension.—(Robson).

For headache and giddiness.—(Saundby).

One of the worst cases of uræmic dyspnœa I have ever observed—I prescribed small doses of nitro-glycerine, and if it failed, morphine. The dyspnœa was greatly relieved, I subsequently learned, by the nitro-glycerine.—(Dr. Stephen Mackenzie in *London Lancet*).

Useful when there is great arterial tension, violent action of the heart with hypertrophy and polyuria.—(Millard).

Ferrum:—Patient weak, much debilitated; secondary disorders of assimilation. Pulse drops a beat occasionally. Pale face, flushing suddenly.

Clinical notes:—

In convalescence, *Ferrum Sulph.*—(Ruddock).

With digitalis, the chloride of iron, etc.—(Millard). See Digitalis.

After subsidence of acute symptoms, the chloride of iron.—(Millard).

Chloride of iron with Cantharides in a case where there was evidently debility of the renal circulation in acute nephritis after scarlatina and diphtheria, when *Merc. Cor.*,

Arsen., and *Apis* had failed to diminish albumin, although bringing about subsidence of other renal symptoms.—(Millard).

In chronic interstitial nephritis, especially when there is enfeebled muscular action of the heart. In a case where there was frequent urination and debility, with history of fever and ague, chloride of iron and quinine.—(Millard).

The *chloride* and *phosphate* of iron in subacute nephritis.—(Millard).

The *iodide* of iron has proved wonderfully curative in acute nephritis.—(Allen).

Iron should be given from the start in chronic parenchymatous nephritis as soon as decreasing specific gravity indicates functional failure. In many cases the milder forms (of iron) are more useful (than the tincture).—(Loomis).

In many cases (of cirrhotic kidney) the nervous symptoms are decidedly aggravated by iron.—(Loomis).

Iodide of iron in lardaceous disease.—(Loomis).

Boudreau's pills were highly prized by the late Dr. N. F. Cooke. The *peptonate* of iron is also now prescribed.

Blaud's pills in the anæmia from acute or subacute nephritis.—(Delafield).

The ethereal tincture of chloride of iron in five to ten drop doses, three to six times daily, in chronic nephritis.—(Wyss).

The ethereal tincture of acetate of iron.—(Bartholow).

[Iron in ponderous doses is a favorite remedy in the anæmia of renal disease. It is, however, well known that when there are disturbances of digestion, *coated tongue*, etc., etc., iron will aggravate, if given in too large doses. I have seen anæmic patients who had run through the whole gamut of "tonics" without relief, helped by *Euonymine*.

It has been suggested recently that what appears to be anæmia is in some cases really *stercorœmia*].

Helleborus:—Scanty urine with dark sediment

like coffee grounds. Dropsy. Absence of thirst. Brain symptoms.

Clinical note:—

Helleborus (tincture) in many forms of dropsy, post-scarlatinal, etc.—(Hughes).

Helonias:—Albuminuria of pregnancy with scanty urine, soreness and pain in region of the kidneys, and great restlessness

Hepar Sulphur:— Post-scarlatinal dropsy when there is much mucus and epithelial debris in the urine.

Clinical note:—

Dr. H. M. Hobart reports success from use of the sixth decimal.

Ipecac:—When there is blood in the urine and patient complains of nausea and cutting pains.

Kali Iodatum:—Subacute and chronic nephritis; patient is chilly, and complains of cutting pains. Syphilitic cases.

Clinical notes:—

In nephritis, accompanied or caused by syphilis, I have known the iodide to effect cures.—(Millard).

Potassium iodide to check development of hyperplasia of connective tissue in the kidneys in cirrhosis.—(Bartels, Ralfe).

A promising remedy if given in the early stages and continued over extended periods of time. Dose from five to ten grains, three times a day, well diluted, and, if digestion be weak, after food.—(Purdy).

Kalmia:—Subacute cases, especially during pregnancy, with pains in the back, worse at

night in bed. Pains in the heart and palpitations predominating.

Lachesis:—In post-scarlatinal and post-diptheritic cases and subacute inflammation of the bladder.

Lithium Carbonicum:—Albuminuria in cases where there is marked acidity of the stomach.

Mercurius Corrosivus:—Tongue seldom dry, saliva abundant, patient nevertheless thirsty. Sallow face. Urine increased or scanty, contains hyaline casts and cast detritus. Burning and tenesmus. Pain in the back, worse at night. Patient cachectic, anæmic.

Of the value of this remedy in many cases of acute nephritis there is no longer a reasonable doubt. Dr. Woodward prescribes it after scarlet fever, when indicated, as soon as frequency of micturition appears and before albumin can be detected. Millard also speaks highly of it in post-scarlatinal (croupous) nephritis. It is also used largely in the treatment of chronic nephritis, but, for the most part, empirically, except, possibly, in syphilitic cases.

Mercurius Cyanatus in post-diphtheritic acute nephritis.—(Hughes).

Mercurius Corrosivus for the bronchitis of renal disease.—(Hughes).

Protoiodide of mercury (dose 1-6th grain after meals) to check the development of hyperplasia of the connective tissue of the kidneys. Less likely to induce ptyalism than the bichloride.—(Purdy).

I have found *calomel* especially suited to early stages of chronic interstitial nephritis (prior to cardiac hypertrophy and establishment of cirrhosis). Dose 5 to 10 grains

of the first trituration, or perhaps of a preparation of 1 part in 1,000, sometimes giving cantharides in alternation with it, two or three hours apart.—(Millard).

Nitric acid:—Tongue coated, canker sores in the mouth, reddish, often offensive urine, fetid breath, pressing pain in region of the kidneys; pale urine, frequent micturition.

This remedy, either alone or in conjunction with *Merc. Cor.* or *Merc. Dulcis*, is of service in diminishing the amount of albumin, especially when there is anasarca or even in dropsical effusions. Millard gave *Merc. Dulcis* and *Nitric Acid* in a case of acute nephritis with hydrothorax (post-scarlatinal) with complete success.

Dr. Kidd thinks well of Nitric Acid in gouty kidney when iron and quinine disagree.

For the dyspepsia in renal diseases.—(Ruddock).

Nux Vomica:—Patient morose, sullen, with desire to lie down and to keep still. Is abusive when spoken to, etc., etc.

Nausea *immediately* after eating. Heat with red face and aversion to uncovering.

Clinical note:—

For the dyspeptic vomiting of renal disease (Jousset), and from alcoholic excess.—(Ruddock).

Petroleum:—In chronic nephritis, when there is headache, with gastric symptoms, and dropsy.

Phosphorus:—Fatty casts in the urine. (See Figure 21). Patient feels a weak, empty, and gone sensation in whole abdominal cavity. Hard, dry, tight cough. Heat and burning in back between shoulder blades. Dry and hard

evacuations. Urine highly albuminous. Cases of impaired nutrition of long standing; tall, slender patients.

Clinical note:—

The best remedy in fatty degeneration.—(Hughes).

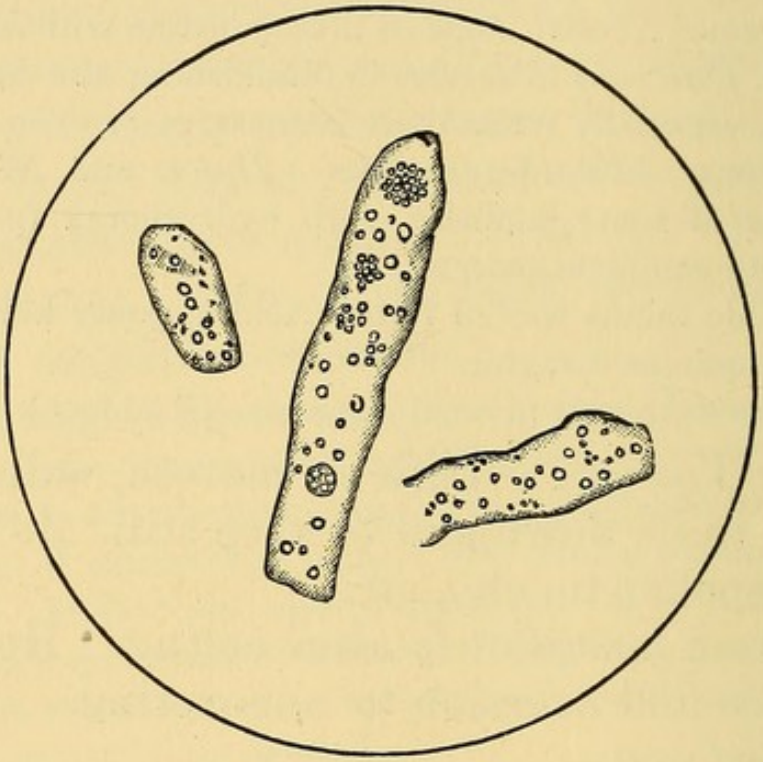


Figure 21. Fatty casts.

Phosphoric Acid:—A marked characteristic is found in the mental condition which is that of *complete indifference.* Diarrhœa lasting a long time, apparently without any weakening effect. Patients rise at night to urinate and pass much urine.

Clinical notes:—

The most promising remedy in waxy kidney.—(Hughes).

Dilute phosphoric acid has proved of value, particularly after the subsidence of the most acute symptoms, in lessening and even controlling the albuminous secretion.—(Millard).

Phytolacca:—Chronic nephritis with pain and soreness in the right side. Urine dark red, even mahogany colored, with painful micturition.

Picric Acid:—Subacute and chronic cases with scanty urine, dropsy, profound weakness, dark, bloody urine.

Plumbum:—Interstitial nephritis. Sensations of numbness and paralysis.

Clinical notes:—

Dr. S. A. Jones used *Plumbum* with good effect in prolonging life in a case of cirrhosis. The patient resumed and continued work for a year after *Plumbum* had been given.

Plumbum is known to decrease albumin and increase urea.—(Hughes).

Rhus Toxicodendron:—When acute nephritis follows sudden and thorough wetting from rain, especially when in perspiration. Patient relieved by changing position but stiff on first movement. Urine usually not reduced in quantity.

Secale:—Post-scarlatinal nephritis. Cheesy sediment in urine.

Scilla:—Dropsy, with profuse urination or too frequent micturition, or both.

Spongia:—When larynx and trachea are in-

volved. Tight, dry cough. Difficulty in breathing, etc.

Stramonium:—Suppression of urine, with mental symptoms.

Strychnine:—Used in albuminurias when there is dyspepsia, headache, etc. The *phosphate* is often prescribed. Dr. Hale uses the double remedies, arsenic and strychnine, when there is danger of apoplexy.

Terebinthina:—When blood in the urine is very abundant, as in post-scarlatinal acute diffuse nephritis. Urine scanty, dark, and highly albuminous.

Clinical notes:—

The leading remedy in chronic parenchymatous nephritis, after an acute attack from cold, wet, etc.—(Hughes.)

In cases where albumin and blood keep recurring so soon as the patient is allowed to get up and move about (not over five minims at a dose).—(Carter.)

CHAPTER VI.

Systematic Application of Urinary Analysis to Diagnosis, Continued—Pyuria and Hæmaturia.

If pus and blood, pus alone, or blood alone, be found, attention is to be paid more especially to conditions affecting the pelvis of the kidney, the ureters, bladder, prostate, and urethra. Tumors, abscesses, etc., etc., must be kept in view. The diagnosis presents many difficulties. Often the evident presence of severe affection of the urinary tract leads us to the diagnosis rather than specific information obtained from examination of the urine. Nevertheless an examination should be made with scrupulous care, as in many cases information of the utmost value is obtained.

EXAMINATION OF THE URINE IN DIAGNOSIS OF DISEASES OF THE KIDNEY-PELVIS AND BLADDER.

The various physical characteristics having been observed and the test for albumin having been made, the sediment should be examined more particularly for pus, mucus, phosphates, bacteria, epithelium; as well as for urates, uric acid, calcium oxalate, cystin, blood; for tubercle

bacilli if tuberculosis be suspected. [A method for the detection of tubercle bacilli has already been given in Chapter II., where the microscopic examination of urinary sediments is described. Several other methods are described in that part of the work further on devoted to the consideration of "Tuberculosis of the Kidney." It is advisable to try several methods before abandoning the task altogether, since the bacilli are with difficulty found in the urine in any event. The detection of them in the sputa is easier, and in cases where tuberculosis of any kind is suspected, examination of the sputa for the tubercle bacillus should certainly be made.] If the prevailing color of the sediment be reddish, test for urates, uric acid, and blood; if whitish, for phosphates, pus, mucus (light colored), urates, calcium oxalate. Use the microscope and look for various kinds of epithelium, and cancer cells. See Chapters I. and II. Cancer cells are only accidentally found, as a rule, and the diagnosis should not be negative because of inability on part of the observer to find them. Read the section on "Malignant Disease," and note the various points in regard to the diagnosis other than the examination of the urine.

The following table will be found of service when pus is found in the urinary sediment:

TABLE X.—Pyuria—Differential Diagnosis.

Suppuration in the kidney.	Suppuration in the kidney-pelvis.	Suppuration in the bladder.	Suppuration in the neck of bladder.	Suppuration in urethra.
Marked chills, emaciation, gastric disturbances. If uræmia present, it is of a typhoid kind, with dry tongue and feeble pulse.	Acute: febrile condition, pain in back. Chronic: course insidious, symptoms may not be marked.	Scalding urine, pain in passing water. Urine in both glasses equally turbid, last drops usually very turbid.	Micturitions frequent and painful at beginning and end. Urine in first glass more turbid than that of second.	Urine in first glass turbid, in second, clear.
Pus sediment like that of pyelitis, if urine acid; hyaline and granular casts possibly ound. If urine alkaline, sediment like that of cystitis.	Pus sediment flocculent, not shreddy nor sticky in uncomplicated cases. Pus corpuscles small. Pus plugs seen with microscope.	Pus sediment sticky, clings to the glass. Sediment contains trifle phosphate, bladder epithelia, bacteria. Pus corpuscles swollen.	Pus sediment shreddy, sometimes surmounted by blood. Shreds may be streaked with blood.	Pus oozes from meatus betw'n micturitions.
Reaction first acid, later alkaline.	Reaction usually acid, may be alkaline if cystitis complicates.	Reaction usually alkaline.	Reaction usually acid.	Reaction usually acid.
Urine contains more albumin than pus accounts for.	Urine contains more albumin than pus accounts for.	Urine contains but little albumin and that due to pus. Ammonium carbonate abundant.	Urine may contain more albumin than pus accounts for.	Urine in first glass will respond to albumin tests.
24 hours' urine decreased in acute cases, greatly increased in chronic.	24 hours' urine decreased in acute cases, greatly increased in chronic.	24 hours' urine usually normal or not increased.	24 hours' urine usually decreased.	24 hours' urine not increased.

Remark on Table X:—In making the differential diagnosis in pyuria, cause patient to void urine during one micturition, into two glasses, and note the character of the urine in both.

Blood in the Urine:—If, in the examination of the urine, *blood* is found, make the differential diagnosis between hæmoglobinuria alone, and hæmaturia, observing the points specified in the following table:

TABLE XI.

HÆMOGLOBINURIA.	HÆMATURIA.
1. Albumin moderate, sometimes abundant.	1. Albumin often very abundant (as in acute nephritis).
2. Sediment brownish and not considerable.	2. Sediment often very abundant.
3. Color yellowish and urine transparent in thin layers; dark red (port wine color) in bulk.	3. Color not yellowish nor urine transparent in thin layers.
4. Blood corpuscles few or wanting.	4. Blood corpuscles abundant (in acid urine).
5. Urine usually clear when voided.	5. Urine turbid when voided.
6. Urine often changes color on standing.	6. Urine does not change color on standing.
7. Voiding of bloody urine paroxysmal and often preceded by chill and generally accompanied by nausea, gastric disorder and slight jaundice.	7. Voiding of bloody urine persistent; often preceded by pain in lumbar region.
8. Often the result of malaria.	8. Often result of kidney or genito-urinary disease.

In alkaline urine blood corpuscles may have been dissolved and not appear under the microscope. Test for blood coloring matter, and if this be found, together with considerable albumin and considerable sediment, it is probably hæmaturia, and not hæmoglobinuria alone.

Hæmoglobinuria is often observed in consequence of poisoning, especially by potassium

chlorate, arsenic; sometimes in poisoning by ptomaines. In a few cases, after transfusion of blood.

The spectroscope is of value in the differential diagnosis between hæmaturia and hæmoglobinuria. The spectrum of the urine of hæmoglobinuria is characteristic of hæmoglobin, but in addition to the bands in D and E, characteristic of hæmoglobin, there is invariably a third present near C, which corresponds with that given by methæmoglobin in acid solutions.

Paroxysmal hæmoglobinuria has been noted in malarial districts. Hæmoglobinuria is sometimes noted in rheumatism.

At a recent meeting of the Société Médicale des Hôpitaux, M. Hayem made a communication on hæmoglobinuria in rheumatism. The patient, a woman aged thirty-seven, was attacked with rheumatism in 1886, and again in 1887. She was then suckling her sixth child. Six days after the second attack came on she entered the hospital. The urine was completely red; there was pain, adynamia, rheumatic œdema in the arms and hands, copious perspiration, rheumatic pneumonia of the right lung, followed by symptoms of pericarditis. The urine, which was scanty at first, became abundant, and the patient recovered. She did not lose her milk, and began to suckle her child again. The urine presented the characteristics of hæmoglobinuria; it contained no red corpuscles, but a large proportion of albumin and white corpuscles. The blood was normal. This case shows that hæmoglobinuria may appear during an attack of acute rheumatism.

If the condition is not hæmoglobinuria, but hæmaturia, consult the following table:

TABLE XII.— DIAGNOSIS IN HÆMATURIA.

BLOOD FROM THE KIDNEYS.	BLOOD FROM THE BLADDER.	BLOOD FROM THE PROSTATIC PORTION OF THE URETHRA.	BLOOD FROM THE URETHRA.
Blood corpuscles spherical, small, and brownish.	Blood corpuscles spherical, small, brownish.	Blood corpuscles of normal disk-form, with central depression and reddish-yellow color.	Blood corpuscles like those from neck of the bladder (prostatic urethra).
Albumin more than blood accounts for.	Albumin less than blood accounts for.	Albumin less.	Albumin less.
Blood only during micturitions.	Blood only during micturitions. Urine more and more tinged as bladder empties itself.	Blood at the beginning of micturition. Sometimes a few drops at the end only.	Blood flows from meatus between micturitions, or may be squeezed out. Blood in the first glass only on micturition.
Urine may contain casts.	No casts.	No casts.	No casts.
Clots rounded corresponding to diameter of ureter.	Clots very large and irregular in shape.	Clots leech-like, ovoid.	Long bougie-like clots.

Remarks on Table XII :—There are certain difficulties in fixing the locality whence blood comes. In some cases, when the blood is derived primarily from the neck of the bladder and is large in quantity, it may flow *into* the bladder, and then, on micturition, the urine in both vessels is equally bloody. Whenever, therefore, the urine in both glasses is equally bloody, keep the patient under observation for some little time, and if, on some occasions, it be observed that *blood is present only at the beginning or at the end of urination, the trouble is in the neck of the bladder*.

It is often very difficult when casts, regular-shaped clots, etc., are absent from the urine, and in the patient usual signs of renal disease are also absent, to decide whether the blood is from the kidneys or from the bladder. It is then necessary to fall back on instrumental exploration of the bladder.[1] With the patient in the horizontal position, introduce into the bladder an English elastic catheter, or, better, a French coudé chariérre, No. 19 or 20, with large openings through which clots may be drawn. Inject cool water (using a syringe holding 100 to 150 c. c.) until the water flows out clear and free from blood. Then sweep round against the

[1] Ultzmann, *Vorlesungen Ueber Krankheiten der Harnorgane*, Vienna, 1888.

walls of the bladder with the elastic catheter in all directions, and if the bleeding at once begins again, the trouble is in the bladder and not in the kidneys.

Another test is by the use of solution of potassium iodide : a soft catheter of vulcanized rubber is introduced into the bladder, and the latter washed with cool water until it is free from blood. Then further there is injected 50 c.c. of a one and one-half per cent. solution in water of potassium iodide, and the catheter removed at once. After fifteen minutes, cause the patient to expectorate into a beaker, add a few drops of boiled, thin-flowing starch, and stir with a glass rod which has been dipped in fuming nitric acid. If there appears a blue coloration, the trouble is in the bladder.[1] If there is no coloration, then the hæmorrhage is from the ureters, kidney-pelvis, or kidneys.

In the latter case, determine which kidney is affected by means of catheterization of the ureter, if possible, or by compression.

It is possible that the hæmorrhage may be from the entire urinary tract.

Collecting urine separately from the two ureters is, if possible, the most certain means of ascertaining the seat of origin of the blood.

[1] For explanation see Ultzmann, *Vorlesungen*, 1888, p. 23.

Compression of the ureters is an easier operation, but its results are not so reliable. Newman[1] has devised a spectroscopic apparatus by use of which the quantity of hæmoglobin is estimated and compared with that of albumin. If the ratio of albumin to hæmoglobin is as 1 to 1.6, it may be inferred that the albumin in the urine is due to the presence of blood. If much above this proportion, the indication is in favor of renal hæmaturia

[1] *Op. cit.*, p. 81.

CHAPTER VII.

Hydronephrosis—Cystic Degeneration—Renal Hydatid Cysts.

The diagnosis is often made more certain by the discovery of a *renal tumor*. If pus or blood be found in the urine, and at the same time a renal tumor can be made out, the chances are that the condition is one of the following : hydronephrosis, cancer, cystic disease, pyonephrosis, or perinephritic abscess. *Hydronephrosis* is recognized when, in addition to a fluctuating tumor, we have *intermittent discharge of pale, watery urine ;* the tumor may occasionally disappear with increased flow of urine ; but little *constitutional disturbance, no dropsy, and no cachexia.*

We find in *cystic degeneration* that the urine is not intermittent ; that the patient has often the complexion, cardiac hypertrophy, and arterial tension of interstitial nephritis.

Table XIII. will help in the diagnosis.

TABLE XIII.—DIFFERENTIAL DIAGNOSIS IN RENAL TUMORS.

HYDRONEPHROSIS.	CANCER.	CYSTIC DISEASE.	PYONEPHROSIS.	PERINEPHRITIC ABSCESS.
Tumor, unilateral or bilateral.	Unilateral.	Unilateral or bilateral.	Unilateral or bilateral.	Unilateral, rarely bilateral
Fluctuant, as a rule, sometimes hard.	Non-fluctuant.	Non-fluctuant.	Fluctuant.	Fluctuant in time.
Irregular form.	Irregular form.	Shape of kidney.	Irregular form.	Irregular form.
Varies in size from time to time.	No variation in size.	No variation; *hydatid cysts:* diminution in size of tumor after renal colic.	Varies in size.	No variation in size.
Painless or feeling of weight and dragging.	Severe and almost constant pain.	Usually painless until suppuration.	Considerable pain in lumbar region, worse on pressure in front, relieved by pressure behind.	Severe, lancinating, and increasing pain.
Hæmaturia rare.	Frequently recurring hæmaturia.	Hæmaturia moderate.	If due to renal calculus, hæmaturia after exercise.	When very large, blood and blood casts in urine.
Fluid pushes forward. Aspirated fluid, neutral or feebly acid, never alkaline.	Fluid accumulations push forward.	Fluids push forward. In hydatid cysts, aspirated fluid never acid, sometimes neutral, usually alkaline.	Fluids push forward. Aspirated fluid contains pus.	Fluid accumulation pushes backward.
Intermittent discharge of pale, watery urine.	Urine not intermittent.	Urine not intermittent.	Intermittent discharge of muco-purulent urine.	Urine not intermittent.
But little constitutional disturbance. No dropsy, no cachexia.	Eventually well-marked cachexia. Loss of flesh. Anæmia. Ascites and œdema lower extremities when pressure on abdominal veins.	Sallow complexion, hypertrophy of heart, arterial tension as in interstitial nephritis. Sometimes dropsy.	May be signs of uræmic poisoning, but usually absence of marked fever.	Great constitutional disturbances; continuous elevation of temperature. Marked rigors and sweat.

How to detect presence of renal tumor:—Patient in bed or on a sofa, knees drawn up so as to flex the thighs upon the trunk. Pass one hand along margin of the false ribs till space between them and crest of ilium is reached; then, with other hand, depress greatly wall of abdomen, push aside intestine, using tips of fingers; then, with disengaged hand, make pressure in the loins with the fingers as much as possible, so as to push kidney as far forward as possible against other hand. Practice and experience required for successful detection of a tumor.

Differential diagnosis between renal tumors and non-renal:— In enlargements of the liver patient is usually jaundiced and tumor is affected by ordinary movements of respiration,

In enlargement of the cæcum or colon there are usually intestinal disturbances, and tumor may disappear after purgatives.

In enlargements of the spleen the tumor is influenced by respiratory movements.

In ovarian tumors vaginal examination often gives information.

It is often a help to remember that renal tumors are more or less covered by the transverse colon.

HYDRONEPHROSIS.

Definition:—Distention by serous fluid of cavity of kidney-pelvis.

Etiology:—Congenital or acquired. If the latter, due to tumors or abscesses of pelvic organs pressing or twisting ureters; *urethral stricture, enlarged prostate* with hypertrophy of the bladder, tumors or abscesses of abdominal organs, displacements of pelvic organs with torsion of ureters, bands and adhesions compressing ureters, *renal calculi*, *displacements* of the kidney, tubercular disease of the bladder, tumors of the bladder, ureter entering renal pelvis at acute angle.

A noteworthy cause is *spasmodic contraction of the ureter*, which may be sufficient to bring about complete anuria. The ureters may be closed by traction and compression against the arcus pubis; by torsion or angular insertion of the ureter at the hilus.—(Landau.)[1]

The general cause, then, of hydronephrosis is retention from obstruction in the ureters. Tumors of the pelvic organs pressing on ureter, stricture of the urethra, enlarged prostate, and renal calculi are the most usual causes of the obstruction.

Diagnosis:—Renal tumor with intermittent discharges of pale, watery urine. Hæmaturia

[1] *Wiener Med. Woch.*, No. 48.

and albuminuria occasionally noticed. If complicated by pyelitis or cystitis, pus and blood will be found. If the tumor be punctured and liquid withdrawn from it, urea will be found, though occasionally it is absent; the liquid is of low gravity, 1004, *neutral or slightly acid, never alkaline* when freshly drawn off, contains an abundance of sodium chloride (but not so much as hydatid cyst fluid), often contains pus.

I have repeatedly called attention to the fact that the *reaction* of the aspirated fluid is the most reliable diagnostic point, since urea and uric acid may be absent. In five cases reported by Landau urea was found but once, uric acid but once.

If there is urethral stricture and bilateral constriction of the ureters, the quantity of urine voided may be decreased, even to complete anuria, and uræmic symptoms may supervene. Hydronephrosis is frequently found in connection with pathological conditions of the female genital apparatus; when it follows upon uterine disease no symptoms may be noticed, or, if present, may be regarded as hysterical. Landau's patients complained merely of temporary, vague sensations—sensations of weight, as of a foreign body.

Prognosis:—Congenital, death at birth or in a few months or years. Acquired: if bilateral

and obstruction complete, death within a short time. If unilateral, prognosis guarded. If due to renal calculus or uterine displacement, the cyst may disappear when calculus is dislodged or uterine displacement overcome. If degree of the hydronephrosis be slight, duration variable. Death seldom from hydronephrosis itself.

Causes of death:— Suppression of urine, rupture of sac into abdomen, interference with functions of other organs than kidney. If surgical operations on lower urinary tract, suppurative pyelo-nephritis.

Treatment:—If due to lesions, such as displacements, renal calculi, etc., careful manual pressure, emptying the sac, friction over tract of ureter, or on the sac, hot baths, etc. If due to pelvic tumors, lower bowel to be emptied daily: support of tumor as in prolapsed uterus by pessaries. If tumor rapidly increases and cannot be emptied by ordinary pressure, surgical means necessary: as tapping, nephrotomy, or nephrectomy. (Newman.) Landau thinks nephrectomy contra-indicated. [Recently another mode of operating has been tried, viz.: stitching the sac to the skin.] J. K. Thornton holds that if the fluid re-accumulates after several tappings, nephrectomy is preferable to nephrotomy and drainage.

CYSTS OF THE KIDNEYS.

Cavities containing fluid formed within the substance of the kidney itself. These are of several classes: (1) simple cysts, cystic degeneration, (2) hydatid cysts, (3) congenital cysts.

Cystic degeneration is usually a consequence of chronic interstitial nephritis. When the symptoms of the latter are found, and, in addition, a non-fluctuant swelling in one or both loins, rounded, nodulated, not painful on pressure, and of slow growth, it is probably a case of cystic degeneration. Prognosis and treatment: that of interstitial nephritis.

In *hydatids*[1] of the kidney the urine may contain hydatid vesicles; a renal tumor may be present, and the discharge of vesicles and hooklets is attended with symptoms of renal colic, and simultaneously with the renal colic or following, there is a sudden diminution in the bulk of the swelling in the loin. Hydatid fremitus, a peculiar vibratory thrill, may possibly be distinguished by laying fingers of one hand on one side of the tumor while giving a sharp percussion stroke with two fingers of the other hand to the opposite side of the tumor. In doubtful cases, withdraw the fluid by aspirator and examine; it is clear, usually alkaline, sometimes neutral, never acid, not urinous, sp. gr.

[1] Due to parasite called echinococcus.

about 1009, never below 1006; does not contain albumin unless cyst is inflamed, usually contains hooklets and vesicles, which may, however, be absent.

Prognosis in hydatids:—Prognosis favorable when tumor is small and near pelvis of the kidney. If large and tends to suppurate, prognosis according to freedom with which pus is allowed to escape. If cyst ruptures into renal pelvis, prognosis favorable.

Causes of death in cases of hydatid cysts:—Rupture of cyst into important viscus, or solitary kidney becoming seat of disease.

Treatment of hydatids:—[The disease is rare, especially in America. Dr. F. H. Newman, now deceased, recorded in the *Medical Era* one case in Chicago of late years.] After rupture, give large quantities of fluids. During the renal colic, gentle friction in course of ureter, warm baths, hot fomentations, morphine subcutaneously. If cysts impacted in the ureter and cause considerable pain and inconvenience, or if cyst increases in bulk so as to endanger life, then surgical interference. David Newman advises cutting down on cyst, evacuating contents, and stitching edges of the cyst to the parietes.

Congenital cysts:—These are often associated with malformations of other parts and are of no clinical importance.

CHAPTER VIII.

Suppurative Diseases of the Kidneys, Renal Pelvis, and Ureters.

If the disorder be not hydronephrosis, or cystic disease, but pus of renal origin is present in the urine, endeavor to discover whether the disorder is *suppurative nephritis*, *pyelo-nephritis*, or *pyelitis*.

Differential diagnosis :—Suppurative nephritis and pyelo-nephritis are distinguished from pyelitis by the severity of the constitutional symptoms. In pyelitis fever is not marked, pain seldom severe, and often absent. In pyelo-nephritis and suppurative nephritis there is a high fever, with rigors. Pain in the loins is severe, and worse on pressure over the *abdominal* walls.

Pyelo-nephritis is distinguished from suppurative nephritis as follows : in the former, pyuria *precedes* constitutional symptoms ; in the latter, pyuria *follows* the constitutional symptoms.

ACUTE SUPPURATIVE NEPHRITIS.

Synonyms :—Purulent or suppurative interstitial nephritis. Multiple renal abscesses.

Pathology:—Acute suppurative inflammation

of renal substance, without affection of renal pelvis or ureters.

Etiology:—Zymotic diseases, and those associated with presence of specific organisms. Traumatism.

Symptoms:—See "Pyelo-Nephritis."

Prognosis:—Unfavorable. In most cases the disorder is rapidly fatal, but death is not invariable.

Treatment:—See "Pyelo-Nephritis."

PYELO-NEPHRITIS.

Synonyms:—Obstructive nephritis. Ascending nephritis. Puerperal kidney. "Surgical kidney." Pyelo-nephrosis.

Pathology:—Suppurative inflammation not only in pelvis of the kidney, but extending beyond the renal pelvis and attacking the renal substance, forming in it independent accumulations of pus. Essentially a chronic disorder, but subject to acute intercurrent attacks.

Etiology:—Septic inflammation, extending from bladder to ureter and renal pelvis. The most common causes are enlarged prostate, stricture and cystitis, uterine and ovarian tumors, pregnancy, pyo-salpinx, tubercle and tumors of the bladder, procidentia uteri.

Symptoms:—Severe. *Pain* in loins severe; worse on pressure over *abdominal* walls. Spasm

in neck of bladder and along ureters. Patient has high fever, with rigors, and wears an anxious expression. Face at first flushed, but later may be sallow or jaundiced. Mouth dry, tongue coated, fissured, crusted. Pulse rapid, feeble; thirst, loss of appetite, headache, vomiting, hiccough, diarrhœa, profuse sweats, drowsiness, sopor, low delirium may be noticed. Micturition frequent, but quantity small. *Urine* decreased in quantity and acid in reaction, if the inflammation was primarily in renal pelvis and has extended to the renal substance. In such cases pus well preserved; usual signs of renal pyuria. When the disorder is chronic there may be polyuria (2500 to 3000 c. c. of urine in twenty-four hours), albuminuria, and, in addition to pus, renal tube casts and pus casts may be found. The urinary solids in such cases are below normal. If, however, the disease is the result of disorder of the bladder, the urine is alkaline and offensive, contains muco-purulent sediment, triple phosphates, and micro-organisms; tube casts can then not be found. Consult Table X.

With the microscope, flask-shaped or spherical colonies of micro-organisms inclosed in a capsule are sometimes seen in the sediment.[1] Several varieties of bacteria and micrococci may usually be found; bacilli and mycelium-like

[1] Saundby, *Bright's Disease*, 1889, p. 237.

threads are to be met with. Zoogloœa masses of bacteria are often plenty.

Clinical note:—

The following analyses were made by the author in cases of suppurative nephritis or pyelo-nephritis.

Case 1. Acute intercurrent attack.

Volume of urine in 24 hours.....500 c. c.
Specific gravity.....1013
Urea, per litre .....21 grammes.
Urea, total.....10.5 grammes.
Phosphoric acid, per litre.....0.4 gramme.
Phosphoric acid, total.....0.2 gramme.

Sediment:—Pus and Bacterian cylinders. Plain trace of albumin. Blood.

Patient had rigors, was confined to his bed, face flushed, only semi-coherent in speech, tongue dry and dirty brown, pulse rapid and rather tense. Death in a few weeks from date of analysis; case shows importance of complete analysis of the urine, together with microscopic examination of the sediment. The amount of albumin in the urine was insignificant, and the amount of urea relatively not far from normal, but the *relative deficiency of phosphoric acid* was very great and microscopic examination of the sediment revealed a number of cylinders of bacteria and micrococci.

Case 2. Chronic pyelo-nephritis.

Urine in 24 hours..... 2000 c. c.
Specific gravity 1014
Urea, per litre.....12 grammes
Urea, total.....24 grammes
Phosphoric acid, per litre.....1 gramme
Phosphoric acid, total.....2 grammes.

Sediment:—Pus corpuscles abundant. Some few blood corpuscles, micrococci and bacteria termo very abundant,

mucous casts, a few small hyaline casts, one or two large and perfect hyaline casts.

Case 3. Probably acute intercurrent attack.
Volume in 24 hours not known.
Specific gravity 1016
Urea, per litre.....25 grammes
Phosphoric acid, per litre.....0.6 gramme
Albumin, plain trace.

Sediment:—Pus and swarms of bacteria. No casts. Death with uræmic symptoms in a few weeks. In this case, although the albumin was insignificant, urea was normal, relatively, and no casts could be found. *The deficiency in phosphoric acid was very great, relatively*, and I gave unfavorable prognosis after results of ophthalmoscopic examination were reported to me.

Complications:— Pulmonary œdema, erysipelas, dropsy, perinephritic abscess. Death preceded by profound coma. Convulsions rare.

Prognosis:—If due to removable pressure, as in pregnancy, and uncomplicated by cystitis, prognosis favorable. When disorder due to some long standing cause, prognosis unfavorable and death usually rapid.

Treatment: — In the first place consider *prophylaxis* against pyelo-nephritis. If a patient has a chronic disease of the lower urinary passages, the *greatest precautions in use of instruments* must be observed for fear of producing septic infection. All instruments used for the relief of retention or incontinence of urine must be thoroughly carbolized. Enforced

retention not to be thought of; patient to be supplied with India-rubber urinals, and to avoid exposure to cold and damp. If any obstruction to the flow of urine occur, it must be relieved completely, but with as little irritation as possible. Effort is to be made to prevent the urine from decomposing within the bladder. On this account various authors advise washing out the bladder with acid solutions, as, for example, 30 grains of boracic acid in four ounces of water, or equal parts concentrated solution of boracic acid and solution of sulphate of quinine, half a grain to the ounce of water. I have seen good results, however, from *internal use* of boracic acid, which passes unchanged through the kidneys. Dissolve 120 grains of pure boracic acid in a fluidounce of glycerine, and 8 fluidounces of hot water, and flavor to suit taste; for example, with syrup of orange peel.[1] A few teaspoonfuls of this solution taken three or four times daily will usually suffice to keep the urine acid,[2] and prevent decomposition within the bladder.

If now, in spite of or without prophylactic measures, either pyelo-nephritis or suppurative

[1] Formula of Ralfe.

[2] According to the French Academy of Medicine, *pure* boracic acid is less poisonous than ordinary table salt. Care must be taken to obtain a pure article, if it is to be given in large doses.

nephritis has become established, the patient must be put to bed at once and the diet regulated.

Diet:—Soups, milk, yolks of eggs, free from white and beaten up with brandy, arrowroot flavored with Madeira, broth from veal stock thickened with cream and arrowroot, boiled sago or tapioca with a little milk. Stimulants to be given freely, if there is much asthenia. If urine scanty, give large quantities of diluents, barley water, linseed tea, warm water, but no saline diuretics.

Remedies:—I have seen favorable results from internal use of *Acidum Boracicum.* In severe cases, from half an ounce to an ounce of the solution already described four times daily: when the urine is foul, intensely alkaline, and loaded with muco-pus. In one case stimulants, boracic acid, and *Chin. Arsen.* snatched the patient from the jaws of death. The bowels must be opened daily with warm enemata or mild purgatives. [If there is constipation, together with scanty urine, strong purgatives as elaterium may be required; or ergot if there is constipation with polyuria.] *Terebinthina* is often of use in this disorder. *Creosote* is also recommended.

If foul urine accumulates in the bladder there is probably less risk in drawing it off than

in allowing it to stay,[1] and after it is withdrawn an antiseptic solution may be introduced.

If the disease is in consequence of pregnancy the propriety of inducing labor must depend on the urgency of the symptoms.[2]

Dr. Hale often prescribes *Eucalyptol*. It is possible, also, that *Salol* may be useful.

Cupping the loins is sometimes of help.

"Dry cupping to the loins relieves renal congestion and favors diuresis. By this temporary abstraction of blood into the subcutaneous capillaries a diminished pressure is produced in the lumbar arteries, which supply the integuments of the loins, and this diverts a certain amount of blood from the renal arteries. The object of the cupping is to draw the blood into the capillaries, in order that it may be taken up and removed by the veins. The cups should be removed as soon as filled, and reapplied. No cups are better for the application of this remedy than the ordinary tumbler, which is always at hand. A good method of applying these is to dampen the bottom of the glass, so that the piece of loose dry cotton which is to occupy the bottom of the glass does not fall when the cup is used. The skin is to be moistened with warm water, and the glass applied instantly after the cotton is lighted, when an excellent vacuum is produced, and the integument rises into the glass. The cupping glass with rubber bulb is also a convenient instrument for dry cupping."

PYELITIS AND PYONEPHROSIS.

Pathology:—Pyelitis: suppurative inflammation of mucous membrane of the renal pelvis

[1] Ralfe, *Kidney Diseases*, 1885, p. 291.

[2] Saundby, *op. cit*, p. 242.

without distention of that cavity. Pyonephrosis: the same with accumulation of pus, as the mechanical result of some obstruction. The pyelitis has become chronic, there is occlusion of the ureter, the renal pelvis is distended with pus and the renal substance liquefied and destroyed; or the liquid being absorbed, only a chalky or putty-like material is left.

PYELITIS.

Etiology:—Not common as primary disorder. Associated with renal or vesical affections especially septic inflammation of lower urinary tract. Accompaniment of pyæmia, enteric fever, scarlatina, small-pox, measles, cholera, acute nephritis, diphtheria, scurvy, pregnancy. May be due to poisons as turpentine, cantharides; or to retained blood-clots. *But the most common cause is renal calculus.*

Symptoms:—In *uncomplicated* catarrhal pyelitis without retention and rapid decomposition of urine, the symptoms are as follows:

Pain:—Seldom severe, often absent altogether. Character dull, dragging, worse on pressure, following course of ureter, or in lumbar region; occasionally extending downwards to the bladder.

Fever:—May be present during attacks of pain, but as a rule is not marked and, when present, transitory, and usually nocturnal.

Urine:—In acute cases diminished in quantity. Mucus increased. Then slowly increasing persistent pyuria; acid urine with complete separation of sediment from urine. Slight hæmaturia possible. The acid urine from the healthy kidney is usually able to overcome the alkaline urine from the diseased kidney; but on standing the urine may soon become alkaline, and crystals of triple phosphate be seen in the sediment which were not observed in the freshly voided urine. If the pyelitis is associated with retention and rapid decomposition of urine, it is sometimes very difficult to make the diagnosis, and to distinguish it from pyelonephritis and suppurative nephritis.

In chronic pyelitis the quantity of urine is greatly increased, even to as high a figure as 2,500 to 3,000 c.c., with diminution of solids both absolute usually and relative.

When the disorder is due to septic inflammation of the lower urinary tract, microorganisms (usually micrococci, but also filamentous fungi and bacilli) may be found in the urine. Small gelatinous masses are described by David Newman,[1] composed of rod-shaped bacilli with a little calcium oxalate.

Prognosis:—Simple catarrhal pyelitis arising

[1] *Surgical Diseases of the Kidney*, 1888.

for example in course of enteric fever, scarlatina, small-pox, measles, etc.; prognosis that of the disorder on which it depends; the pyelitis usually disappears when convalescence sets in. But when pyelitis occurs as a complication of acute nephritis, cholera, and diphtheria, prognosis grave.

Calculous pyelitis:—Prognosis favorable, if stone can be removed.

If the pyelitis happens for any reason to be bilateral, the prognosis is grave.

Pyelitis associated with grave vesical disorders:—Prognosis unfavorable as in pyelonephritis, to which it may lead.

Simple pyelitis becoming chronic may lead, in consequence of prolonged suppuration, to lardaceous disease, or be complicated by sclerosis, in which case prognosis ultimately unfavorable.

Treatment:—Acute simple pyelitis[1] usually yields to the following treatment: absolute rest; plenty of warm, diluent drinks; hot baths, especially hip baths; hot water bottles to loins, flannel being interposed.

Satterthwaite suggests that the patient sit over a steaming decoction made by putting a bunch of wormwood in a chamber or other

[1] For treatment of calculous pyelitis and of tuberculous pyelitis, see consideration of Renal Calculus and Tuberculosis.

receptacle in a closed water-closet chair and then pouring on it some boiling hot water.

Patients subject to pyelitis should be cautioned in regard to sexual excesses.

The *remedies* usually of service are *Hepar Sulphur, Cantharis*, and *Mercurius.*

Hepar Sulphur:—Patient very sensitive in regard to everything. Pus in the urine abundant. Urine escapes slowly or with difficulty and the last drops are tinged with blood. Patient complains both while passing water and after.

Mercurius is indicated when there is much pus in the urine. See "Indications for Use of Remedies." Other remedies are, Nux Vomica, Petroleum, Phosphorus, Pulsatilla, Sepia, and Sulphur.

Those in favor of vigorous measures advocate wet cupping followed by warm poultices; application of leeches to the loins, removing in robust patients 12 to 16 ounces of blood. Alkaline, demulcent drinks when there is irritation caused by hyper-acid urine. Porter calls attention to the fact that pyelitis is often due to sexual excesses. He also recommends *inspissated bile.* Hyoscyamus and bicarbonate of potash are frequently prescribed, also damiana.

Chronic pyelitis:—The object of treatment is to diminish the amount of pus and mucus, preventing, if possible, the development of lardaceous disease or complication by chronic interstitial nephritis.

Hygienic:—Patient to have nourishing food and, as a rule, unless there is great weakness, non-stimulating diet. *Change of air* highly important. Sea shore best locality. Warm salt baths. In some cases, if patient's strength permits, sea bathing is allowable.

The remedies in the simple chronic form are those already mentioned.[1] *Hepar sulphur* and *Mercurius;* the latter when the amount of pus is very great. If the urine is strongly acid, *Terebinthina.*

The following remedies may also be found useful:—

Barosma:—Recommended by Dr. E. M. Hale, in chronic pyelitis.

Benzoic Acid:—After the pain and fever of the acute stage have subsided, but urine is still cloudy, scanty, of dark brown color, and strong urinous (*not* ammoniacal) odor.

Berberis:—Useful in the pains of chronic pyelitis. Suppuration on the left side, very severe pain from left kidney down ureter to hip, *Berberis vulgaris*, first decimal dilution.[2] Berberis is a remedy which is especially suited to disorders of the lumbar region.

---

[1] For treatment of calculous or tuberculous pyelitis, see Renal Calculus and Tuberculosis.

[2] S. D. Johnson, *Medical Current*, September, 1889.

Eucalyptol:—Dose, two to five minims in an emulsion.

Ferrum:—It may be advisable to use this remedy in cases where there is great weakness and emaciation. See Chapter V.

(Other remedies will be mentioned under heading of Renal Calculus.)

Those in favor of vigorous measures recommend turpentine (dose, 2 to 5 minims in an emulsion) and borax (dose 5 to 20 grains) when the urine is acid; boracic acid (dose 2 to 5 grains) when it is alkaline; creasote (1 to 2 minims) when the urine is fetid. The chronic pyelitis of the gouty is often benefited by alkalies and Vichy water; when associated with oxaluria by nitro-muriatic acid (dose 5 to 20 minims) and Contrexéville water—(Ralfe).

If the condition is due to obstinate urethral stricture, the surgeon must enable the urine to pass freely, and if there is evidence of decomposition within the bladder, the latter should be washed out with an antiseptic solution and kept thoroughly aseptic for fear of pyelonephritis.

Relief is usually experienced from dilating strictures, but sometimes not until *perineal drainage* of the bladder is tried according to the method of R. Harrison.[1]

PYONEPHROSIS.

Definition and Pathology:—See Pyelitis.

[1] *London Lancet.* Dec. 7, 1889.

Etiology:—Among the *indirect* causes are those of hydronephrosis, which, if inflammatory, becomes pyonephrosis. *A very common cause is impaction of stone in the renal pelvis.* Septic inflammation, pyelitis, tubercular disease of kidney, malignant disease of neighboring organs. Said to occur, like pyelitis, in course of acute nephritis, diphtheria, and other zymotic diseases.

Direct cause:—Occlusion of the ureter. It is a frequent termination of pyelitis.

Symptoms:—Renal swelling, elastic, fluctuant, etc. See Table XIII. Previous to the progressive development of tumor in lumbar region, there have been symptoms of pyelitis and disappearance of pus from the urine as the tumor is perceived. The swelling occupies the space between the crest of the ilium and the floating ribs, hence abdomen is unsymmetrical. Percussion reveals increased area of dulness [1] often crossed by a resonant zone indicating position of colon. Aspiration will show presence of pus. The quantity of pus in the urine varies from day to day, according to posture and nature of the obstruction.

[1] Remember that the situation of the kidneys is from the level of the twelfth dorsal vertebra to the first to third lumbar. The right kidney borders above on the liver, the left on the spleen. Percussion determines the lower and outer border; *the latter is about four inches external* to the spinous processes.

Prognosis:—Unfavorable, if primary disease is tuberculosis of renal pelvis or bladder, or malignant disease of uterus or rectum.

Unfavorable, if distention of the renal pelvis is rapid and due to sudden impediment in escape of pus; the danger to life is in such cases great, unless surgical interference is possible, (nephrotomy or nephrectomy).

Unfavorable, if urine is alkaline and there is vesical irritation.

Not immediately unfavorable, if urine acid, pus in small bulk in the renal pelvis, obstruction and suppuration unilateral in otherwise healthy patient.

Pyonephrosis is essentially a chronic disorder and the pyuria and hæmaturia may continue over a long period of time.

Favorable, if tumor ruptures into some part of conducting portion of the urinary tract and at the same time, no grave structural change has taken place in the affected kidney.

Amelioration, if rupture takes place into alimentary canal, though constant danger of acute peritonitis.

Death soon follows rupture into retroperitoneal tissue, peritoneal cavity, or thorax. Death may follow inflammation induced in renal substance or neighboring parts. The patient may succumb to slow, gradual exhaus-

tion and anæmia with low fever, symptoms of lardaceous degeneration of various organs, pyæmia and septicæmia.

Recovery has been known to take place when formation of pus ceases and the sac contracts on a cheesy mass.

Treatment:—Attend to cause of obstruction; displacements of pelvic organs, tumors, renal calculus, urethral stricture, enlarged prostate, etc., must be looked for and, if possible, remedied. If the purulent discharge from the kidney is found intermittently in the urine, and there are signs of calculous obstruction, keep patient at rest on sofa, or specially constructed couch, administer diluents, as distilled water, freely. If the urine is over-acid, give Londonderry Lithia water and *Terebinthina*. If alkaline, render acid with boracic acid unless the irritation is primarily due to uric acid as shown by history, in which case alkalies may prove more serviceable. If swelling increases in bulk and there is more pain, and pus is not freely found in the urine: if fever, gastric symptoms, rigors, sweat, and emaciation are noticed, together with evidence of extension of the inflammation, then surgical interference is immediately required.[1] First, *nephrotomy* with free antiseptic drainage at point of election

[1] David Newman, *op. cit.* p. 229.

behind. If the purulent discharge from the sinus is continuous and undiminishing, *nephrectomy* is to be performed. Mortality from operation is lower when there is no calculous obstruction.

Clinical note: Dr. E. R. Lyon, resident physician to Charity Hospital, New York, reported to Dr. Prudden the following case of carcinoma of the cervix uteri invading the bladder, occluding the openings of both ureters and causing hydronephrosis and pyonephrosis. The patient was a German female, seventy years of age. On admission she complained only of a little cough, and was very feeble; she was stupid, and at times mildly delirious. She was not much emaciated, but had a sallow, cachectic appearance; no fetid discharge was noticed from the vagina. She gave the physical signs of bronchitis. There was considerable œdema of lower extremities. The pale, alkaline urine had a specific gravity of 1.010, and contained two and one-half per cent. of albumin. It contained pus in considerable quantity. She remained in the same stupid condition, and died suddenly four days after admission. Autopsy: Heart, normal; lungs, bronchitic. The pelvis and ureter of the left kidney were filled with pus. The kidney substance was somewhat encroached upon by the accumulation of pus in the pelvis.

The right kidney was converted into a sac. The right ureter was completely occluded as it entered the bladder, and was dilated to a diameter varying from seven millimeters to two centimeters. The pelvis and ureters together contained 300 c.c. clear amber urine, sp. gr. 1.010, containing no albumin, but considerable numbers of hyaline casts, fatty epithelial cells, and ordinary urinary and cholesterin crystals.

Dr. C. C. Lee of the Woman's Hospital, New York, reports an interesting case: The patient's urine was alkaline, of specific gravity 1.012, slightly purulent, quite albuminous and

after a few days contained hyaline casts. After drawing off the urine with a catheter the presence of uterine fibroids was discovered, the woman was pregnant and the pregnancy was estimated to be between the third and fourth month. There was retention of urine produced by pressure on lower part of bladder and pyonephrosis, the latter condition confirmed by post-mortem.—(*Medical Record.*)

PERINEPHRITIC ABSCESS.

Definition:—Abscess forming in the tissue immediately surrounding the kidney.

Etiology:—Connective tissue surrounding the kidney is prone to suppuration. Most frequent cause, *extension of inflammation* from within renal tissue. General pyæmia. Septic infection in febrile conditions. Purulent absorption in cases of inflammation of connective tissue about uterus, vagina, or rectum after childbirth or operation. Not an uncommon complication of pelvic cellulitis. Operations on the testicle or spermatic cord following inflammation of connective tissue about the bladder. Operations on perinæum, rectum, uterus. Suppurations in gall bladder, liver, spleen.

Symptoms:—See Table XIII. In perinephritis a large tumor is present while in suppurative nephritis there may be merely well-defined swelling in lumbar region extending downwards.

Pain:—Severe, and worse on pressure over the lumbar region and on movements of the patient.

Swelling:—No diminution on complete evacuation of bowels, not affected by respiratory movements.

Skin:—Red, waxy, and œdematous in situation of tumor.

Temperature:—Persistently elevated.

Urine:—Normal unless abscess is the result of bruises or lacerations, then hæmaturia and pyuria; or if due to pre-existing disease of bladder or kidney, then characters of that disease. If abscess very large, then urine of passive congestion of the kidney, albumin, blood, blood casts.

Prognosis:—Favorable if disorder primary and recent, provided early surgical treatment is resorted to, drainage of abscess, etc. *Unfavorable* if pus is allowed to burrow; abscess may rupture into peritoneum, pleura, or intestines.

Unfavorable if secondary to grave lesions of the kidneys or of neighboring organs, or in diseases of the spine. Least favorable when disease follows the puerperal state or septic conditions.

Possibilities of recovery:—Depend largely on constitution of patient. Cases of recovery on record even when abscess has burst into bowels.

Treatment:—In primary or traumatic cases as

soon as diagnosis is made, absolute rest, cold applications, bowels thoroughly opened. If there is no redness or fluctuation, ice bags or cold compresses. When skin is inflamed, hot emollient poultices.

Remedies:—Aconite, Arnica, Belladonna, if due to exposure to cold or if after external injury. *Hepar Sulphur, Mercurius,* and *Silicea* for the abscess.

[Those advocating vigorous measures advise cupping, leeches, and a sharp purge, and if inflammation subsides hot emollient poultices, application of ointments, one, for example, containing iodides of potassium and lead.]

In secondary conditions and especially in the case of delicate women vigorous measures like the above cannot be thought of; treatment must be directed, first, to relief of pain: try inunctions of belladonna; or liniment of equal parts chloral hydrate and camphor. Morphine by mouth or rectum. Bowels must be kept open. As soon as suppuration is suspected (pyrexia, rigors) puncture swelling with aspirator needle and apply large poultices. Incision must be made if fluctuation can be made out or if there is increase in the swelling, pain, fever, rigors, redness and œdema of the skin over affected kidney.

Clinical note:—Dr. M. H. Fussell reports a case originally puerperal cystitis which went on to pyelitis and perinephritis. Pus was found in the urine the first day after confinement and the case treated as one of puerperal cystitis; pain caused by the catheter was great and there was frightful dysuria when the urine was passed voluntarily. The least movement caused urine to be voided with frightful pain and tenesmus. The usual remedies for puerperal cystitis gave no relief; washing of the bladder also failed to help the patient. The only relief was

from injections of solution of cocaine, twenty grains to the ounce, half a drachm at a time. Six months later, severe pain in region of right kidney. Two years later another child born, and violent pain afterwards on voiding urine. Urethra was stretched. Bladder found thickened, bleeding profusely but no growth. Relief from operation so far as tenesmus was concerned but eventually chills, pain, and tenderness over the right kidney, urine diminished to one pint; finally dulness was found and the edge of the kidney felt in the flank. Complete recovery after lumbar incision and evacuation of pus. The case was regarded as originally a severe cystitis with development of mild pyelitis, acute exacerbation after stretching the urethra, finally occlusion of the ureter, retention, increased inflammatory trouble in the distended pelvis, and perinephritis either by the rupture of the pelvis in the post-nephritic space, or simply by inflammation by contiguity.

Suppose now that the urine contains renal blood or pus *with or without* pyelitis or pyonephrosis.

It is of importance to know whether the patient is suffering from *renal calculus* or not. Examine the urine carefully for *pus*, as it is advantageous to distinguish calculus without suppuration from calculus with it.

CHAPTER IX.

Renal Calculus.

Etiology:—Occurs most commonly before age of fifteen and after fifty. Causes: faults in digestion, "renal inadequacy,"[1] heredity.

Composition of calculi:—Crystals deposited from the urine cemented together by organic matter. Calculi may be formed of uric acid, urates, calcium oxalate, calcium carbonate, cystine, xanthine, indigo; also of phosphates. Uric acid calculi are more common abroad and oxalate calculi in America.

Diagnosis:—1. Calculus without suppuration: The chief symptom is *hæmaturia*, small in amount, either constantly present, or often repeated. Sometimes very slight. Sometimes the only symptom. Increased by movements of the body but not always immediately; may take place 12 to 14 hours or even days after the exercise. *Hæmaturia appreciably less on rest in bed.* Urine is clear above the sediment of blood corpuscles and when there is no blood there is no albumin. No blood casts.

---

[1] Whether "renal inadequacy" is "fanciful" or not, the fact remains that renal calculi are common in those patients whose renal secretion is below par.

Pain:—Slight feeling of dulness or weight in the loin aggravated by *jolting movements.* Patient can walk but cannot drive. Pain varies with posture. Sometimes only in lower extremities.

Micturition:—Frequent and painful. Irritability of the vesical neck.

General symptoms:—There may be reflex digestive disturbances and at times intestinal colic. In one case which I saw, an attack of intestinal colic was rapidly followed by renal colic and subsequent passage of much sand and gravel.

The urine:—May contain in freshly voided samples, crystals or bits of the calculus, together with pus and blood, a trace of albumin, usually considerable mucus.

2. Calculus *with* suppuration:—The chief points are the *pain,* as already described, and the *pyuria.* The pus separates rapidly and completely from the acid urine, forming a sediment, on top of which blood may, in time, be seen.

Sudden and marked variation in quantity of pus is one of the most certain signs of partial or complete obstruction of the ureter whence the pus flows. Disappearance of pus from the urine with increase in lumbar swelling followed by sudden flow of large quantity of purulent urine and subsidence of the swelling is sign that the blocked ureter is now open.

WHAT TO DO WHEN RENAL CALCULUS IS SUSPECTED.

If renal calculus exists, it is of the utmost importance from a therapeutic standpoint to ascertain its *chemical composition,* its *situation, whether more than one kidney* is affected and, if but one kidney, which one. First, study the prevailing character of the sediment, using microscope. If crystals of uric acid [1] are persistently found, as soon as the urine settles, especially jagged ones, the calculus is of the *uric acid variety.* Suppose, however, no crystals are to be found, but the urine is strongly acid in patients either young and vigorous, or in older ones subject to gout. In such cases, if there are symptoms of renal calculus, it is probably of the uric acid variety. The "uric acid diathesis" usually shows itself by the following symptoms:

So-called neurasthenia, nervous prostration or exhaustion, "malaria," general worthlessness, inability to do anything, or make any exertion, indolence, laziness, even though habits are good. Patient irritable, fretful, peevish, and discontented with those around him, but rarely finds fault with himself, or is hypochondriacal. May rise at night to void urine, which latter is high-colored and deposits a sediment frequently reddish in color. Con-

[1] See page 48.

stipation, drowsiness, headache, restlessness at night. Examine the urine for sediments of urates and uric acid, especially in patients who lead sedentary lives, spending their time in offices or at home and taking little exercise, who drive, or ride in street cars, but seldom walk.

The urine in uricæmia after standing may show on microscopic examination skeins of mucus, sometimes wound up and sometimes spread out over the whole field (Cutter). I have repeatedly observed these skeins of mucus.

If, now, on the other hand, the urine is clear, containing a large quantity of lime salts, and on standing precipitates crystals of calcium oxalate[1] especially those of the dumb-bell variety, suspicion should point to a calculus composed mainly of *calcium oxalate*, always supposing that the usual symptoms of renal calculus (pain, hematuria, or pyuria, or both) are present and that the patient complains of the usual symptoms of oxaluria as follows:

The urine may be normal in quantity and specific gravity, but pale green in color, micturition frequent and urgent though no great quantity of urine be voided. Burning sensation across loins, with feeling of tightness and dragging round the abdomen, shooting and burning

[1] See page 49.

pains in the lower limbs, twitchings of the muscles; feelings of numbness, deadness, and coldness in different parts of the body. Patient generally amiable to those around him, but is himself filled with gloom and forebodings, and excessively hypochondriacal. Bowels irregular. Nervous dyspepsia. Urine to be examined microscopically every day for at least a week, for sediments of calcium oxalate; look particularly in morning urine voided on rising. If dumb-bell crystals of calcium oxalate be found, the condition may lead to renal calculus. (Diagnoses of incipient locomotor ataxy and of syphilitic disease of the spinal cord have been made in cases where the condition was relieved when the patient voided a small concretion of calcium oxalate).

Patients subject to oxalate calculus often have serious nervous prostration, which is, as a rule, different in character from the uric acid "indolence," being much more severe.

If signs of both uric acid and calcium oxalate are wanting, it is possible that the stone is phosphatic. Examine the urine for crystals of triple phosphate or calcium phosphate.[1]

[Note that such crystals may be found not only in alkaline urine but in urine acid when voided. If one kidney is healthy and the

[1] Pages 49 and 52.

other diseased, the acidity of the urine from the healthy kidney may cause partial solution of phosphatic crystals in the bladder. But on exposure to air these crystals soon form again and may appear as soon as the sediment has settled].

If the urine is alkaline from increase in volatile alkali, shown roughly by fading after drying of the blue color given red litmus paper when dipped into urine, some disease of the conducting or collecting portions of the urinary tract is shown.

Situation of the calculus:—If the calculus be in the *substance of the kidney*, and there is no pyelitis, pain slight, or severe for a time and then disappearing for years. Sometimes constant dull pain in the loin. No premature or general disturbance.

If the calculus be free and moving in some large cavity of the kidney or in renal pelvis, the pain is felt not only in the loin, but along the course of the ureter and even as far as to testicle, inner aspect of thigh, or lower part leg, even in the heel. Pain much worse on motion.

If the calculus be dislodged from the infundibula or from fixed position in renal pelvis, pain, then severe and paroxysmal, nausea, faintness, vomiting.

If the calculus be in the ureter, then renal colic, agonizing pain, nausea, faintness, writh-

ings and contortions, even convulsions. After some hours, pain subsides suddenly. There may be sudden suppression of urine on one side; urine reduced suddenly to half the normal quantity.

If the calculus be impacted in the ureter, pain sets in suddenly and is only gradually relieved; does not cease suddenly, but there are paroxysms of pain until finally the ureter becomes habituated to the presence of the stone.

If the calculus be impacted in the ureter close to vesical exit, site of pain after having for some time shifted in a direction generally downward, suddenly becomes *fixed;* there is evidence of suppression of urine on one side.

If the calculus has become merely displaced from renal orifice of ureter, but is not yet in bladder, another paroxysm of pain may take place at any time.

If calculus has passed into bladder, patient may possibly be aware of it. The renal colic ceases and after a time signs of the presence of the stone show themselves as follows: hæmaturia after strong bodily exertion, disappearing after a long rest. Day urine contains more blood than night. The urine begins to show the features of cystitis. (See Cystitis.) Sounding for stone will sometimes reveal its presence.

Both kidneys affected or one only? If the

stone is primarily phosphatic the disorder is limited to one kidney.

If the stone is uric acid or oxalate, both kidneys may be affected.

If during renal colic, while one ureter is blocked, the urine voided be perfectly normal, then the one kidney is healthy.

In doubtful cases try compression of ureters or catheterization.

It must be remembered that absence of the symptoms mentioned above does not necessarily signify absence of calculus. In some cases the diagnosis cannot be made with certainty. The urine is often normal in all respects and gives no sign of the presence or character of the calculus. Renal colic may be the first marked symptom. Moreover, the symptoms of calculus, viz., lumbar pain, extending at times to the groin and testicle, paroxysmal, aggravated by movements, accompanied or followed by hæmaturia, pyuria, and frequent micturition, may all be present and yet there be neither stone in the kidney nor disease of the bladder. (See Tuberculosis of Kidney.)

ANALYSES OF URINE IN CASES OF RENAL CALCULI.

In the following cases the diagnosis was confirmed by renal colic and passage of small calculus:

CASE I. *Uric Acid Calculus.*

	First Analysis. 24 hours before passage of calculus.	Second Analysis. First 24 hours after passage of calculus.
Volume in 24 hours	960 c.c.	600 c.c.
Specific gravity	1020	1016
Urea, per litre	21 grammes	23
Urea, total	20 "	14
Phosphoric acid, per litre	2.25 "	1 95
Phosphoric acid, total	2.16 "	1.20
Reaction	strongly acid.	ditto.
	No albumin.	Trace albumin.
Sediment	Muco-pus; and not abundant.	Blood and pus corpuscles, pus plugs, uric acid crystals, mucous casts.

The calculus in this case was rough, hard, weighed 0.02 gramme, was of light brown color, and composed of urates and uric acid.

It is a noteworthy fact that *although the quantity of urea was relatively increased* in the cysto-pyelitis following the passage of stone, *the quantity of phosphoric acid became relatively diminished.*

CASE II. *Phosphatic Calculus.*

I was consulted in the spring of 1888 by a well-known scientific man who for several years past had been troubled with great urgency of micturition, and at times with a cutting pain in the urethra during urination. Failing to obtain a satisfactory diagnosis of his affection, he had undertaken the examination of his own urine, according to the directions laid down in one of the numerous manuals of urinary analysis.[1]

[1] *The Practitioner's Guide in Urinary Analysis*, Gross & Delbridge, Chicago.

He was not long in discovering that his urine deposited on standing a few hours a heavy sediment of crystals, which he recognized as those of ammonio-magnesium phosphate. On coming to Chicago, he collected his urine for twenty-four hours and gave it to me for analysis. I found that his own examination was correct so far as the sediment of triple phosphate was concerned. The urine was free from albumin and from sugar. The total quantity in twenty-four hours was 1,225 cubic centimeters. It contained approximately 83 grammes of solids. The amount of urea, estimated by the hypobromite process, was 41 grammes, more than was normal for his weight, which was 175 pounds. In the sediment, in addition to the triple phosphate, I found a considerable quantity of amorphous calcium phosphate. There was no pus and no blood.

I made during the next few months several examinations of the twenty-fours' urine, and found from time to time about the same conditions present, viz.: total quantity normal, solids in excess, sediment heavy. The twenty-four hours' urine was invariably alkaline on reaching me, as he lived some distance from Chicago, but he stated that his urine was often acid when voided, and even after standing some little time. He spent his vacation, as advised, in the mountains. I saw him on Oct. 15th, and found him greatly improved in appearance and spirits. Nevertheless he again collected the twenty-four hours' urine, and gave it to me for examination. There was now some improvement in the character of the urine. The solids were less in amount, urea but 37 grammes, sediment somewhat less than ever before. But I did not feel warranted in taking a hopeful view of the case, although he had been, while in the mountains, free from his urinary troubles. On careful microscopic examination of the sediment, after dissolving the phosphates in the field, I was able to find several pus corpuscles, but no epithelial cells at all distinctive in character. There was still no trace of albumin.

He came to Chicago again in December, and, after a fatiguing day in the city, was seized next morning with severe pain, accompanied by a rise in temperature. He had been irregular in his meals and had eaten food which had disagreed with him, so that at first the case seemed possibly one of gastro-intestinal disorder. But his family physician, knowing his history, suspected that the pain was of renal origin, and, after a consultation, it was decided to treat the case as one of renal colic due to incarceration of a phosphatic calculus. Boracic acid was given, and results showed the correctness of the diagnosis and the efficacy of the treatment.

I made frequent examinations of his urine, and the records are of interest in that the changes which went on in the body are so clearly shown by a study of the character of the urine.

First Collection.

Quantity of urine in 24 hours	1350 c. c.
Total solids (approximately)	55.00 grammes.
Total urea	48.00 "
Weight of sediment	1.53 "
Constituents of sediment	Ammonio-magnesium phosphate, amorphous calcium phosphate, amorphous urates; pus corpuscles seen by aid of microscope.

The effect of the treatment had been apparently to soften and disintegrate the incarcerated calculus, and to aid in removing much gravel. The quantity of urine was, therefore, not reduced from mechanical reasons. I collected the entire sediment of twenty-four hours on a filter, dried, and weighed it in the usual manner. The total quantity of urea was far above normal, as might be expected during the febrile condition. Pus and blood could not be seen with the naked eye, nor demonstrated chemically, but under the microscope the corpuscles were now more numerous than I had ever seen

them in the patient's urine. The sediment of urates (amorphous) appeared for the first time since my examinations had begun, and I regarded it as a not unfavorable sign.

Second Collection.—Patient's Urine Now Showing the Influence of Boracic Acid.

Quantity of urine.....1357 c. c.
Reaction.....Faintly acid.
Total solids.....57 grammes.
Total urea.....43 "
Weight of sediment..... 0.83 "
Sediment (constituents).....Same as in first collection, but fewer crystals and more amorphous urates. Pus corpuscles numerous, but no pus macroscopically.

The sediment was now reduced to nearly one-half the weight of that of the first collection. The reaction of the urine was still acid at the end of twenty-four hours and even longer.

Third Collection.— Made Five Days After the Second. Patient Now Convalescing.

Quantity.....1180 c. c
Reaction.....Strongly acid.
Solids.....45 grammes.
Urea..... 38 "
Sediment (weight)..... 1 "
Sediments (constituents).....Uric acid and urates.

The phosphatic sediment had now completely disappeared. The urine was strongly acid, and the sediment contained free uric acid and urates. The color of the urine was red, and the urea diminished in quantity to about normal, though relatively still high. In order to ascertain whether he was still voiding a notable quantity of phosphates in solution in the urine, I made a quantitative analysis of the total phosphoric acid, and found it considerably *below* the normal figure,

viz., but 1.35 grammes. Decided, therefore, that the trouble was probably over for the present.

Fourth Collection.—During the twenty-four hours the patient rids himself of remaining ills, voiding the remains of the stone and much pus with it.

Quantity ....1505 c. c.
Solids ..... 48 grammes.
Urea ..... 35 "
Sediment ....Pus in great abundance with a little triple phosphate.
Albumin .....0.3 of one per cent.
Calculus .....Soft, friable, phosphatic. Weighed when dry, 0.4 gramme.

The albumin in the urine I regarded as due to a cysto-pyelitis, excited by the calculus, for there was more than the pus would account for. The pus and albumin soon disappeared, as the record of the next collections will show. *Note the small quantity of phosphoric acid as compared with that of urea.*

Fifth collection.

Quantity ....1888 c. c.
Solids ..... 57 grammes.
Urea ..... 30 "
Sediment .....Mostly mucus with still a little pus
Albumin .....About 1-20 of one per cent.

Sixth collection.

Quantity .....1770 c. c.
Solids ..... 64 grammes.
Urea ..... 32 "
Sediment .....Mucus with a faint white line of pus.
Albumin .....Barely perceptible trace.

Not long after this, the patient left the city, feeling "clearer in his head," he asserted, than during years past. A number of distressing symptoms had disappeared after the date of the second collection.

This case shows (1) the value of routine examinations of the urine in obscure cases ; (2) the help to be had at a critical moment in the patient's life from records of the previous character of his urine; (3) the importance of an early recognition of a tendency to calculous formation, and (4) the aid, from a therapeutic standpoint, to be had from a knowledge of the chemical composition of the stone.

I should say in conclusion, however, that in this particular case the favorable termination was also due to the assiduous care and attention of the family physician.

Seventh collection.—Made one year later. Patient in good health and has gained fifty pounds.

Volume..... 920 c. c.
Specific gravity.....1032
Urea, per litre..... 32 grammes.
Urea, total ..... 29 "
Phosphoric acid, per litre, 2.20 "
Phosphoric acid, total.... 2.02 "
Reaction.....Acid.
Albumin.....None.
Sediment .....Amorphous urates and phosphates but no crystals. Some mucus and leucocytes.

We cannot help noticing the relative deficiency of phosphoric acid in cases when the kidneys (or even the kidney pelvis) are inflamed. The quantity of urea may be normal or even above normal, but the phosphoric acid does not as formerly thought, vary either with the diet or with the urea.

An interesting point in this case was the variation in *reaction* of the urine. Before the passage of the stone he would send me a specimen for examination and I invariably found the urine *alkaline* in reaction. In answer to my questions he replied that his freshly voided urine was *acid* in reaction. When in Chicago, he called at my office and voided urine for examination. I found it *alkaline* in reaction. He expressed

surprise, for having tested his freshly voided urine several times he had always found it acid. On another occasion I tested his freshly voided urine and this time I too found it *acid*.

After the diagnosis of renal calculus had been confirmed, and the chemical character of the stone established, an interesting solution to the variations in acidity occurred to me. One kidney was diseased, the other healthy. The acidity of the normal urine of the healthy kidney was at *times* able to overcome the alkalinity of the urine from the diseased renal pelvis. At other times not. Hence, sometimes the urine was acid when voided, at other times alkaline.

The alkaline reactions were found to be due chiefly to volatile alkali from decomposition of urea either in the diseased renal pelvis or bladder. Now, whenever the normal urine from the healthy kidney was at its lowest ebb of acidity at the times of the "alkaline tides" so-called, the volatile alkali either overcoming the feeble acidity of the normal urine or, adding itself to the fixed alkali rendered the freshly voided urine *alkaline* in reaction. On the other hand, such was the acidity of the normal urine of the healthy kidney at the times of its "acid tides" that it overcame the volatile alkali from the diseased kidney, and the freshly voided urine was then slightly *acid* in reaction.

I think it desirable from my experience with this case that the time of the acid and the alkaline tides of persons in health be observed. A series of simple tests with litmus paper will often show by degree of coloration at what different hours of the day the urine is most acid and least acid. In some individuals whose meals are at 8, 1, and 6 to 7, the greatest acidity has been shown to be between the hours of 11 A. M. to 1 P. M., and from 11 P. M. to 8 A. M. Ralfe found the acidity of his urine from 11 A. M. to 1 P. M., to be equal to 0.20 grammes of oxalic acid per hour. From 7 P. M. to 11 P. M., it was only equal to 0.02 grammes per hour.

Knowing the normal acid and alkaline tides of any individual, marked changes in them might throw light on a disorder which, all other circumstances being equal, would possibly escape notice. For example, persistent acidity at the times when experience had shown the alkaline tide to be due, would suggest tendency to uric acid formation long before the evil results of such a condition were perhaps thoroughly realized. On the other hand it is known that there is increase in the amount of fixed alkali secreted, or a diminution in the quantity of free acid eliminated, associated with grave organic diseases as chronic Bright's, phthisis pulmonalis, cirrhosis of the liver, diseases of the spinal cord, etc., and further, that the condition where there is increased fixed alkali may exist for some time before our attention is attracted to the urine by ureal decomposition, presence of volatile alkali, etc., which eventually may follow the increase of fixed alkali.

The following analyses were made in cases with previous history of passage of calculus and at times subsequently when trouble from gravel was marked.

CASE I. History of renal colic and calcium oxalate calculus. Patient now has much pain on passing water.

Volume of urine in 24 hours	850	c. c.
Specific gravity	1025	
Urea, per litre	29	grammes.
Urea, total	25	"
Phosphoric acid, per litre	1.90	"
Phosphoric " total	1.62	"

Albumin: trace.

Sediment: amorphous urates, and abundance of pus corpuscles. A few days later much calcium oxalate in the freshly voided urine.

CASE II. History of uric acid calculus. Calculus small and not hard, passed 18 months ago.

Volume of urine	920	c. c.
Specific gravity	1025	
Urea, per litre	25	grammes.
Urea, total	23	"
Phos. acid, per litre	2.26	"
" " total	2.07	"

Sediment: blood, uric acid (free)—sharp spiny crystals and rhombs, columnar epithelium, tailed cells. Albumin 1-20. Six weeks later calculi removed by operation.

Treatment of renal calculus:—The *prophylactic* treatment of renal calculus is of great importance and under this head I shall consider uricæmia, oxaluria, and phosphaturia.[1]

Etiology:—Morbid conditions of the nervous system.

URICÆMIA.

Etiology:—Disorders of digestion. Sedentary life. *Heredity.* Highly nitrogenous diet with immoderate use of alcohol in districts where the soil is wet.

Diagnosis:—Urine contains uric acid relatively or absolutely in excess, together with relative or absolute excess of other urinary solids, as urea, etc. Urine may or may not contain a sediment of uric acid and urates. If without any errors of diet a patient under 40 habitually passes urine which soon deposits a pinkish sediment, or which

[1] These disorders may, it is true, be due to morbid conditions of the nervous system, and be unaccompanied by calculus, but to avoid repetition I mention them here.

though clear when voided soon becomes thick, and opaque, or covered with a delicate film or pellicle exhibiting faintly a play of prismatic colors—or if in a few hours there is seen in the sediment a deposit of free uric acid —"red pepper" crystals—there is undoubtedly an undue tendency, either inherited or acquired, to produce *uric acid.* (Thompson.) [If there be no such sediment and yet the patient manifest symptoms already described (see "What to do when renal calculus is suspected"), a quantitative analysis of the uric acid must be made. See method of Arthaud and Butte (described in *British Medical Journal*, March 1, 1890). There is no simple method of quantitative analysis.]

Treatment:—1. Hygienic: Moderate out-door exercise. Mountain air. Bathing with friction of surface of body or dry rubbing after exercise, according to temperament. Woollens next to skin. Warm clothing in winter. Avoidance of unnecessary exposure to cold. Cheerful surroundings and congenial occupation. Change of air whenever possible; a course of Congress water at Saratoga, followed by mountain climbing in the Adirondacks, is my favorite prescription.

Diet: It has recently been shown by Draper that the lithæmic patient should avoid sweets, starchy food, and fats. My own experience has shown me that this, in the ma-

jority of cases, is true. Sir Henry Thompson thinks rice and sago puddings, as ordinarily made, inventions of the devil for the lithæmic; whole-wheat bread, pearl-barley, oatmeal, etc., are highly recommended by him; but I find some American lithæmics not wholly at ease with the food, either of graminivorous animals or of things with gizzards.

The prejudice against a moderate meat diet in cases of lithæmia I cannot understand. It is now held that a certain amount of meat is positively essential for those engaged in intellectual work. To cut off meat entirely is injudicious; the retrenchment should be made along the line of sugars, starches, and fats.

The Lithæmic Patient May Take:	The Lithæmc Patient Should Avoid:
Tender, lean beef and mutton. Fish and poultry. *Well-made* bread. Gelatine preparations. Fresh or green vegetables. Well-cooked celery, asparagus, baked potatoes. Butter in moderation. Milk only with other articles of diet, as tea, coffee, etc. White of egg to be used in cooking only. Baked apples without sugar. Moselle, Rhine wine, Bordeaux. In some cases a little good whisky in distilled water.	Fat pork and fat meats generally. Herrings, mackerel. Ham, sausage. Turkey. (The abomination of desolation is the American rural dietary of ham and eggs, doughnuts, and pie.) Sugar, sweets, starchy food and fats. Ice-water. Watermelons, raw apples, oranges. All berries and preserves. Cheese, eggs, especially omelette, cream, champagne, sherry, port, beer.

Mineral Waters:—For the lithæmic, waters containing *sulphate of soda* are by far the best; alkaline waters, like Vals, Vichy, etc., may cause the urinary sediment to disappear temporarily, but their curative range is limited. The best known sodium sulphate waters are Pullna, Hunyadi Janos, Friedrichshall, Marienbad, Carlsbad, etc.

The full dose of Hunyadi Janos is from five to seven ounces taken an hour before a light breakfast, during which a cup or two of some hot liquid is to be taken.

Marienbad water is far more agreeable than Hunyadi Janos, since it contains no sulphate of magnesia. Dose, half a pint or more. Carlsbad contains no magnesia. It is best suited to robust patients.

Sir Henry Thompson recommends Carlsbad water to which a little Hunyadi Janos is added. From four to seven ounces of Carlsbad at a dose, heated, to which as much Hunyadi Janos is added as is demanded by the bowels of the patient.

In this country, in default of sodium sulphate water,[1] the best saline waters are probably the Congress and the Hathorn. I have found Congress water admirably suited to those lithæ-

[1] There is great need of an American water which shall *without much lime*, contain an abundance of sodium sulphate.

mic patients who complain of "emptiness" or "goneness" at the stomach, for which sensation the prescription of "sherry and egg" is often made and fails to relieve. I have known patients who did better on Congress water than on such Carlsbad as is to be had in America.

When the patient is passing considerable gravel and sand I have derived advantage temporarily from use of the Londonderry Lithia water. Millard thinks the Buffalo Lithia water useful when there is a torpid liver. The fundamental objection to American mineral waters is the relatively large proportion of lime salts which they contain. The desideratum is a mineral water not only containing sulphates, but large quantities of *chlorides*. Continuous use of water containing sulphates without chlorides interferes with digestion. When chlorides are present they exert a favorable influence on digestion and tissue change generally.[1] The Saratoga waters are, many of them, rich in chlorides.

If alkaline waters are given care should be taken not to make the urine too alkaline persistently and too long, for fear of jumping out of the uric acid frying-pan into the fire of phosphatic calculus. The conditions necessary for uric acid formation are present chiefly *during*

[1] Von Mering, Frerichs, Henry Thompson.

the hours of sleep, so that it is not necessary to drench the patient with strongly alkaline waters during the day.

Solvent Treatment:—So far as actually dissolving uric acid calculi is concerned, it is possible, according to Ebstein, that it may be done,[1] but it should not be attempted on account of the danger to the system of an alkaline *regime*. Careful use of alkaline waters is often desirable up to the point when the urine becomes slightly acid or neutral. As soon as the urine becomes distinctly alkaline, discontinue the alkaline water. Vals Désirée water, after two days' use, has been known to render gravel and stone fragments soft, pliable, and to cause loss of weight.

In acute cases Goldenberg[2] recommends the sodium carbonate waters, Vals, Vichy, and perhaps also Fachingen, or 3 to 5 gramme doses daily of bi-carbonate of sodium largely diluted in carbonated waters. Prolonged use of lithium carbonate is dangerous, and as soon as discontinued, its action ceases. In chronic cases, milder treatment: Fachingen water and magnesium boro-citrate. (The use of Cantani's powder—one part lithium bicarbonate, one part so-

[1] The majority of the claims as to the success of solvent treatment are, as a rule, not worthy of credence.

[2] *Medical Record*, May 12, 1888.

dium bicarbonate, two parts potassium citrate —is not without danger.)

2. Remedial treatment:—For the general condition of uricæmia, *Bryonia, Lycopodium, Euonymine, Nux Vomica, Podophyllum.* It cannot be denied that the tendency to uric acid formation is difficult to overcome. There may be general indications for a variety of remedies, among which *Arsenicum, Belladonna, Calcarea, Phosphorus, Silica,* and *Zinc.* In cases of uric acid gravel and calculus (renal), renal colic, etc., study the following:

Argentum nitric., according to Dr. C. Preston, is preferable to every other remedy when the passage of sand or sediments in general through the urethra produces active symptoms; is superior to *Lycopod.* and *Nux Vomica* in renal catarrh and attacks of nephritic colic. Little or no pain during urination is an indication for the remedy, although it also relieves when the symptoms seem to call for *Canthar.* The pains may be very severe, almost driving one crazy, and extend from the kidneys along the ureters to the bladder; at other times they are burning in character, and are accompanied by the voiding of red sand or uric acid sediments. Its main indication is catarrh of the kidneys.

Berberis is useful in renal colic from uric acid gravel or calculus. Cutting pains go from

kidneys and radiate to the loins, hips, and back; the urine has a gray, meal-like sediment.

Calcarea Carbonica is said to be useful when Berberis, Lycopodium, and other remedies fail in renal colic, or when there are general indications for its use. (See Chapter V.)

Cantharis:—Cutting and contracting pains from the ureters to the penis with relief from pressure on the glans penis. Urine turbid, scanty, cloudy when passed during the night, with white sediment. Hæmaturia (not profuse) from renal colic: constant, inefficient desire to pass water.

Cannabis Sativa:—When in consequence of passage of sand or gravel, there is much soreness along entire urethra.

Corn-silk:—In calculous pyelitis (see *Stigmata Maïdis*).

Copaiba:—In calculous pyelitis.

Hydrangea:—Calculus passing from kidney. (A preparation called "Lithiated Hydrangea" is advertised extensively.)

Lycopodium:—Dull pains in the kidney relieved by voiding urine. Urine high-colored, scanty, red sandy sediment of uric acid and urates. *Solids normal in character and quantity but water deficient.* If much irritation from crystalline urates in children, urine may contain mucus and pus, causing whitish sediment; or

even blood from laceration of mucous lining of the bladder.

Dr. Dowling reports a case of lithæmia successfully treated with Lycopodium.

Nux Vomica:—Pain running from right kidney extending to genitals and right leg; painful and ineffectual desire to urinate; urine comes in drops with burning and tearing pain at neck of bladder and in urethra.

Ocimum:—Nausea excited by pains; urine scanty, contains uric acid in sediment; pains go tearing down *right* ureter only.

Papaine:—Recommended as worthy of trial as a preventive of renal calculi; in one grain doses, to be taken with meals.

Pareira Brava:—Stone in the bladder or trying to pass from the kidney; constant urging to urinate; violent pains in the glans penis; straining; pain causes screaming; patient goes down on all fours to urinate; urine contains much viscid, thick, white mucus or deposits red sand and has strong ammoniacal odor; the pains go down the thighs during efforts to urinate.

Piper Methysticum is said to be useful in renal colic from uric acid calculus. (Dose of the fluid extract from 10 drops upward, after meals.)

Pichi is said to be of undoubted value in lithiasis and renal stone, controlling hæmaturia

and pain, especially in wineglassful doses of the fresh infusion. (Dose of the fluid extract 10 to 30 minims or upwards.) Useful to allay irritation after passage of uric acid calculus.

Stigmata Maïdis:—(Corn-silk.) Not easy to procure at all seasons of the year. In chronic pyelitis and renal colic this drug, in wineglassful doses of the fresh infusion, is said to be of great value.

Thlaspi:—It has been claimed that this remedy is exceedingly useful in causing expulsion of "red sand." (Tincture, 30 drop doses.)

Uva Ursi:—Calculus passing from kidney. Renal hæmorrhage and pyelitis. Constant urging to urinate; straining with passage of blood and muco-pus, or straining without any discharge or few drops at most, after which cutting and burning in the urethra with discharge of blood. Stools hard.

For calculous pyelitis try especially corn-silk, copaiba, pichi. For the general condition *Cantharis*, *Merc. Cor.*, *Nux Vom.*, *Petrol.*, *Phosphor.*, *Puls.*, *Sepia*, *Sulphur.*

Palliative Measures:—"Benzoate of lithium is theoretically of special utility in the treatment of gout, since it contains benzoic acid, which renders uric acid soluble, converting it into hippuric acid and lithium urate, which promotes its expulsion from the system. It is important that the base should be lithium and not potassium or sodium. And it is also better that the acid used in the preparation of the compound should be that obtained from benzoin. The dose is from one to ten

grammes (15 to 150 grains) a day, given in divided doses, dissolved in water. In the interval of the attacks a daily dose of 15 grains is sufficient; but on the first approach of an acute attack it should be rapidly increased in order to hasten the transformation and expulsion from the organism of the uric acid and the urates."

In ordinary cases (not severe) where the benzoate of lithium is used I have found that quarter-grain doses of the chemically pure drug are quite sufficient to decrease acidity of the urine, increase the flow and the quantity of urea.

Alexander Haig has shown that not only the acid in wines or beer but other forms of acids diminish excretion of uric acid and cause pains from retention of uric acid in the system. He has also shown that while *pure* phosphate of sodium is a solvent of uric acid and increases uric acid excretion, all specimens of the drug do not act equally well. He has shown that a certain form of headache is accompanied by a very large excretion of uric acid. Dr. Haig has also attempted to show that, within certain limits, it is possible to increase or diminish the excretion of uric acid at pleasure, by means of acids and alkalies. Alkalies always increase, acids invariably diminish the excretion.

The form of headache alluded to is curable by a dose of salicylic acid. It would appear that salicylic acid forms an important exception to the above statement, for, while it increases urinary acidity, it does not in any way diminish the excretion of uric acid. Further, acids given while salicylates are present in the circulation have no longer the power of diminishing the excretion of uric acid. This action of salicylic acid and salicylates is of great importance in explaining the value of these drugs in gout, rheumatism, and other diseases connected with uric acid. Excessive excretion of uric acid taking place under salicylates is not accompanied by any headache, and salicylates have previously been found useful in this headache. The action of acids and alkalies on uric-acid excretion is probably due to the fact that alkalies increase and

acids diminish its solubility, and the same with the exceptional action of salicylic acid; for salicyluric acid, which it is supposed to form, differs from uric acid in being very greatly more soluble in water, and probably also more soluble in dilute acid.

See also " Renal Colic."

OXALURIA.

Etiology:—Obscure. Under nearly same conditions one patient is lithæmic while another is oxaluric.[1]

Diagnosis:—Patient voids urine which *soon* deposits crystals of calcium oxalate. In patients subject to oxalate calculus, I have found the crystals in the sediment as soon as the latter settles. Crystals found at the end of 24 hours may signify nothing. Freshly voided urine should be examined. The symptoms of oxaluria have already been given (see " What to do when renal calculus is suspected "). Large crystals of calcium oxalate may almost always be found in the deposit of urine containing spermatozoa.

Diet:—Patient should avoid articles of food known to contain oxalic acid, as for example, rhubarb, sorrel, cresses, tomatoes, and fruits rich in citric, tartaric, and malic acids, especially apples and currants; champagne and Moselle

[1] Many deny altogether that there is a distinct disease of nutrition which leads to increased excretion of oxalic acid in the urine, and attribute the sediments to use of certain fruits and vegetables.

wine and beers, especially strong ones, are to be strictly abstained from. If alcoholic stimulants are required brandy, whisky, and gin are to be preferred. Stale or toasted bread allowed, but no flatulent vegetable food. Tea in moderation, but no coffee. Diet in other respects liberal, but cooking plain; sugars, pastry, etc., to be avoided. Picard advises food rich in phosphates, such as fish-roe, calf and mutton brains.

Beaumetz advises patients to avoid tea, coffee, chocolate, coca, coarse bread, spinach,—quoting Esbach's table.

The best waters for the oxaluric are those containing very few solids. *Pure distilled water*[1] or very soft water is the best. The patient should avoid alkaline waters and all waters containing lime. It is well known that nearly all American mineral waters contain a considerable percentage of lime.

Out of door life in the mountains is suitable to the oxaluric, but in regions where it is dry, as for example, in New Mexico.

2. Medicinal:—Treatment should be directed to the relief of catarrhal conditions, if dyspepsia is associated with more or less persistent deposits of calcium oxalate. *Carlsbad salts*, in doses of a teaspoonful dissolved in

[1] Thanks to American enterprise, *pure* distilled water is now an article of commerce.

ten to fifteen ounces of water as hot as the patient can bear it, should be taken every other morning an hour before breakfast.

Remedies:—There are no " specifics."

The general treatment for nephro-lithiasis may be tried with selection from the following, according to symptomatology: *Arsen.*, *Aspar.*, *Calc.*, *Cann. Sat.*, *Erigeron*, *Silica*, *Zinc*, probably also *Bell.*, *Canthar.*, *Phos.*, *Sarsap.*, *Sep.*, *Tabac.*, *Uva Ursi.* Remedies directed to the relief of the dyspeptic conditions are of most value.

Oxalic Acid:—Acid urine with uric acid and calcium oxalate in the sediment, burning pain during micturition. Milky white sediment, with pains in region of kidneys.

Washing out the stomach is serviceable in some cases. The use of a *cold-water compress* over the abdomen at night is recommended by Ralfe, not only for relieving the abdominal catarrh, but for protecting the patient against a return of the malady.

[Nitro-muriatic acid is a favorite prescription with those relying on ponderous doses. When there is acidity of the alimentary canal, Picard advises carbonate of magnesia.]

FORMATION OF PHOSPHATIC SEDIMENTS.

Etiology:—Causes which tend to make urine alkaline. Urine alkaline from fixed alkali is found in cases of general debility, where there is feebleness in respiratory action, diminished secretion of bile, flatulent dyspepsia. Urine alkaline from volatile alkali is found in disorders of the conducting and collecting portions of

the urinary tract. Urine persistently alkaline from fixed alkali after a time may become alkaline from volatile alkali, due to decomposition of the urine within the urinary passages, and conversion of the normal constituent urea into ammonium carbonate.

Diagnosis:—Test the sediment for phosphates as directed p. 26 (*d*), observing whether the urine is alkaline from *fixed* or from *volatile* alkali. Look for crystals with microscope (pp. 49, 52), especially for triple phosphate, in urine a *few hours* after voided, but not so late as 24 hours, especially in hot weather. Cause patient to urinate into a *perfectly clean* vessel. The best vessel for such purpose is a neckless glass pitcher, six or more inches in diameter at the top, which can be thoroughly cleaned with scalding hot water, inverted, and allowed to drain till dry. Observe also whether the urine, when boiled, as in testing for albumin (p. 13), but *without* acetic acid, throws down a white precipitate, readily dissolved with effervescence on addition of two or three drops of 20 per cent. acetic acid. Such urine, even if of acid reaction before being boiled, is deficient in acidity. There may be no great sediment of phosphates in such urine. [If there is no sediment of phosphates and yet there are obscure nervous symptoms, it is well to estimate the total quantity of phos-

phoric acid, using the volumetric process with uranium nitrate.]

TREATMENT OF PHOSPHATURIA.

1. *Urine alkaline from fixed alkali:* — Sediment of earthy phosphates. Urine usually alkaline when first passed, effervesces, and clears on addition of hydrochloric acid. Creamy discharge of phosphates at end of micturition, with considerable irritation at neck of bladder. Or slightly acid urine, becoming turbid when boiled, turbidity soluble in acid. Patient usually debilitated and suffering from flatulent dyspepsia.

Diet:—The diet is that of *flatulent* (not *acid*) dyspepsia in general. Patients should masticate their food thoroughly. All food should be tender, easily digested, and well cooked. Meals to be taken with regularity, and the intervals between them not too prolonged ; in some cases patients should eat a little something every three or four hours, before going to bed, and on rising in the morning. Patient to avoid milk, taking cream instead, in tea or coffee, the latter being sparingly taken. Alcoholic drinks to be avoided. If absolutely necessary, a tablespoonful of brandy, diluted with two of water, at the principal meal.

Mineral waters and fluids in general to be avoided *at meals ;* a small tumbler of Apolli-

naris allowed. Fluids, as, for example, Vichy water, to be taken two hours after meals, but not if there is intestinal flatulence with oxaluria.

Other measures:—Ralfe advises use of the cold, wet compress before patient goes to bed; or, in the case of delicate and feeble patients, a little tea, with toast, is given on first waking in the morning, and the compress is applied; three hours later the compress is removed, and the skin gently rubbed with a bathing glove or Turkish towel.

Remedies:—Bismuth may be given before meals, and pepsin after. When there is great fœtor of the stools, vegetable charcoal, the latter taken *before* meals if the flatulence is in the stomach, or *after meals* if in the intestines. In highly flatulent cases a drop or two of chloroform in a teaspoonful of glycerine, after meals, often gives relief when there are cramps and spasmodic pains.

Sulpho-carbolate of soda:—Patient complains of pain, often most marked on one side of abdomen, generally the left, under the ribs. [5 to 10 grain doses immediately before or after food.]

Other remedies are: *Nux Vomica, Phosphate of Strychnine, Carlsbad Salt, Terebinthina* (drop doses). Systematic employment of Carlsbad Salt, a teaspoonful in 10 to 15 ounces of as hot

water as patient can bear, every other morning, an hour before breakfast.

2. *Sediment of earthy phosphates, coupled with increase in total phosphoric acid above normal.*[1] The symptoms are as follows: Great nervous irritability; derangements of digestion; possibly great emaciation; aching rheumatic pains in loins and pelvic regions; dry, harsh skin, with tendency to boils, and ravenous appetite; possibly cataract; polyuria, or normal quantity of urine, with high specific gravity.

Excessive elimination of phosphoric acid, associated with nervous derangements, or with phthisis, is a difficult disorder to control; prognosis unfavorable. Excessive elimination of phosphoric acid, running a course like saccharine diabetes, but without sugar, or alternating with saccharine diabetes, is more easily managed; prognosis more favorable. *A sediment of earthy phosphates in the urine is not necessarily of any clinical significance whatever, unless the total amount of phosphoric acid in the urine is increased.* This can be ascertained by quantitative analysis only, with uranium nitrate solution, care being taken to use a specimen of the mixed urine of 24 hours. The great feature is considerable and constant elimination of phosphoric acid, with or

[1] Normal quantity of phosphoric acid in 24 hours is 2.5 to 3.1 grammes. In some cases of disease the quantity may rise to 7, 8, or even 9 grammes.

without increase of the other constituents of the urine.

The *treatment* consists chiefly in enforcing rest and promoting nutrition. The remedies are: *Ferrum*, *Phosphorus*, *China*, *Nux Vomica*; if syphilitic history, *Kali Iod.* Warm baths, followed by tepid douches, give great relief to the neuralgic pains. Alcohol and coffee to be avoided. Food light and nutritious; milk advisable. Cod liver oil, maltine, and hypophosphites may prove serviceable. Country air and massage.

For the severe rheumatic and neuralgic pains, Ralfe recommends codeia in full doses, one-quarter to one-third of a grain at night. During the day, hydrochloric acid, with nux vomica, and cod liver oil.

For consideration of sediments of triple phosphate, see "Cystitis."

TREATMENT OF RENAL COLIC.

Warm diluent drinks, *alkaline waters* in case of uric acid calculus; *pure distilled water* in case of oxalate calculus, *acid* drinks (solutions of boracic acid), if calculus be phosphatic and urine ammoniacal. Hot fomentations to loins; hot baths; emollient enemata; cupping of the loins.

If pain intermittent: Try external manipulation in renal regions or along course of ureter. During paroxysms, change position of patient.

Moderate open-air exercise. Diet to be regulated according to nature of stone. (See Diet in Uricæmia, Oxaluria, and Phosphaturia.)

During renal colic give *Belladonna*, if there are spasms and crampy straining along the ureter, as calculus goes down.

Cantharis (high) when intense pain above crest of ilium.

Drosera:—Writhing, twitching, crampy pains.

Arnica:—Piercing pains; patient chilly and inclined to vomit; violent tenesmus of the bladder.

Arsenicum:—When there is also gastralgia, tickling and itching in urethra from gravel, etc.

Tabacum:—Patient has violent nausea.

Nux Vom.:—For the effects of morphine.

Clinical notes:—*Calc. Carb.*, thirtieth trituration, has its admirers. So also has tincture of *Berberis* and *Pareira Brava*. Hypodermics of morphine have, however, found considerable favor, particularly with patients, who, as a rule, demand them. For the effects of the morphine give *Belladonna* and *Nux Vomica*.

Antipyrine in fifteen grain doses, frequently repeated, is advised by Tyson.

Morphine, opium, belladonna are given in ponderous doses. When, after repeated attacks, morphine fails to relieve, try antipyrine for a time. (Lund.)

If pain so violent that patient is in convulsions, or nearly, give chloroform or ether.

Various French authorities[1] claim that the paroxysms may be aborted by *sandalwood oil* in doses of 20 minims, followed by a hot bath.

Manipulation, without incision, in a case of stone in the kidney, when the latter is easily felt with the hand.

In patients attacked with renal colic, caused by uric acid calculi, Dr. Crittenden prescribes 20-grain doses of biborate of ammonium every two hours, until a free passage of urine takes place, and then every four hours until all ill feeling passes away. He then decreases the dose to 15 grains, three times a day, before meals, in a glass of flaxseed tea, and continues this treatment for several months, discontinuing it for a day or two at a time every two weeks. When given for a length of time, he states that he has found it to be a good plan to combine it with lithiated extract of hydrangea in teaspoonful doses.

Johnson at present recommends the carbonate, or citrate of lithium, to be taken in a tumbler of Bethesda water three or four times daily. In a very few days the pain and other distressing symptoms abate, and in a short time there will be evidence of the passage of a small calculus down the ureter, or through the urethra.

Sir Henry Thompson[2] gives the patient sub-

[1] Philbert, Gipoulon.
[2] *Calculous Disease*, 1888. Philadelphia: P. Blakiston.

ject to renal colic half a grain of blue pill, with three or four grains of compound extract of colocynth at night, followed next morning by three to four ounces of Hunyadi Janos, taken with a little hot, plain water; on each succeeding morning, six ounces of Carlsbad, with about two of Hunyadi Janos, and four of hot water, daily, until the end of the first week; subsequently, four to seven ounces of Carlsbad every morning.

Hæmaturia of Renal Calculus:—If profuse, rest in recumbent posture.

If slight, but prolonged, try cold local applications. Remedies: *Cantharis, Terebinth., Uva Ursi.*

Gallic acid and ergot are often given in ponderous doses. (See "Renal Hæmaturia.") *Hydrastinine* may be thought of.

When to operate for renal calculus:—As already shown the usual symptoms of renal calculus may be present and yet no renal calculus exist; on the other hand, renal calculus may be present without unusual disturbances. The question arises, therefore, in regard to the desirability of operation, which will not be discussed in full here, but the reader is referred to the conclusions of Henry Morris, quoted by David Newman.[1]

[1] *Diseases of the Kidney Amenable to Surgical Treatment.* London, 1888, p. 253.

Jacobson[1] calls attention to the following symptoms and conditions which justify nephro-lithotomy:

These are: 1, continued hæmaturia, or passage of blood and pus; 2, pain or tenderness in the loin or elsewhere; 3, points connected with the previous history, for example, family history, habitat, habits, lithiasis, oxaluria, passage of previous stones, renal colic; 4, frequency of micturition; 5, absence of any condition in the rest of the urino-genital tract to explain the symptoms; 6, failure of previous treatment.

Care should be taken not to confuse transient deposits of uric acid coinciding with suppression of acute nephritis, or alternating with albuminuria. In all cases examine the urine for albumin, casts, and tubal epithelium.

Bruylauts claims that decrease or absence of the *sulpho-cyanide of potassium* is a test of the lithæmic state.

Nephro-lithotomy for calculus *without suppuration* is, according to Newman, very successful. In forty-two operations no deaths.

Renal colic or uricæmia in children: Examine the napkins for reddish-brown stains. If the stream of urine is abruptly checked, suspect stone in the bladder or deep urethra.

[1] *British Med. Journal*, Jan. 18, 1890.

In young children prolapsus ani, priapism, and hæmaturia are signs of calculous disease.

Retention of urine in a child often means a concretion impacted in the urethra.

The prognosis is, as a rule, favorable. In the treatment of uricæmia in children and infants order copious drinks, warm baths, limitation of nitrogenous articles of diet, sodium phosphate and the phosphate of soda and ammonia (12 grains three times a day) and the benzoates.

Miscellaneous Surgical Measures: Bozeman, of New York, treats chronic pyelitis in women by *kolpo-uretero-cystotomy*, irrigation of the pelvis of the kidney and intra-vaginal drainage.

Before nephrectomy, Fenwick recommends collection of urine directly from the other kidney with view to ascertain its working capacity by means, in the case of male patients, of *suction of the ureters*.[1] This is accomplished by use of an instrument the principle of which is a slight suction, which is exerted on the ureteral orifice by means of a catheter and a small India rubber ball.

Fenwick believes that in certain cases the pelvis of the kidney may be washed out by distending the bladder with fluid in which pressure is exerted by means of a certain apparatus (the evacuator usually employed in lithotrity).

[1] See *Lancet*, Sept., 1886.

Iversen, of Copenhagen, by means of epicystotomy, with antiseptic precautions, and use of the cystoscope, has catheterized the ureters in the diagnosis of suppurative inflammation of the kidneys.

CHAPTER X.

Chronic Renal Tuberculosis. Carcinoma. Tumors.

After preparing the specimen as directed in Chapter II., look with a power of 750 diameters for minute rod-shaped bodies stained the color of the staining fluid used, 3 to 7 micromillimeters long, sometimes straight, more frequently curved or bent at an obtuse angle, frequently beaded, in bundles or singly.

Norderling, of Rockford, prefers the following process for staining: One part of aniline oil is thoroughly shaken for a few minutes with ten parts of distilled water, and then filtered through a filter previously moistened with water. To the perfectly clear solution is then added four or five drops of a saturated alcoholic solution of fuchsin. In this solution (fuchsin aniline water) is immersed the prepared cover-glass. The solution is slowly heated a few minutes, until vapor appears; then the cover-glass is taken out and washed in distilled water, and afterward immersed in a saturated solution of oxalic acid. It must remain here until it is completely decolorized, when it is taken out, dried, and immersed in a weak solution of methylin blue, until it has received a light-blue color (about one-half to two minutes). After this it is dried again, and examined in Canada balsam with a homogeneous immersion lens. All is now colored blue except the bacilli, which have a beautiful red color.

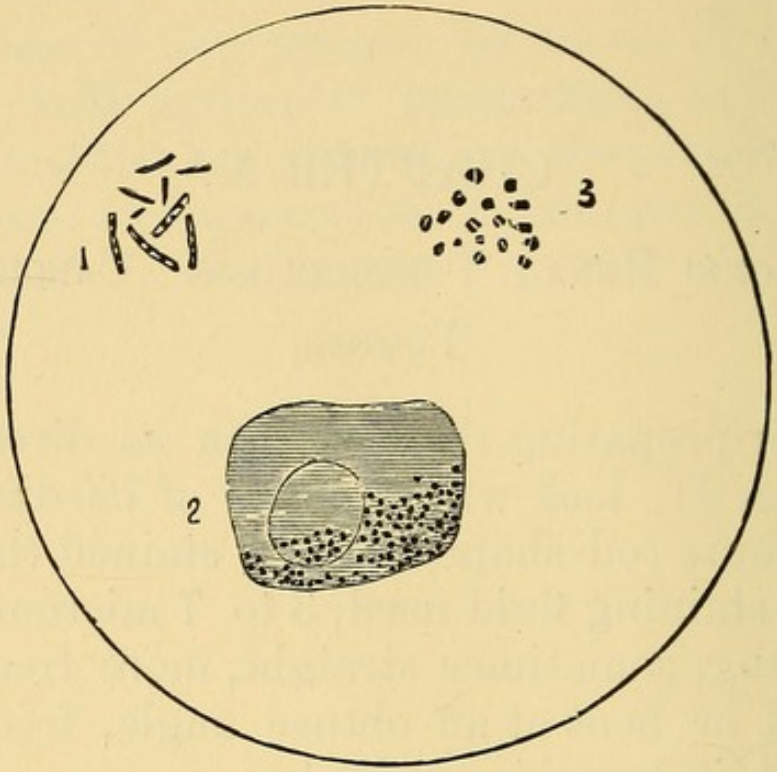


Figure 22.

Tubercle Bacilli and Gonococci.

1. Tubercle Bacilli. 2. Pus-cell with Gonococci. 3. Gonococci.

If tubercle bacilli are found, ascertain by ureteral catheterization, if possible, which kidney is affected, obtaining urine from each kidney and examining, as before, for the bacilli.

Symptoms of renal tuberculosis: If tubercular bacilli cannot be found—as is often, if not usually, the case—attend to the symptoms the patient presents.

The Urine:

1. Urine may present signs of pyelitis proper, with clear urine of acid reaction above sediment. Blood corpuscles may be found in the sediment, and a tinge of blood noticed above

the pus sediment. *The blood will be found in the night urine, as well as in the day.*

Albumin in early stages may be present in amount greater than blood accounts for. (Sometimes diffuse nephritis sets in, and tube casts are found.)

Later, when pus and blood more abundant, not so rapid and complete separation of the sediment from the urine, as in calculous pyelitis.

2. If the disease begins in the kidney and extends downward, the condition of the urine is that of pyelitis proper at first, as above; but if the bladder be invaded, the urine contains mucus, as well as pus, and the urine is no longer clear above the pus sediment, and the reaction becomes feebly acid, more often alkaline. The sediment does not settle completely but the urine is hazy, from mucus and suspended pus; is viscid, cloudy, and opaque. Albumin may possibly be no more than pus accounts for. The condition is now one of cysto-pyelitis.

The urine is likely to contain continuously a large amount of pus and granular débris; there may be cheesy masses, insoluble in acetic acid, shreds of connective tissue, beautiful meshes of elastic fibres from the cast-off patches of disintegrated mucous membrane.

It is always wise to suspect tuberculosis, if a pyelitis or cysto-pyelitis exist, without evidence

of stone. Examine the patient thoroughly for the following symptoms:

Micturition:—When the disease is advanced there is frequent micturition, and invariably with pain in bladder. The pain is severe at the middle of the flow of urine, increases toward the end and subsides immediately when the bladder is empty. Escape of blood with last few drops of urine is rare. There is no pain in the penis nor sudden stoppage in the flow of water as in the case of vesical calculus. Pyuria *without* pain on voiding urine excludes tuberculosis of the bladder.

Fever:—Temperature usually 2° to 4° higher at night than during day or intermittent periods of fever for several consecutive days.

Miscellaneous:—Profuse night sweats, emaciation, loss of appetite, exhaustion early in the disease, diarrhœa obstinate. Confirmatory testimony to be had from discovery of phthisis pulmonalis, tubercular disease of the bones and joints, of testicle, prostate and vesiculæ seminales, mesenteric glands, intestines, or lower urinary tract. Look for scrofulous scars, swelling of the testicles, with tense plastic exudation, for which there is no assignable cause; deep and difficultly healing rectal fistulæ. There may be renal colic from caseous masses, plugs of mucus, or from tubercular ulcers.

Physical Signs:—If urine is pale and of low

specific gravity, renal swelling, sometimes in greater part of one side of the abdomen, may be noticeable with indistinct fluctuation, pain, and general constitutional disturbance. Tubercular pyonephrosis, in other words. Complete suppression of urine may take place with uræmic symptoms. In many cases the order of symptoms is as follows :—

Backache, hæmaturia, and albuminuria; then a putrid, alkaline urine; later, swelling, pyuria, suppression, uræmia, and death. To distinguish from calculus: the evening temperature rises, hæmorrhage when at rest, more continuous discharge of pus, frequent urination, which is very painful when the bladder is affected.

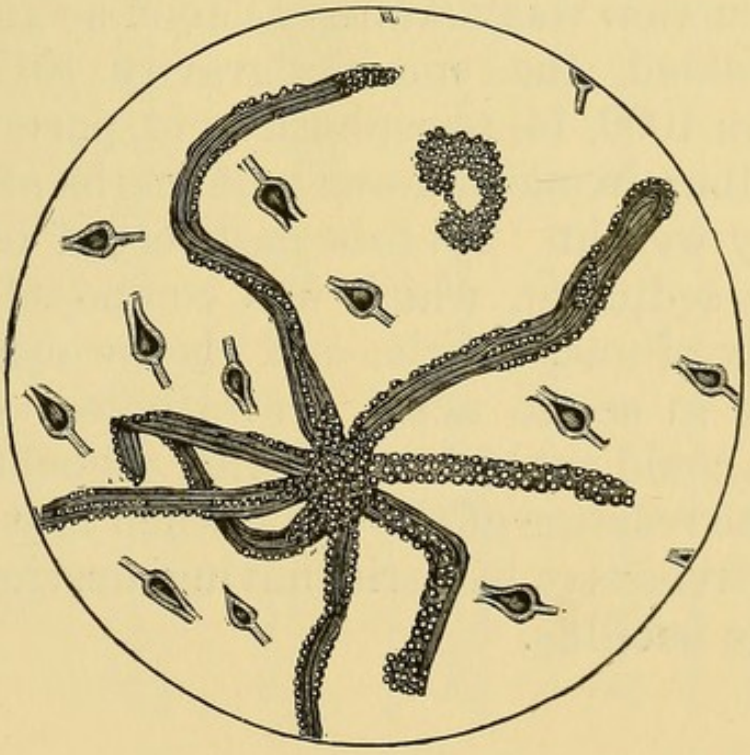


Figure 23.
Fungous growth of no clinical significance. Found in albuminous urine.

The prostate is probably affected before the kidneys, and as a rule the testicle or epididymis first. The epididymis first on one side and then on the other becomes swollen, hard, and then may suppurate. Cases have been known in which pale urine with albumin and casts have been found prior to signs of trouble in testicle or prostate.

In a case which I recently examined, there was family history of tuberculosis, and there were scrofulous scars. Patient complained of pain when bladder was full, ceasing when empty; the locality of the pain was the perinæum. He was obliged to urinate every three-quarters of an hour; the urine was voided into several glasses and all were equally turbid. The reaction was alkaline as soon as the urine was voided, the specific gravity 1017, urea, parts in 1000, 14, phosphoric acid, parts in 1000, 1.86, albumin one and one half tenths of one per cent by weight. No tube casts could be found in the sediment, which was composed almost entirely of pus, debris, and cheesy masses insoluble in acetic acid. Nevertheless tubercle bacilli could not be found, owing probably to the alkaline reaction of the urine when first voided, the putrefactive bacteria having destroyed the specific bacillus.

TABLE XIV.—Differential Diagnosis in Tubercular Pyelitis, Calculous Pyelitis and Renal Cancer.

Tuberculous Pyelitis.	Calculous Pyelitis.	Renal Cancer.
Pus in the urine abundant, early and continuous. Great quantities of vibriones and micrococci.	Pus in the urine in small quantities at first, slowly increasing. Preceded by mucus.	Little or no pus or debris.
Hæmaturia not frequent, slight, and in night urine as well as day. Frequently absent for long intervals.	Occasional attacks of slight, sometimes severe, hæmaturia after exercise, none at night, or after repose.	Hæmaturia usually light at first, but later profuse. Spontaneous, continuous, aggravated at intervals; and both after repose and exercise.
Pain:—Greatest in bladder, relieved when bladder is empty.	Pain:—Paroxysmal and radiating. Worse on motion.	Pain not affected by movements.
Pyrexia, marked.	Pyrexia not marked.	Pyrexia not marked.
Emaciation, loss of appetite, etc.	General nutrition good.	Loss of flesh, anæmia, cachexia.

Prognosis :—Unfavorable if bilateral, or extends from one kidney to urethra, ureter, or bladder. *Not immediately unfavorable*, if disease is confined to one kidney. Considerable time may elapse before it invades other parts.

Favorable, in rare cases: if unilateral, there is a chance that the lower urinary tract may escape; the diseased kidney may be destroyed by suppuration or dry up into a firm, caseous mass.

Treatment :—Surgical interference sometimes useful *early* in the course of the disease. If it is possible, by catheterization of the ureters, to discover that the disease is unilateral and if it is of small area, a lumbar incision may give great relief.[1] If the wound continues to discharge, nephrectomy, with scraping out of caseous material.

If the disease is unilateral, either by proof or strong presumption, and covers large area, nephrectomy as a primary operation may be performed.[2]

If the bladder is extensively affected, cystotomy may possibly prolong life.[3]

---

[1] In twenty cases of nephrotomy in tubercular disease, six died (Newman). In nine cases, two died (Guyon).

[2] In thirty-three cases thus operated on twelve died (Newman). In twenty-four cases eleven died (Guyon).

[3] Ralfe records a case (*op. cit.* p. 337) in which life was prolonged by this operation.

The strictest asepsis should be sought for in all operations.

Medical Treatment :—In later cases, and especially where the disease has invaded both kidneys, the ureters, bladder, etc., medical treatment must suffice, even washing out of the bladder being contra-indicated. The diet should be nutritious and digestible and the treatment that of tuberculosis in general:—

Cod liver oil, the iodide of iron, *Calcarea, Kali, Mercurius, Sulphur, etc., etc.* For the pyrexia, cold sponging. Diarrhœa should be checked, except possibly when there are uræmic symptoms.

MALIGNANT DISEASE—CARCINOMA.

Etiology:—More common in children and old people, in men than in women. Largest and most rapidly increasing growths occur usually in children.

Diagnosis:—Renal swelling, lumbar pain, pressure on neighboring parts, cachexia, signs of disease in regions beyond the kidney, changes in the urine.

Swelling:—See Table XIII.

Pain:—Usually dull ache, paroxysmal, but not affected by movements of the body. More severe in situation of affected kidney, but in later stages extends. If there is pressure on lumbar nerves, extreme pain is felt in the chest, lumbar region, back, hip, testicles, thigh, leg.

Pressure:—If on abdominal veins, then there may be œdema of lower extremities, ascites. Dilatation of superficial veins from occlusion or thrombosis of intra-abdominal vessels. If pressure on abdominal viscera, vomiting, constipation, anorexia, icterus.

Cachexia:—Significant loss of flesh, anæmia, change of color when patient has not lost much blood and has fairly good appetite. May not be noticed, however, in sarcomatous affections.

Micturition:—Considerable difficulty and pain in micturition in early stages and even when bladder is not affected.

Varicocele:—Guillet declares that an important symptom is the presence of *a suddenly occurring and rapidly growing varicocele.*

The Urine:—Normal, if tumor limited to kidney alone. If pelvis of the kidney involved, hæmaturia; deposit of blood corpuscles mixed, if with anything, with sanguinolent material, epithelium, portions of growth, etc., etc. *Hæmaturia constant*, both in repose and after exercise; albumin usually due to blood, but albumin more than blood accounts for, and blood casts may be found, if there is coincident nephritis. Hæmaturia rarely severe in early stages, with some exceptions. After it once starts likely to be profuse, spontaneous; continuous, subject to aggravation; formation of clots liable. Hæmaturia in elderly persons often precedes the tu-

mor; cancer cells not as a rule to be found. Sometimes it is possible by filtering the urine to obtain portions of the growth on the filter.

Differential diagnosis between renal tumors and those of other organs:—Renal tumors, according to Stiller, present the following characters:

1. Unilateral occupation of abdomen.
2. Spherical contour.
3. Downward growth. (Palpation reveals lower margin.)
4. Absence of any influence of the rhythmical movements of the diaphragm in breathing, when the tumor is fixed against the abdomen.
5. Relation to intestines: intestines lie over small tumors; in larger ones, are pushed toward median side.[1]
6. Presence or absence of tympany depending on amount of intestine covering the tumor.
7. Bulging posteriorly.

Prognosis:—In children, disease fatal in from ten weeks to a year. In adults, five months to seven years; average, two and one-half years.

Treatment:—

In general, *Arsenicum.*

If hæmaturia is profuse: complete rest, cold applications to lumbar region; internally, *Hamamelis*, *Secale*, *Ferrum*, *Ipecac*, according to indications; or, ten-grain doses of gallic acid

[1] *Ann. of the Univ. Med. Sci.*, 1889. G 31.

every four hours, with ice in a bladder to abdomen. Prevent tumor from dragging by flannel roller. Enemas for constipation, to avoid diarrhœa. Remove clots and coagula by gently washing out bladder.

For the pain: apply belladonna or aconite liniment; mixture of chloral hydrate and camphor. Opium by rectum. Subcutaneous injections of morphine acetate.

In certain cases nephrectomy may be performed early in the course of the disease, before it has spread.[1]

OTHER TUMORS.

The kidney may be the seat of sarcoma, adenoma, fibroma, congenital rhabdo-sarcoma, angioma, lipoma, lymphoma, osteoma, cavernous tumors, and gummata.

The symptoms of sarcoma are about the same as those of carcinoma, except that there is usually less pain, sometimes little or none, and more profuse hæmaturia.

Nephrectomy is accompanied by high mortality.

Adenoma may occur in early life.

Syphilitic gummata are not common, but are more frequent than formerly supposed.

FLOATING KIDNEY.

Synonym:—Movable kidney.

[1] In sixty-one operations there were thirty-three deaths. (Newman.)

Etiology:—Rapid wasting of the body. Violent concussions. Tight lacing. Hydronephrosis. Of much greater frequency among women than men; relaxation of tissues which comes of an inactive, sedentary life.

Diagnosis:—If the female patient complains of a feeling of "something loose" in that region of the abdomen which moves, for example, on turning over in bed, with a sense of dragging or gnawing at the spot, sometimes amounting to sharp pain; and if there is also distinct neuralgic pain in the course of the lumbar nerves, shooting round the abdomen to the hypogastrium, and down the thighs, examine the patient as follows: stand at the right side of the patient, place the right hand against the anterior abdominal parietes, and then press the left against the back of the lumbar region, so as to press the kidney forward. Then place the patient on her side, with the knees drawn up. By sharply shaking the body the kidney, if movable, will fall forward.

In both sexes in all cases with obscure abdominal pains, systematic search for a movable kidney ought to be made.

The right kidney is the movable one in the majority of cases.

Prognosis:—As a rule, causes no discomfort, produces no symptoms and requires no treatment. In some cases severe symptoms occur

which can be relieved by simple means. In a few cases such severe symptoms occur that operative measures are required, even nephrectomy as a last resort.[1]

Treatment:—Patient, if a female, to avoid dancing or riding, especially during menstruation. Tight lacing to be avoided. Bowels regulated so that no straining at stool. Prolonged rest in recumbent posture after delivery. Massage and electricity, properly applied.

Lindner[2] treats the abnormality by careful bandaging. Niehaus[3] has devised a pad to hold the kidney in place. Landau recommends an abdominal bandage or a peculiar "corset." A crescentic pad is the best.

In case symptoms of so-called *strangulation of the kidney* set in, to-wit, after some sudden exertion (though occasionally while at perfect rest) severe abdominal pain, great tenderness in the neighborhood of the kidney, frequently accompanied by rigors, nausea, and vomiting, urine dark and scanty: the patient should at once be placed in the horizontal position and an attempt made to replace the kidney. If the attempt fail put patient into a warm bath and try again.

Make hot applications, apply poultices, etc., etc.

---

[1] Ralfe.

[2] *Ann. Univ. Med. Sci.*, 1889, G. 22.

[3] *Ann. Univ. Med. Sci.*, 1889, G. 24.

In a few days, at most two weeks, according to Ralfe, it will certainly be possible to replace the kidney, the first sign of recovery being a copious discharge of urine, which may possibly contain pus.

If mechanical support cannot be borne or fails to relieve, Ralfe holds that where the symptoms are so severe as to incapacitate for the ordinary duties of life, operative interference is necessary and justifiable. Nephrorraphy is indicated in troublesome cases.

GENERAL TREATMENT OF RENAL HÆMATURIA.

If the bleeding becomes serious, absolute rest in bed in a horizontal position, while the pelvis is somewhat raised. Cold applications should be made in the vicinity of the kidneys, ice bags, etc. Internally, *Hamamelis*, in doses of thirty to ninety minims of the fluid extract; fluid extract of *Gelsemium*, fifteen to thirty minims. *Ergot* may be necessary, and may be given as follows:

℞ Extr. Secalis cornuti, - - - - gr. xv.
Sacch. albi, - - - - - gr. xxx.
M. F. pulv. Div. in dos. Nr. sex. Sig. one powder three times daily.

In this way the patient takes less than three grains of ergot in each powder.

Hæmoglobinuria requires *Ferrum* and *China* principally.

CHAPTER XI.

Suppurative Diseases of the Ureters, Bladder, Prostate, and Urethra.

If the suppurative disorder is not one of the kidneys or renal pelvis, study Tables X. and XII. still further, in order to make clear whether the pus or blood be derived from the bladder, neck of the bladder, or urethra.

URETERITIS. RENAL TENESMUS.

Before entering upon a study of cystitis, something must be said in regard to inflammation of the ureter.

Diagnosis:—The diagnosis must be made chiefly by exclusion. If there are no evidences of trouble elsewhere, and yet the urine contains pus and epithelial debris, especially in women, *after a cleansing injection*, it may be reasoned that the ureter is the seat, at least partially, of the inflammation. Often, however there occurs what is known as *renal tenesmus*, violent and painful contractions of one or the other ureter and corresponding pelvis of the kidney, with marked tenderness or soreness under pressure of the latter organ, proceeding from morbid irritability of both structures.

The pains occur in paroxysms, which vary in frequency, duration, and severity in different cases, according to the stage of the preceding ureteritis and the extension of the lesion to one or both sides. As a rule, it is confined at first to the groin on one side of the body, and afterward to the corresponding lumbar region. In the more severe attacks, the pain, besides being violent in these situations, radiates to the hip, the outer and inner sides of the thigh, the knee, leg, and even to the toes. Cramps of the muscles of the lower extremity on the affected side also occur in these severe paroxysms. In the well-marked cases, attacks of this sort come on daily, or even several times a day. They are most frequent and severe during the menstrual periods. The patients describe them as occurring most often during the night. They awake with a pressing desire to urinate; the emptying of the bladder is accompanied by more or less pain and spasm, and its evacuation is followed by a cramp-like pain, ascending along the course of the ureter to the kidney, and radiating to the lower extremity. The patient sleeps, as a rule, on the affected side, with the face turned toward the pillow, and it is the habit of many to draw the opposite thigh up over its fellow against the abdomen. The pain is excited in the early stages by the marital relation, which in nearly all cases becomes intolerable in the advanced stages of the disease.

Other symptoms are associated with the renal pain and the disturbance of the functions of the bladder. Anorexia, nausea, and vomiting are almost always present, especially during the menstrual periods, and as the attacks of vomiting are generally long continued, the vomited matters become stained with bile. Jaundice, even, is not an uncommon result. Hysterical symptoms form a marked feature of most of the cases. The patients start at the slightest noise, become despondent, cry, and laugh without sufficient cause, and sometimes have well-marked hysterical convulsions, followed by a period of unconsciousness. Finally, in the advanced stages of the disease, after years of almost ceaseless pain, when dyspepsia, loss of appetite, nausea and vomiting, torpidity of the liver, constipation of the bowels, and yellowish tinge of the complexion shall have supervened, the general aspect of the subject is that of inanition or starvation, from which, with continually increasing physical and mental sufferings, death puts an end to the roll.[1]

Differential Diagnosis between Renal Tenesmus and Renal Colic—An attack of *renal colic* continues, as a rule, with only short intermissions, until the calculus escapes into the bladder, and the concretion is afterward usu-

[1] Bozeman, *Medical Record*, Aug. 4, 1888.

ally discovered in the urine; the paroxysms, moreover, recur at irregular and usually long intervals.

On the other hand, the pain of renal tenesmus is less severe; it comes on more frequently, and the paroxysms, as we have seen, occur several times a day, and often from the most trivial causes. The most important diagnostic feature of renal tenesmus, however, is the facility with which an attack can be excited. When any doubt of the causation of the pain exists, it may be set at rest by making pressure over the ureter where it lies in the vesico-vaginal septum, or by injecting the bladder with warm water. The pressure of the water, when sometimes only a few ounces are used, causes an irresistible desire to urinate, which, if not promptly relieved, is followed by the pain along the ureter and in the kidney, even in the corresponding hip and lower extremities, down to the ends of the toes. The patients recognize the pain produced in this way as the symptoms which have been their chief source of suffering. The attacks of renal tenesmus brought on by either of these procedures may last for several hours or days, and are frequently accompanied by great mental excitement and hysterical manifestations. Hence the necessity of caution in adapting these means to the peculiarities of the case. (Bozeman.)

Prognosis —Essentially the same as pyelitis. When, however, there is renal tenesmus, the prognosis is less favorable, unless relief is obtained from operative procedure.

Treatment:—Ureteritis and renal tenesmus are the almost inevitable consequences of disease of the lower urinary passages. In the female, urethrocele, with cystitis following on it, leads to ureteritis; consequently, the *preventive treatment* of ureteritis is that of disease of the urethra and bladder. (See "Cystitis.") The treatment advocated by Bozeman of renal tenesmus, once established, is kolpo-uretero-cystotomy. An opening through the vesico-vaginal septum not smaller than a silver half-dollar is made, having specific and close relation to the outlet of the affected ureter and kidney.

Remedies:—The chief remedies in *ureteritis* are, *Aconite* in acute cases; *Arnica* when the result of traumatism; *Mercurius* if there is much pus. For the *renal tenesmus* see indications for remedies in the chapter on "Renal Calculus."

CYSTITIS.

Definition:—Inflammation of the bladder.

Etiology:—May possibly be a primary disorder, but is usually secondary to diseases of the spinal cord, injuries, etc.; or may follow inflammation or suppuration of the prostate, urethral stricture, urethrocele, vesical calculus,

pelvic or other abscesses, growths, etc., etc. Highly concentrated urine irritates the bladder, and may in the end induce cystitis. Symington Brown[1] claims that the so-called "hysterical" urine of low specific gravity, almost destitute of saline ingredients, is a common cause of irritation and pain. In women the larger number of cases arise from not emptying the bladder often enough.

Diagnosis:—Acute cystitis may be distinguished from acute nephritis by the abundance of ropy pus and mucus in the urine, by the comparatively small quantity of albumin, usual absence of blood, absence of casts.

Cystitis may be differentiated from suppurative nephritis by absence of severe constitutional symptoms, kidneys not enlarged or tender, etc., etc. See Table X., p. 219.

Cystitis may be differentiated from spasm of the bladder by the presence of mucus and pus, scalding urine, and absence of difficulty in passing water, except for pain.

Summary:—In cystitis, urine leaves the kidneys usually normal in amount of solids and in character, but in bladder is exposed to action of bacteria, and undergoes change. Reaction, therefore, faintly acid, neutral, or alkaline, even when first passed. Deposits an abundant sedi-

[1] *Amer. Pract. and News*, Feb. 2, 1889.

ment, usually leaving supernatant urine clear. In sediment we find pus, bladder epithelium, and sometimes some of the mucus from the mucous membrane, innumerable bacteria, in the form usually of short rods in active movement. Odor ammoniacal, quantity in twenty-four hours normal, or not increased. Viscid masses are found in severe cases in the sediment, which can be drawn out into threads, arising from pus-corpuscles and dissolved epithelium. Albumin, usually traces only, will be found in the urine.

WHAT TO DO IN CASES WHERE CYSTITIS IS SUSPECTED.

Collect total amount for twenty-four hours. Test the urine for albumin, and sediment for pus and blood. Take reaction. Calculate total amount of solids. Estimate urea in the freshly voided urine. Look for bladder epithelium in sediment. If the quantity in the twenty-four hours is normal, the amount of solids normal, the reaction neutral or alkaline, the amount of albumin small, corresponding to the pus, no tube casts and no dropsy or other symptoms of kidney trouble present, the trouble is probably not with the kidney, but the pus, blood, etc., are from the bladder. Kidney complications shown by deviation from standard of the quantity in twenty-four hours, solids, presence of considerable albumin, etc., etc.

Ammonium carbonate may be suspected by the ammoniacal odor of the urine, and a test for it may be made as follows: bore a hole through a cork, using a cork borer the thickness of a lead pencil, and fit into it a glass tube. Into the tube put a strip of moistened red litmus paper. Warm the flask gently, *avoiding boiling*, and if ammonium carbonate is present, the paper will be colored blue.

Next study the *cause* of the disorder, for purposes of prognosis and treatment. Obtain whatever history of the disorder is possible, and consult the following table:

TABLE XV. — The Urine in Diseases of the Bladder, Urethra, and Prostate.

Disease.	Quantity.	Color.	Sp. Gr.	Reaction.	Sediment.	Abnor. Constit.	Contents of Sediments.	Nor. Constit.
Cystitis, Acute, 1st Grade; as in inflammation of prostate, after gonorrhœa, etc.	Normal or not increased.	Normal. Turbid.	Normal.	Feebly acid; in a few hours alkaline.	Considerable; not compact, but diffuse.	Ammonium carbonate. Albumin not yet present.	Mucus. Bladder epithelium. Single crystals of triple phosphate.	Unchanged.
Chronic, 1st Grade; as in hypertrophy of prostate, hindrances to urination, requiring use of catheter, etc., etc.	Normal or not increased.	Wine-yellow. Very turbid.	Normal.	Acid when freshly voided; changes suddenly to alkaline.	Abundant diffuse. does not settle well.	Ammonium carbonate. Albumin not yet present.	Mucus. Bacteria. Bladder epithelium. Single triple phosphate crystals.	Unchanged.
Acute, 2d Grade; as in hypertrophy of prostate and acute prostatitis: after operations.	Normal or not increased.	Dark wine-yellow.	Normal.	Alkaline when freshly voided.	Greenish-yellow and gelatinous.	Albumin; haze with cold nitric acid. Ammonium carbonate considerable.	Pus, amorphous and crystalline phosphates, single blood corpuscles. Ammonium urate, bladder epithelium.	Urea decreased.
Chronic, 2d Grade; as in hypertrophy of prostate, paresis of bladder, serious strictures.	Normal or not increased.	Wine-yellow; turbid.	Normal.	Alkaline when freshly voided.	Greenish-yellow and glutinous; sometimes dissolved, making urine syrupy.	Albumin as above. Much ammonium carbonate.	As above. Pus corpuscles distended, nuclei coming out. Free nuclei, bacteria, single bladder cells.	Urea decreased.
Acute, 3d Grade; parenchymatous cystitis and pericystitis.	As in acute 2d grade.	As in acute 2d grade.	As in acute 2d grade.		Not glutinous.	Albumin more than pus or blood will account for.	Pus and blood.	
Chronic, 3d Grade; purulent catarrh, with ulcerative processes.		Dirty brown-yellow. Turbid. Odor cadaverous.	Lowered.	Strongly alkaline.	Dirty yellow. Glutinous.	Albumin. Blood coloring matter. Ammonium carbonate, ammonium sulphide.	Pus, blood. Phosphates. Bacteria. Detritus. Single cells of bladder epithelium. In croupous processes fibrinous plates.	
Cysti-spasmus.		Pale. Clear.		Faintly acid or neutral.	Slight.	None.	Calcium carbonate, crystalline calcium phosphate, amorphous earthy phosphates.	

Whenever a patient has cystitis, look first for stricture of the urethra or stone in the bladder. If neither condition account for the cystitis, next suspect enlarged prostate, especially in elderly patients.

The Cystoscope in Diagnosis: — Extraordinary progress in the diagnosis of urinary affections has been made of late by means of intelligent use of the cystoscope. For example, if, in hæmaturia, the bladder is found healthy, the source of the bleeding is to be sought for in the upper urinary passages. Moreover, by observation of the character of the urine issuing from each ureter, we may draw conclusions as to whether one kidney is affected, or both. Ulceration of the bladder, for example tuberculous, can be discovered and treated surgically. Foreign bodies are recognized. Fragments of stone remaining after litholapaxy are discovered. Sounding for stone in the bladder often fails to detect presence of a concretion which may be shown by the cystoscope. By its use the early diagnosis of tumors of the bladder is rendered possible. [The details belong properly to works on surgery. The reader is referred to Nitze's *Lehrbuch der Kystoscopie*, Berlin, 1889, and to Dr. F. E. Doughty's paper, *Transactions of the Amer. Inst. of Hom., 1890.*]

SUPPLEMENT TO TABLE XV.

THE URINE IN NEW GROWTHS OF BLADDER.

In *fibrous polypi* there is cystitis of second grade.

Medullary sarcoma may be characterized by urine of greenish brown color and putrid odor. In later stages there may be a third grade cystitis.

In *epithelioma* we find a cystitis of the second grade, sometimes of the third. In the sediment there are present blood, pus, small, round, or oval epithelial cells, sometimes caudate cells with two or three small projections, their nuclei large and brightly glistening, with several in the same cell. Sometimes ten or twelve cells may be found together, forming a shred.

In *villous* or *vascular* tumors the urine is normal in quantity, red-brown to brown-black in color, feebly acid reaction, but alkaline when tumor grows rapidly; the sediment is fine, flocculent, brownish in color, with reddish or large shreds; the urine is usually normal in consistence, but at times stiffens suddenly to a jelly-like mass; after long shaking, again becomes liquid and of slightly reddish-yellow color. Sometimes there are severe symptoms on micturition.

STONE IN THE BLADDER.

Small, smooth stone, as uric acid: first grade cystitis.

Large or rough, as phosphates or oxalate: second grade cystitis, with considerable hemorrhage; look for signs of kidney trouble or pyelitis, as concretions may be present in kidney pelvis. If the latter is the case, cysto-pyelitis with hemorrhage may be present.

PROSTATITIS.

Acute and chronic prostatitis: first grade cystitis.

Prostatic hypertrophy: first, sometimes second grade cystitis; where the hypertrophy is very great, spermatozoa in sediment.

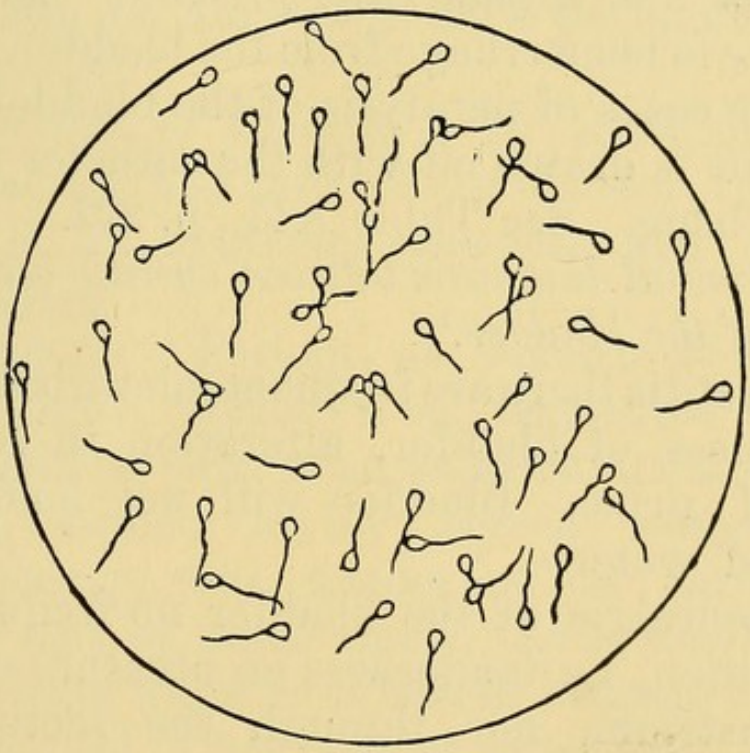


Fig. 24. Spermatozoa, X 400.

HEMORRHAGE FROM THE BLADDER.

Stone in the bladder: hemorrhage worse on exercise, "patient can ride in a carriage, but not walk." If complicating bladder catarrh is present: alkaline urine, triple phosphate, bladder epithelium, blood and pus corpuscles in the sediment.

New growths in the bladder: often hæmaturia alone with no other phenomena. In villous cancers, micturition sometimes painful. On washing out bladder and withdrawing liquid, pressure, as bladder becomes empty, will color the liquid with blood.

Varicose conditions, parasites, tuberculosis, croupous and *diphtheritic processes* may also give rise to hemorrhage from the bladder. Sometimes in cases of paralysis of the bladder, when the urine is drawn off with the catheter there is hemorrhage. See Table XII., p. 222.

Differential diagnosis between cystitis and neuralgia of the bladder.[1]

In cystitis there are frequent micturition, pain, tenderness of bladder, alteration in reaction, etc., of urine. Bladder will not hold much injected water.

In neuralgia of the bladder no frequency of micturition, no tenderness on pressure over the hypogastrium, nor through the rectum, nor

[1] Guyon in *Le Progrés Medicale.*

on introduction of the sound, but increased sensibility and resistance to the passage of an instrument through the membranous portion of the urethra. Bladder will hold considerable quantity of injected water.

Prognosis in Cystitis:—As shown by Table XV., there are three kinds of cystitis, viz.: acute cystitis, chronic cystitis, and so-called vesical catarrh, which is most frequent. The prognosis is usually favorable in the first two varieties, and in the third when it is due to causes which can be overcome. There is a tendency, however, for vesical catarrh to go on from bad to worse, and promises of a "cure" should not be indiscriminately held out, though much can be done to relieve the sufferings of the patient.

Treatment of Cystitis:—In acute pyuria of the bladder and neck of the bladder, the treatment is by hygienic measures and internal medication.

Hygienic: Patient, as regards *diet,* is to avoid highly spiced food, fermented liquors, black coffee, salt meat, salt fish, pork, lobsters, cheese, beans, highly spiced soups, fried food, pastry, sour drinks, unless carbonated. Water may be taken freely, but in *small quantities.* Lithia water is of benefit in some cases. A small cupful of hot milk or gruel may be taken at bedtime.

Constipation should be overcome by movement of the bowels at a regular hour daily, massage in the track of the colon, oat-meal at breakfast, and occasionally a small dose of sodium phosphate in water.

Rest in bed is a necessity, especially for female patients; attention to the position in bed should be paid, the pelvis being raised with graded cushions so that contact of the urine with the *trigonum vesicæ*, the most sensitive spot in the the bladder.[1] Warmth, both of clothing and of climate, is highly essential. If the patient with chronic cystitis has the means, he should spend his winters in the South; otherwise, if in the North, should studiously avoid exposure to cold.

Mineral waters:— In subacute and chronic cystitis carbonated *Silurian* water is recommended by Yandell.[2]

Clysmic is very generally used. In acute cases mineral waters are better avoided till the pain disappears; carbonated water and milk and decoctions of uva ursi may then be employed.

In acute cystitis warm demulcent drinks may be allowed.

2. *Medical treatment:*—The leading remedies are *Aconite*, *Cannabis Sativa*, and *Cantharis*.

[1] Symington Brown.

[2] *Amer. Pract. and News*, March 29, 1890.

Dr. John V. Allen[1] compares *Cantharis* with certain other remedies as follows:

Cantharis (compared with regard to pains, burning, etc.)—Pains in the bladder violent, burning and cutting, especially at the neck, with violent urging; pains extend to fossa navicularis, worse before and after urination.

Cannabis Sativa:—Burning, worse at the beginning and at the end of urinating, but most characteristically just after; burning in the fossa navicularis (cantharis, cutting,) worse when not urinating, compelling him to urinate almost constantly; the cutting pains extend from fossa navicularis to neck of bladder (cantharis, reverse), worse while urinating.

Capsicum:—Symptoms not so violent as those of cantharis and cannabis sativa; burning, of a smarting character, worse before, during, and after urinating.

Cantharis (compared with regard to tenesmus)—*Violent* tenesmus of the bladder.

Mercurius Corrosivus:—Marked tenesmus; dysenteric symptoms; aggravation at night; profuse sweat; large, flabby, indented tongue. See also Table X., p. 124.

Antimonium Crudum:—Tenesmus comes on at night so soon as he falls to sleep, and it arouses

[1] *Medical Advance*, Oct., 1889.

him, with cutting in the urethra while urinating.

Pulsatilla:—Tenesmus, with stinging pains and continued pressure on the bladder without desire to urinate; tenesmus, worse during urination: pains extend up the ureters.

Tarantula:—Tenesmus, the bladder seems swollen and hard, the pains are excruciating, and the passage of one drop of urine is impossible.

Cantharis (compared with regard to urging to urinate)—Urging almost constant; worse when standing, and still more when walking; better when sitting.

Ferrum Phosphoricum:—Frequent desire to urinate, with pain at the neck of bladder and head of penis; he must urinate at once; not much annoyed at night or when lying, but worse the more he stands.

In addition to the above named remedies consider, also, the following:

Belladonna:—Acute cystitis.

Lycopodium:—Chronic cystitis in the uric acid diathesis, especially in children, when bladder is irritated by urates.[1]

Lachesis:—Subacute cystitis.

Gelsemium:—Paralysis or paresis of the bladder in elderly patients or after diphtheria.

[1] H. N. Lyon, *Medical Visitor*, 1890.

St. Clair Smith relieved a case of puerperal cystitis with *Equisetum* 30, after *Cantharis*, *Prunus Spinosa*, *Pareira Brava*, *Uva Ursæ* and other remedies had failed.

Saccharin, internally, alternated with *Eucalyptus* or *Chimaphila* is Hale's prescription for chronic catarrh of the bladder.[1]

S. D. Johnson[2] relieved a case of tenesmus in cystitis with fluid extract of Chimaphila, twenty drops in half a glass of water, teaspoonful doses every hour.

In acute cystitis *hot baths* are of value. General irritation over the hypogastric region with heat there and in the perinæum will often relieve the pain.

Injection into the rectum, twice daily, of water at a temperature of 120° is mentioned by Palmer.[3]

In acute cystitis Gross' favorite treatment was by hops and infusion of uva ursæ.

Ultzmann gives 2 or 3 grains of lupuline with $\frac{1}{8}$ grain morphine, three or four times a day, or morphine suppositories for the urgency of urination.

If the pain specially affect the rectum and perinæum, a few leeches to the latter region will give relief. If suppositories are not well

[1] *The New Remedies*, 1890, p. 59.
[2] *Medical Current*, Nov., 1889.
[3] *Amer. Pract. and News*, 1889, p. 200.

borne, the bladder may be washed out with warm water containing 10 or 15 drops of laudanum.

In case of retention, use soft catheter.

Keyes, in acute (gonorrhœal) cystitis, insists on rest in bed with elevation of the pelvis, alkaline diluent drinks, an empty rectum, opium in the rectum, pichi, and a few drops of a ten grain solution of silver nitrate carried to the deep urethra.

According to Yandell, pichi is especially useful in subacute cystitis, and its efficiency is much increased by three pints daily of carbonated Silurian water. For gonorrhœal tenesmus, pichi is said to be invaluable.

Chronic cases:—To sterilize the urine, boracic acid internally in 10 to 20 grain doses, in chronic cases. It is claimed by Dreyfuss[1] that internal use of *salol* is greater in range of utility than injections of antiseptic fluids. Dose 20 to 60 grains a day.

Saccharin, in one grain doses, three times a day in water acidulated with lemon juice, is recommended by Hale.

In chronic cystitis the bladder is washed out with saturated solutions of boracic acid at 100° F; and, in addition, a dash of mercuric chloride, 1 in 50,000 used.

Chronic cystitis has been treated with great success by Mosetig-Moorhof, of Vienna, with iodoform injections. His method of treatment is as follows:

The bladder having been previously irrigated with moderately hot water, an injection of the following emulsion should be made:

[1] *Wiener Med. Blatt.*, Dec. 19, 1889.

℞.—Iodoform,	50 parts.
Glycerin,	40 "
Distilled water,	10 "
Tragacanth gum,	1-4 part—M.

In the treatment of chronic cystitis Ultzmann believes in efficient washing out of the bladder, with the after-employment of antiseptic or astringent solutions. In washing out the bladder a soft catheter is to be used. In most cases a simple India rubber tube is sufficient, one end of which is slipped over the end of any ordinary syringe. By nipping the tube the liquid can be retained or the syringe refilled without trouble. After micturition the soft catheter or tube is passed and any urine left behind drawn off. Several ounces of lukewarm water are now injected and the catheter is withdrawn a little so that the end is brought to the neck of the bladder. On now opening it the organ is completely emptied. The injections should be continued until the returning liquid is quite clear. The patient should stand during the process, for in this way the sediment is most readily evacuated. After the bladder is washed out antiseptic solutions may be introduced. (See, also, " Catheter Fever.")

Solutions used in washing out the bladder. These, as the schoolboy would say, are " too numerous to mention." Three per cent. solution of boracic acid is a favorite; ¼ per cent. cocaine, ½ per cent. resorcin, 1-6 per cent. carbolic acid, 5 per cent. sulphate of soda are used; also, 10 drops tincture of opium in 100 c. c. of water. Astringent injections are ½ per cent. alum, ¼ per cent. zinc sulphate or carbolate, 1-15 per cent. potassium permanganate, 2 per cent. tannin, 1-10 per cent. silver nitrate. When the urine is very offensive and strongly alkaline, any of the following may be used: 1-10 per cent. potassium permanganate, lukewarm water with a few drops of amyl nitrite, half a liter (one pint) of water containing 3 to 5 drops of amyl nitrite, 1-10 to 3-10 per cent. solution of salicylic acid, ½ per cent. creolin solution, 25 per cent. solution of peroxide of hydrogen. When there is a heavy sediment of phos-

phates, 1-10 per cent. solution of equal parts hydrochloric acid and carbolic acid, or 2-10 per cent. solution of salicylic acid, or 2 per cent. salicylate of soda.

In bacteriuria, 1 in 10,000 of corrosive sublimate.

Supersaturated solution of boracic acid may be made as follows: Add to 100 parts of boiling water 15 parts of boracic acid and 1 part of calcined magnesia; let cool. Lavaux has used this solution successfully in chronic cystitis when the ordinary four per cent. solution failed to relieve.

In severe forms of chronic catarrh of the bladder it may be necessary to use drainage, the patient lying in bed and the urine flowing off continually through a catheter introduced and tied to the penis.

CYSTITIS IN THE FEMALE.

Functional Disorder of Bladder or Urethra.	Real Cystitis.
Urine normal or nearly so	Urine loaded with triple phosphate and muco-pus. Alkaline in reaction.
Micturition frequent and painful, but relieved when bladder is empty.	Great and prolonged tenesmus. Pain and straining after water has all been voided.

Treatment:—If the trouble is functional, attend to causes. A displaced womb must be replaced and retained in its proper position; a diseased womb must be cured, rectal trouble relieved, a foreign body in the bladder removed, etc.

Chronic cystitis often proves to be a very difficult disorder to treat satisfactorily.

Dr. Madden, of Dublin, treats severe cystitis in women by dilating the urethra, which permits

a continuous outflow of the secretion. This treatment, together with mild washing of the bladder, usually effects a speedy cure. If not, the fundus and neck of the bladder should be wiped with a bit of cotton soaked in carbolized glycerine and passed through the dilated urethra. The use of cocaine will prevent the pain of the operation.

In general, before any operative interference is undertaken the urine should be normally acid; this can generally be accomplished by the free use of citric acid in the shape of lemonade or lemon juice and water; the mineral acids act more slowly, and benzoic acid

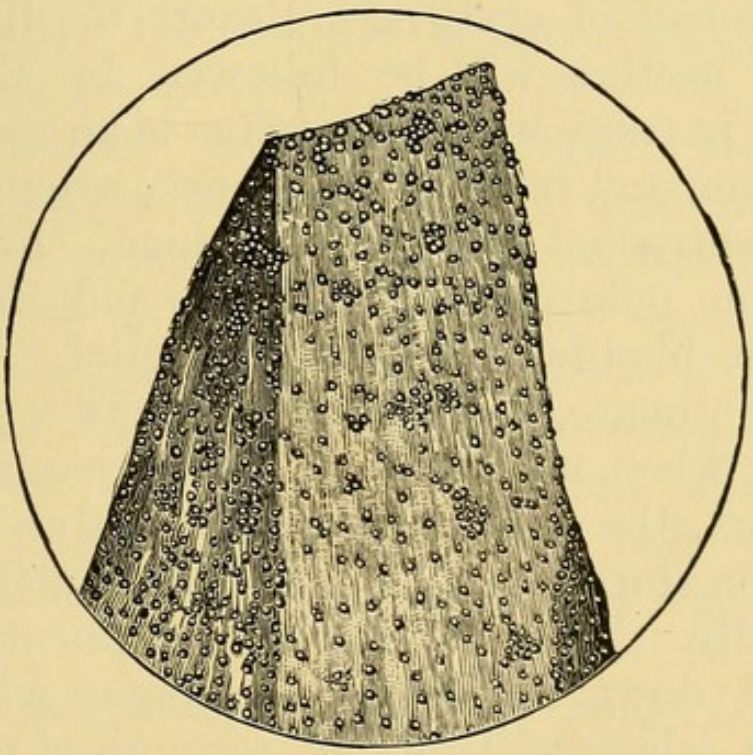


Figure 25.

Flake of amorphous calcium phosphate studded with blood corpuscles. X 400.

is not often well borne by the stomach if administered for too long a period of time. The use of citric acid in one day has been known to remove a thick phosphatic crust on the edges of a vesico-vaginal fistula, or on the wound through the perinæum in lateral lithotomy.

McGuire[1] treats obstinate chronic cystitis by drainage and dilatation of the urethra.

Symptoms present in a case of cystitis are often but an expression of the organ that there has occurred a lesion or a morbid process at a distance from the part seemingly affected. Anal and rectal inflammation are not uncommon causes of cystitis. Resort to dilatation of the urethra will be followed by the best results in cases where tenesmus is an important symptom, and in which the parts around have been contracted and hypertrophied. Faradism with one pole near the uterus and the other over the bladder gives speedy relief. Corrosive sublimate, 1 to 2,000, will often prove of benefit when no marked organic changes have occurred, the train of symptoms due to suppuration, fermentation, and the uncleanliness generally. No general rule of application can be laid down in all cases. Some will yield readily, others will defy all recognized methods

[1] *Canada Medical Record.*

of treatment, and can be cured or corrected only after the most ingenious and skillful operation.[1]

Dry heat in the treatment of cystitis in the female is advocated by C. Hoyt.[2] He uses the apparatus of Dr. Philip Porter, of Cincinnati. The bladder being emptied, a heater is introduced into it. The heater is similar in size and shape to the ordinary double canula catheter, but closed at the point instead of open. An even supply of hot water is furnished by means of the use of a tin vessel arranged on a bracket over a gas jet.

CATHETERISM AND WASHING-OUT OF THE BLADDER.

Whenever the bladder becomes sufficiently distended to produce pain and the ordinary remedies fail to give relief, recourse is to be had to the catheter. Before employing a soft catheter, it must be soaked for ten minutes in hot soap-water, and flushed out with it; then it is disinfected with a strong germicide lotion, preferably corrosive sublimate, from which it must be freed again by another flushing with salt water before it is anointed with iodoformized vaseline for introduction.

(The salt water should be tepid, and, in

[1] *Med. Record.*

[2] *Hahnemannian*, August, 1889.

strength, a teaspoonful of salt to a quart of water. The iodoformized vaseline should be 1:50 in strength.)

A simple India rubber tube is preferable for use in cases in which it can be passed.

After use, the catheter should be again flushed out thoroughly with carbolic or mercurial lotion, dried, and put away in a tight box or wide-mouthed bottle. If needed frequently, the catheter should be kept immersed in a five per cent. carbolic lotion. Before using, however, the adherent carbolic lotion must be always removed by washing in salt water.[1]

Injections may be made by use of an ordinary fountain syringe. Whatever solution be used the temperature of it should be 100° F. when it reaches the bladder, say 105° to 110° in the syringe.

In giving injections an ounce or two only of fluid at a time should be used first, and pain should not be inflicted. The water, after remaining in the bladder for a few moments, should be allowed to run out. It will bring with it at first whatever substance is mixed with the urine—always mucus—sometimes pus and mucus. The injection should be repeated until the water runs away clear. After a time there will either be an improvement in the bladder itself, or it

[1] Gerster.

will have grown accustomed to injections, when larger quantities of water, and often of much higher temperature, may be introduced.[1]

Catheter fever: In cases of chronic retention of urine, death sometimes results from removal of much urine.

According to Klophel,[2] in operations for the relief and cure of chronic retention of urine, the complete evacuation of all the urine at first should not be permitted, but rather the withdrawal of a few ounces, and the immediate injection of a solution of boracic acid, in volume equal to one-half of quantity of urine withdrawn, lessening at each succeeding injection the quantity of fluid thrown in, and increasing the amount of urine withdrawn. Thus, by regular gradation the bladder is emptied, and the circulation, in its abnormal walls, is accommodated by degrees to the new order of things. The same may be said of the ureters and of the kidneys.

It must be carefully borne in mind that in nearly all chronic diseases of the lower urinary tract, the kidneys become involved in time. (See "Suppurative Nephritis.")

TREATMENT OF HEMORRHAGE OF THE BLADDER.

Rest as in renal hæmaturia, with cold appli-

[1] Yandell, *in Amer. Pract. and News.*

[2] *Therapeutic Gazette,* 1890, page 160.

cations to the hypogastrium with the remedies *Hamamelis*, *Geranium*, *Ergot*, *Hydrastinine* hydrochlorate, etc. Empty the bladder with a thick Nelaton catheter and inject cold water or ice water, till the bleeding ceases.[1]

In severer hemorrhages, when the bladder is filled with blood clots and is distended, provided the patient can void urine still, and there is not retention, it is not necessary to interfere, for after a time the bleeding ceases, the blood clots cause catarrh of the bladder, the urine becomes alkaline and dissolves them. The patient should be kept perfectly quiet, narcotics being used together with ergot internally. If, however, the clots cause retention then the bladder must be emptied by an evacuation-catheter and astringents applied locally. If the bleeding still continue, a thick elastic catheter with large openings must be introduced and fastened, the open end dipping into a 5 per cent. carbolic acid solution. Every ten minutes injections of cold water are to be made.

In long continuing hemorrhages, as in new growths, etc., daily injections of silver nitrate 1:500 should be used. When the patient becomes less sensitive, 1:200.[2]

In all cases of intractable cystitis, bear in mind the possibility of stone in the bladder.

[1] Ultzmann, *Krankheiten der Harnorgane*, Vienna, 1888, p. 27.
[2] Ultzmann, op. cit. p. 28.

Failure to detect presence of stone by sounding should lead to the use of the cystoscope, if this instrument has not been thought of before. Post-mortem examinations often reveal stone in the bladder when the surgeon has during life been unable to detect it by sounding.

SUPPURATION IN THE NECK OF THE BLADDER.

Etiology:—Usually post-gonorrhœal, but also from unknown cause.

It is of help in the diagnosis, if the urine during one micturition be voided into *two* glasses, and it be observed whether that in the first glass be more turbid than that in the second, etc.

The albuminuria noted under "Suppuration in the Neck of the Bladder," Table X., disappears if the tenesmus be overcome by administration of narcotics. Inasmuch as the urine in cases of suppuration in the neck of the bladder (prostatic urethra) often contains more albumin than the pus accounts for, there is danger of mistaking the case for one of nephritis.[1] Moreover, the small, round epithelial cells from the neck of the bladder being swollen by inflammation, are not easily told under the microscope from altered renal epithelium (Ultzmann).

[1] Ultzmann seeks to explain the albuminuria of this condition on the theory that there is hindrance to the outflow of urine from the ureters.

Hence we cannot always rely on an examination of the urine alone.

First. Prove presence of pus in the urine, and find albumin more than a trace, often as much as one-tenth of one per cent. by weight. Prove absence of tube-casts and find none of the well-recognized symptoms of diseases of the kidney parenchyma.

Second. Prove absence of chronic pyelitis by finding urine of 24 hours not increased. (Make as many 24-hour collections as possible, the patient beginning on an *empty* bladder in the morning, rejecting the urine voided on rising the first morning but including that voided the second morning, and ceasing to collect thereafter.)

Third. Take note of the micturitions of the patient, whether about normal or very frequent and painful.

Fourth. Cause him to void the urine into two glasses. (See Table X.)

Now, if after some or all of these precautions in observation we find:

1. Pus and possibly blood in the urine, or pus-shreds streaked with blood.

2. Albumin possibly more abundant than pus accounts for.

3. Quantity of urine in 24 hours not increased but less than normal, or very much decreased.

4. Micturitions frequent; every fifteen min-

utes or half hour not unusual. Intense pain at beginning and at end of micturition, and exceedingly painful tenesmus with perhaps a slight flow of blood at the close of micturition.

5. Urine in first glass more turbid and containing more pus than that in the second.

6. No discharge from urethra.

The condition is due to inflammation of the *neck of the bladder*, and on exploration the maximum pain will be felt just as the instrument enters the bladder.

There may, however, be present in one case both catarrh of the vesical neck and that of the kidney-pelvis.

In such a case the pyelitis must have been either primary or secondary, and we must inquire at once for history as follows: *Primary pyelitis:* history of pus in the urine originally *without* frequency of micturition, tenesmus, etc., followed by pus in the urine *with* frequency of micturition and tenesmus as the process invades the vesical neck; lastly, pus in the urine again without frequency of micturition and tenesmus as the process ceases in the vesical neck but is still persisting in the kidney-pelvis. History of pain in the back and of fever. *Secondary pyelitis:* Acute, has history usually of recent gonorrhœa, stricture, prostatitis, hypertrophy of prostate, or paresis of bladder; chronic, shows great increase of

24 hours' urine, with absence of pain in back and of tenderness.

If acute secondary pyelitis exist at the same time with catarrh of the vesical neck, the diagnosis may be difficult as regards the pyelitis, but the vesical catarrh will show itself by increased frequency of urination, tenesmus, and the like. If there is also pain in the back, fever, and the characteristic pus "plugs," short, thick, cylindrical aggregations of pus corpuscles, are found with the microscope, the presence of pyelitis may be inferred. Chronic secondary pyelitis in a patient suffering from catarrh of the vesical neck may be suspected by the great increase in 24 hours' urine.

Treatment:—In acute cases the hygienic precautions and the remedies, *Belladonna, Cannabis, Cantharis*, etc., mentioned under Cystitis, are to be used. Surgical interference not desirable.

Chronic cases, as a rule, require surgical treatment, and often resist treatment altogether.

Chronic catarrh of the vesical neck occurs in individuals who have practiced masturbation for a long time or are addicted to sexual excesses; it is also found in the early stages of tuberculosis of the prostate or elsewhere.

Try warm sitz baths, and, also, full baths,

enemata of warm water (95° F.) or chamomile tea, twice or three times daily.

In chronic inflammation of the bladder we must discriminate whether the trouble is primary and isolated, or whether, in addition to the bladder, the vesical neck, posterior urethra or prostate is affected. If the latter be the case, as in young men, who, from gonorrhœa, contract chronic vesical catarrh, the neck of the bladder and the posterior urethra must be included in the treatment. This is best accomplished by introducing a soft catheter or small silver catheter in the bladder and then withdrawing it about an inch, so that the point of the catheter is in the neck of the bladder: with a small syringe the solution is slowly injected. The fluid enters the bladder but does not return into the catheter, as its fenestra is closed by the neck of the bladder. After all has been injected the catheter is withdrawn, and the patient empties the bladder spontaneously. If, on the other hand, the bladder itself is implicated, the fluid is injected through a catheter giving a double current and allowed to return. As the bladder is contracted, but a small portion of its mucous membrane will be reached by the fluid. It is best to inject the fluid through a soft catheter, using a syringe held in the hand. When irrigators are used too much fluid is introduced, and if the bladder is weak it may be dilated.

Only in rare cases of contracted bladder in young persons is this method useful. The precaution must also be taken to empty the bladder thoroughly after each injection. When possible, it is best if the patient stand during the irrigation. For irritable bladder Ultzmann advises lukewarm water with Tinct. Opii, cocaine one-fourth per cent., resorcin one-half per cent., carbolic acid one-sixth per cent.

Ultzmann irrigates the neck of the bladder with a short metallic catheter, using various solutions, as carbolic acid, 1 in 500; or alum, zinc sulphate, and carbolic acid (equal parts) ½ to 1 in 500 of water; or potassium permanganate 1-10 to ½, zinc sulphate 1 to 3 parts, in 500 of water; or fused silver nitrate 2-10 to 1 part in 500 of water. All solutions to be tepid. If no benefit is derived from irrigation, cauterization of the prostatic portion of the urethra may be necessary, for which purpose a solution of silver nitrate, 1 in 20, is used and applied by means of a drop-catheter (Ultzmann's urethral injector). Or a small suppository containing nitrate of silver may be deposited in the prostatic urethra by means of a porte reméde, a catheter-shaped curved instrument, provided with an obturator. Ultzmann directs five suppositories, to contain in all one-tenth of a gramme of silver nitrate, and begins the treatment with half a suppository. If there is annoy-

ing tenesmus of the bladder, iodoform suppositories may be used.

Finally, if no relief is obtained, the prostatic portion of the urethra may be cauterized with lapis in substance, either with Lallemand's *Porte Caustique* or by use of the endoscope.

It must not be forgotten that pyuria occurring in feeble or neurotic individuals is best treated by letting the urethra, bladder, etc., entirely alone and trying change of climate, diet, and surroundings.

FISSURE IN THE NECK OF THE BLADDER IN FEMALES.

According to Morris,[1] fissure of the neck of the bladder is apparently much more commonly met with than fissure of the anus, but seldom recognized. The fissure can be seen by gently distending the urethra with proper specula, and throwing in light with a head mirror. It is a narrow, grayish ulcer, similar to a narrow aphthous spot in the mouth. The primary symptoms are pain on urination, lasting tenesmus after urination, and frequent urination. Secondarily come catarrhal cystitis and nervous derangements. The ulcer may be caused by the compression of folds of urethral mucous membrane by a uterus out of place, from a scratch by a passing bit of gravel, or it may be simply microbic, as the aphthæ of the mouth are now known to be.

[1] *New York Med. Jour.*, Feb. 15, 1890.

Treatment consists in dilating the urethra slowly with the finger, to accomplish the same end as when we stretch the sphincter of the anus for fissure in that locality. Immediately after urination a few drops of a five per cent. cocaine solution injected at the neck of the bladder will at once control the painful tenesmus. The wool tampon for the vagina will give a feeling of great comfort and lessen tendency to spasm of the bladder. Absorbent cotton should never be used for the tampon, because when it became stony in a few hours it irritates the bladder just as it usually does the uterus.

The above treatment failing to cure, the bladder should be opened to give the urethra rest. This is best done by introducing a Sims uterine dilator through the urethra, pressing the bladder-wall backward, and then slipping a scalpel through the wall between the blades, entering from the vaginal surface. In one aggravated case recently, Morris opened the bladder above the pubes and poured into it, twice daily, an ounce of a mixture of boroglyceride and glycerin. Boroglyceride and glycerin is the best thing for any sort of hypertrophic catarrh. Clots in the bladder should be digested out with pepsin. If the bladder is acidulated with citric acid, pepsin will digest the thick tenacious muco-pus quickly, and give patients great relief. In old cases with contracted bladder, expansion

daily with Davidson's syringe and warm boric acid solution will gradually enable the bladder to hold a pint or more of urine.

HEMORRHAGES FROM NECK OF THE BLADDER AND PROSTATE.

Acute inflammations, erosions, and fissures are the chief causes. The bleeding may also be due to concretions in the prostate; prostatitis, injuries, or wounds of the prostate and vesical neck, and new growths are sometimes the causes.

Hemorrhage from prostate and vesical neck is characterized by absence of pain, except when urinating, and of general symptoms, absence of vesical irritability and of urethral disease, lack of tenderness on pressure upon the hypogastrium and perinæum, occurrence of hemorrhage chiefly in the morning, and after stool; absence of renal symptoms. Clots are fusiform, that is, wider in the middle than at the ends, and may escape with the first gush of urine. (Lydston.)[1]

Catarrhal ulcerations of neck of the bladder: Usually after gonorrhœa; hæmaturia shows itself toward the close of micturition.

Varicose condition of neck of the bladder: Sudden and profuse hæmaturia, so that the patient in one or two days is quite anæmic.

Hemorrhage from the prostatic urethra and vesical neck should be treated as follows:

[1] *Medical Era*, Dec., 1887, p. 364.

If the hæmaturia, as is often the case, is brought on by straining at stool, give Euonymine or laxatives in general which act on the liver; if there is urethral stricture, this should be attended to; finally, such remedies as Hamamelis, Ergot. The diet should be simple, bread and milk alone being advisable.

In some cases of hemorrhages from the vesical neck the spasm of the bladder is so great that narcotics may be required. If the hemorrhage is due to a fissure, astringent injections. In very profuse hemorrhages from the neck of the bladder, introduce a soft catheter and allow it to remain.

PROSTATIC DISORDERS.

Irritability and inflammation of the prostate are frequent between the ages of 25 and 50; 33 per cent. of all men over 55 have enlargement. In all cases of chronic urinary trouble introduce the finger into the rectum, and at a distance of one and one-half inches from the anus the prostate, if healthy, is felt in the median line as a body about one and one-half inches long and as broad as it is long.

Prostatic Hypertrophy:—The symptoms are as follows: Difficulty in emptying the bladder, the urine escaping in driblets; there is frequent desire to pass water, especially nights and mornings; the character of the urine is usually

unchanged, and there may be slight pain before passing it, but usually none afterwards. These are the early or premonitory signs of hypertrophy, and unless relieved increase in severity as the enlargement progresses. The patient reaches a stage where he finds it difficult to hold the water; the desire to pass it is imperative, and must be immediately attended to. This condition is produced by over-distention of the bladder, in which the urine accumulates on account of that viscus not being entirely emptied.[1]

Prostatic Congestion:—The symptoms are, complete retention of urine, accompanied by bloody urine, an increased temperature, quick pulse, and more or less pain and uneasiness in the region of the bladder. If the urine is not speedily evacuated through the catheter, putrefaction ensues, the tongue becomes dry and covered with a brown coat, the pulse becomes faster and weaker, and the patient sinks into a typhoid condition, which may end fatally.

Old men are more liable to these attacks than young men. It is not improbable that suppurative nephritis may rapidly follow in congestion occurring suddenly in old urinary cases.

Chronic Prostatitis:—The symptoms are: a frequent desire to urinate, with a feeling of

[1] *Therapeutic Gazette*, 1889, p. 375.

weight and heat in the perinæum, and a pain extending the whole length of the passage to the tip of the penis At times a few drops of blood will follow the water, and generally the patient suffers from frequent nocturnal emissions. The urine is cloudy, and deposits a muco-purulent mass after standing for a time. A rectal examination shows the prostate tender to the touch, and more or less enlarged.

Berkeley Hill[1] describes the use of the endoscope in the diagnosis of prostatitis and tubercle of the prostate. His observations on tubercle of the prostate are of special interest.

Prostatic Irritability:—In this condition there is always more or less complaint in regard to the urine, which feels hot, with a slight smarting or stinging sensation after passing; there is often a feeling as if the bladder was not entirely evacuated, which is true, as a very slight enlargement of the floor or middle portion of the gland, as previously remarked, interferes with the complete emptying of the bladder, and causes the last drops to dribble away after the stream of urine has ceased. This symptom is one indicative of the beginning of chronic hypertrophy.

A still more frequent symptom of hyperæsthesia of the prostate is the oozing out of a

[1] *Chronic Urethritis and Other Affections of the Urinary Organs.*

thin, transparent discharge, which is increased by any sexual excitement. This discharge, mostly composed of prostatic mucus, is not only very annoying but often alarms the patient, who mistakes it for semen.[1]

The Urine:—As already shown in Table XV. there may be various alterations in the character of the urine. Presence of prostatic cylinders, amyloid bodies, and Böttcher's rhomboidal, transparent crystals may make the diagnosis plainer.

Treatment:—Patient to be careful about excesses of all kinds and to live on simple nutritious diet, sometimes milk, avoiding highly spiced food, stimulants, etc., etc. Care must be taken in regard to exercise, which in irritable prostate should be moderate only. Remedies internally as already described. Rectal suppositories are of value in prostatic hypertrophy. Introduce every night at bedtime a rectal suppository containing potassium iodide, belladonna, iodoform, and mercuric nitrate. At the same time ointments containing various substances may be applied to the prostatic urethra by the instrument of Lallemande—*porte caustique.* The substances thus used are mercuric chloride, iodoform, belladonna, ergotin, cocaine, etc., etc.[2]

[1] *Therapeutic Gazette*, 1889, p. 371.
[2] *Therapeutic Gazette*, 1889, p. 377.

McGill, of London, opens the bladder above the pubes, and removes with scissors and forceps that portion of the enlarged prostate which prevents the outflow of urine.

URETHRITIS.

If the suppuration is in the urethra anterior to the compressor urethræ, there is never tenesmus or any uncontrollable desire to urinate, but merely a severe smarting sensation as the urine passes along the urethra. In acute urethritis the mouth of the urethra is usually swollen and reddened.

Treatment:—Catarrhal urethritis is usually of but short duration and often disappears in a few days if the causes of it, as catheterizing, masturbation, etc., are removed.

GONORRHŒAL URETHRITIS.

In cases of urethritis, obtain some of the pus which oozes from the meatus, and examine for the gonococcus (Fig. 22) in order to determine whether the condition be due to gonorrhœa or not. If the urine be examined for the micrococcus, freshly voided urine must be obtained, quickly filtered, and the pus on the filter examined as follows: A drop is pressed between two cover-glasses, spread out to a thin film upon a slide, and to it are added a few drops of a concentrated aqueous solution of methyl blue,

which is washed off in half a minute, and the cover-glass pressed between folds of filter paper dried over the alcohol flame and examined in Canada balsam (dissolved in turpentine) or in cedar oil. In examining with microscope remove the diaphragm from the microscope stage and use condenser, thus causing colored objects to become more prominent.

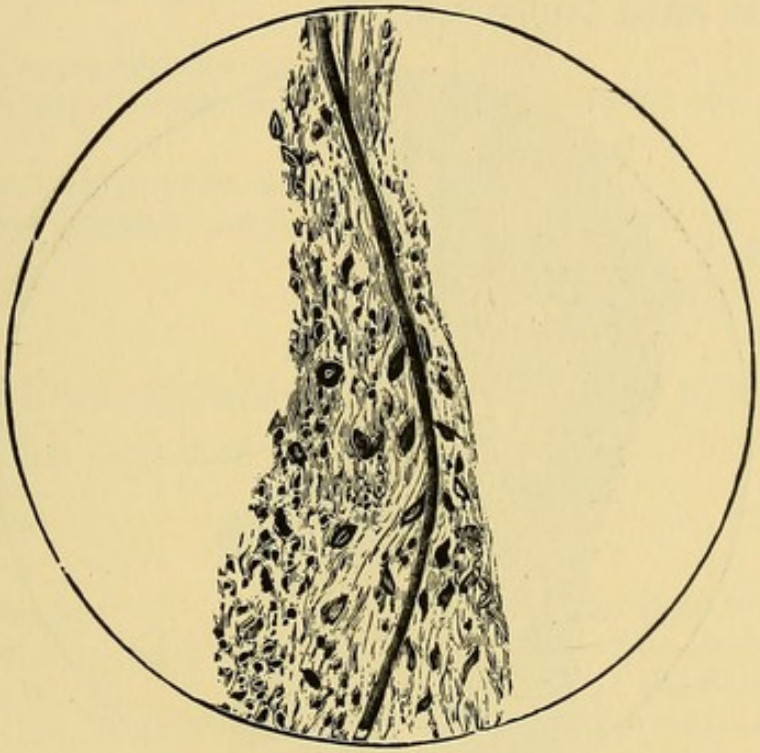


Figure 26.
So called "clap-thread" around a hair. X 150.

The gonococcus shows unmistakable characteristics, such as tendency of the specific cocci to aggregate; to be present wholly within the pus and epithelial cells, or wholly without them, never half in and half out, nor ever in the nucleus. After being stained with methyl-blue, a

solution of 5 minims of acetic acid in 6 drachms of water does not decolorize, whereas alcohol causes decoloration more rapidly than in case of other organisms.

Subsequent to gonorrhœa the so-called "clap threads" may be found in the urine. Figs. 26 and 27. In cases where they are found and there is no history of gonorrhœa, prostatic irritation is said to be shown.

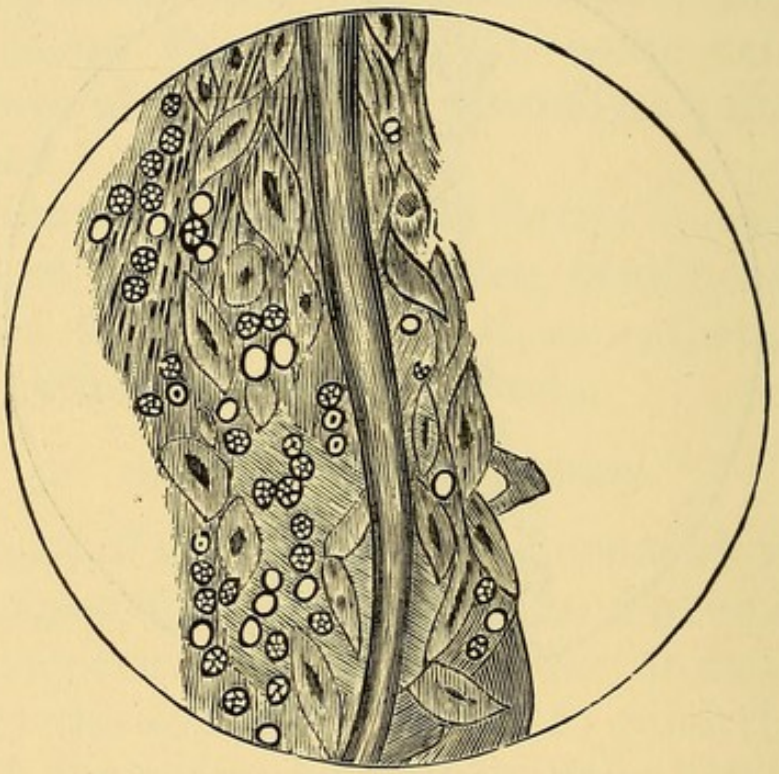


Figure 27.
So-called "clap-thread" and a hair. X 400.

CHRONIC URETHRITIS.

Inasmuch as this condition is usually dependent on gonorrhœa it will not be considered here. Berkeley Hill makes observation of the pathological condition by use of the endoscope, treating granular areas with silver nitrate solutions and indurated areas by gradual dilatation.

EXAMINATION OF THE PATIENT WHEN PUS IS FOUND IN THE URINE.

I. The examiner is to cause the patient to void urine into two glasses during one micturition, and to have the last few drops caught in a third glass.

Hints:

Urine in first glass most turbid.	*Urethritis or Prostato-Urethritis.*
Both glasses equally turbid.	*Cystitis.*
First glass turbid, second clear.	*Suppuration in the neck of the bladder.*
Last few drops very turbid.	*Cystitis.*
Last few drops bloody.	*Suppuration in the neck of the bladder. Tuberculosis. Chronic Prostatitis.*

II. The examiner is to note the manner in which the urine is voided.

Hints:

In driblets.	*Prostatic hypertrophy.*
Sudden stoppage.	*Stone in the bladder.*
In spurts.	*Spasm of the bladder.*
Retention, in children.	*Concretion in urethra.*

Look for swelling of the testicle (*tuberculosis*, when no gonorrhœal history), prolapsus ani, priapism (*uricæmia* in children).

III. The examiner is to note if there is any *pain*, and if so where and when.

Hints:

Pain in the end of the penis.	*Calculus.*
Pain in whole urethra as urine courses along.	*Urethritis or chronic prostatitis.*
Pain in whole urethra with weight and heat in perineum.	*Chronic prostatitis.*
Pain when bladder is full, severe in middle of urination and increasing till bladder is empty, then relief.	*Tuberculosis.*
Pain at beginning and at end.	*Suppuration in the neck of the bladder.*
Pain prolonged after urine is voided, tenesmus, etc.	*Cystitis.*
Pain paroxysmal and lancinating, but urine does not scald.	*Spasms of the bladder.*

CHAPTER XII.

Oliguria and Anuria. Incontinence of Urine. Motor Neuroses.

Oliguria is the discharge of urine much less in quantity than the normal for 24 hours. If it is a manifestation of Bright's disease, treatment should be that already described, pp. 118 and 125. The quantity of urine is often much decreased, not in Bright's disease, in debilitated women and lithæmic men. In the former case the treatment must be purely general and in the way of supporting strength. In the latter case, the general treatment for uricæmia is to be adopted.

Anuria (voiding of no urine at all) may be due either to *suppression* (arrest of secretion in the kidney) or to *retention* within the bladder. Suppression of urine occurs in children after "catching cold," in acute nephritis, and in any condition where there is renal hyperæmia, as in poisoning by cantharides, turpentine, lead, mineral acids, and irritants. Suppression may follow introduction of the catheter for the first time. It occurs a few hours before death from acute inflammatory affec-

tions, as typhus, small pox, etc. Also in conditions of shock or collapse.

Treatment of suppression depends on the cause. If due to acute nephritis, see pages 118 and 125. In renal congestion, *Terebinth* should not be forgotten. If due to taking cold, *Aconite.*

Digitalis in sudden suppression from cold or damp, or after scarlatina. *Apocynum, Cantharis, Eupatorium, Hellebore, Nitric Acid* may be indicated. *Cantharis* when there are inflammatory symptoms, etc. *Apocynum* and *Hellebore* when there is dropsy. *Arnica* when due to mechanical injuries. For diet, see page 114.

Anuria due to retention is usually gradual. The symptoms are dragging and pain in the region of the bladder; there may be a high fever, and perspiration of urinous odor. The distended bladder is uniform in development and may be felt not only in the hypogastrium but also in the rectum or vagina. If a finger be introduced into the latter, while, with the other hand gentle percussion is made over the hypogastric region, an undulatory motion can be felt.

Prognosis in retention:—If the urinary passages are healthy and obstruction sudden, as when calculus blocks the ureter of a solitary kidney, the patient may live from several days to twenty-one days. If, however, there has

been long-standing cystitis or pyelitis, suppurative nephritis will appear and the patient die in a few days, five or six at most. Death is indicated by typhoid uræmia, sub-normal temperature, etc. Hiccough is common.

In partial retention from enlarged prostate the case may run a protracted course.[1]

Treatment of retention:—Except in hysterical cases, the treatment is surgical. In hysterical cases, the various remedies for the general condition, as *Ignatia*, the valerianates, bromides, etc., etc. In other cases the cause must be ascertained: impaction of calculus is a frequent cause. (See "Renal Calculus.") If due to stricture or enlarged prostate, instrumental relief must be given at once. The catheter must be promptly used. Vesical calculus to be removed as soon as detected.

INCONTINENCE OF URINE.

Inability to hold back the urine is a condition which may occur in very different affections of the urinary apparatus.

According to Townsend the causes are as follows:[2]

I. Reflex.

(1.) Increased quantity of urine:

(*a*) diabetes, (*b*) nephritis.

---

[1] Ralfe, *op. cit.*

[2] *Ann. of the Univ. Med Sci.*, 1888, p. 489.

(2.) Irritant quality of urine:
(*a*) increased acidity, (*b*) uric acid crystals, (*c*) calcic oxalate crystals, (*d*) excess of phosphates.
(3.) Vesical calculus.
(4.) Hypersensitive state of external genitals from:
(*a*) stricture of urethra, (*b*) phimosis, (*c*) balanitis or vulvitis.
(5.) Anal irritation from:
(*a*) pin-worms, (*b*) fissure, (*c*) eczema.
(6.) Psychical.
(7.) Increased irritability of bladder.
II. Atony of sphincter vesicæ:
(1.) General debility.
(2.) Spinal disease.
(3.) Acute febrile disease.
III. Malformations of bladder or urethra.

To I. 4 may be added hypersensitive conditions of the external genitals due to inflammation of the vagina, vestibule, and urethra caused by masturbation. Small polypous excrescences about the meatus urinarius in girls.

WHAT TO DO IN CASES OF INCONTINENCE OF URINE.

First examine the urine as to its acidity, presence of crystals, sugar, albumin, etc. Next examine the external genitals and anus. Lastly examine the hypogastric region for signs of retention.

Remedies:—These must be given with an eye to the cause. If diabetes or nephritis be present, the treatment must be for these conditions. If due to over-acid urine, try Londonderry Lithia Water, Lithium Benzoate, or even Liquor Potassæ in small doses (2 to 5 drops in water). If there is an uric acid diathesis, see "Uricæmia." In cases where there are calcium oxalate crystals, see "Oxaluria." If due to phosphates, see "Phosphaturia." If vesical calculus be the cause (ascertained by sounding or use of cystoscope), the stone should be removed. If there is urethral stricture, surgical treatment should be invoked: dilatation with sounds.

In cases due to phimosis, circumcision, or when the prepuce is adherent, it is generally sufficient to break up the adhesions by stretching the prepuce and removing the smegma. Cases due to balanitis will require *Merc. Cor.*, *Merc. Sol.*, *Thuja*, and local applications, as Calendula; in vulvitis, *Arsenicum, Thuja, Mercurius.* If there is a polypous excrescence about the meatus, snip it off. Cases due to anal irritation should receive the care of an orificialist. When there are psychical causes the treatment becomes general, with hygienic and dietetic precautions, rest from work, cheerful surroundings, change of air, etc., etc. Where there is increased irritability of the bladder, Belladonna or Atropine.

Among the causes of incontinence of urine

and of other phenomena of micturition are the various *motor neuroses.*

MOTOR NEUROSES.

The motor neuroses of the urinary system are either spasmodic contractions or paralysis. *Dribbling of urine* after micturition is probably due to spasmodic contraction of the organic muscular fibres of the urethra throughout its whole length. Spasm of the external sphincter shows itself by more or less inability on part of the patient to urinate, though the impulse is frequent. The treatment is the daily passing of large metallic sounds, allowed to remain in from 5 to 15 minutes.

Spasm of the detrusors (cystospasmus) is shown by a frequent, though generally painless, impulse to urinate, for the most part only by day, but also during any sleepless nights. The urine is clear, pale, of low sp. gr., neutral or faintly acid, or even alkaline, and increased in quantity. The phosphates appear on heating. If the disorder is the result of gonorrhœa, we find short, thick shreds from the prostatic urethra. The treatment is to decrease mental work, prohibit sexual excesses, advise change of air, travel, sea bathing, agreeable recreation, etc., etc. Internally, *China*, *Ferrum*, *Arsenicum*, in the lower decimals. In severe tenesmus, morphine suppositories. If due to gonorrhœa, sex-

ual excess or masturbation, then passage of sounds, use of short urethral catheter, warm rectal injections, and warm baths.

Paresis of the bladder is shown by inability to empty the bladder completely. The diagnosis is made by passing catheter immediately after patient has urinated. The amount of urine then drawn off is a measure of the insufficiency of the bladder. Moreover patients complain that they have to wait long before urinating, pressing and straining; when the urine comes, it falls feebly down. There is no feeling of satisfaction after urinating. If the paresis pass gradually into paralysis, incontinence occurs, first at night but later becomes constant. The diagnosis between paresis of the sphincter and of the detrusor is made, according to Ultzmann,[1] as follows:

Paralysis of the Sphincter.	Paralysis of the Detrusor.
Incontinence of urine, early and in the day first.	Incontinence late and in the night first.
No retention.	Retention possible.
No distention.	Bladder distended.
No dulness over symphysis.	Several finger breadths of dulness over symphysis.
No resistance to catheter.	Powerful resistance.

The urine:—In paresis of the bladder the urine may be normal or neutral, or feebly alkaline, with a sediment of earthy phosphates.

[1] *Genito-Urinary Neuroses.*

Diabetes decipiens is sometimes an accompaniment. Gradually a purulent bladder catarrh comes about.

The *treatment* of paresis is as follows: in light cases when in strong persons slow and infrequent micturition is established, daily massage of the bladder, regular micturition at short intervals and with use of mineral waters containing salts of soda, as Carlsbad; regular exercise with cold rubbing of entire body, cold sitz-baths, douching of the perinæum and over the bladder and lumbar region, cold showers on the back immediately after coming out of a hot bath. [Internally, Ultzmann advises quinine, ergot, strychnine. The latter hypodermically, 5-100 of a gramme of strychnine nitrate in 10 c.c. of distilled water, one-half to a whole Pravaz syringeful daily, injected into the skin of the abdomen over the bladder; to be discontinued if muscular twitching, etc., appear.]

A thoroughly carried out regular course of catheterization with vulcanized rubber catheters is advised by Ultzmann. After some weeks or months of catheterization electricity may be used, one pole as a catheter-formed electrode being passed into the bladder, and the other placed over the lumbar vertebræ, or introduced into the rectum. Electricity should not be used too early nor at all, if there is purulent pyelitis or nephritis.

In paresis of the sphincter or when this predominates, the electrode need be passed only into the prostatic urethra.

Among motor neuroses, we find *enuresis* (involuntary evacuation of normal urine in children) often very troublesome. In some cases the urine dribbles constantly night and day.

Treatment:—The cause must be ascertained, but in children the following is, as a rule, of help: Cool sponge bath, with tablespoonful of sea salt added to the water every morning. Body briskly rubbed and especially in the region of the spine with a moderately coarse towel. Child to be clad in woollens next to skin and to have warm shoes; it should have as much fresh air as possible in fine weather and be allowed to exercise. But very little meat should be allowed and the quantity of drink should be restricted in the latter part of the day especially, no fluid being given after 4 or 5 o'clock in the afternoon. The child should be taken up to urinate late at night and early in the morning, and, if necessary, once during the night, in each case being thoroughly awakened.[1]

Remedies:—When there is irritability of the bladder, *Belladonna* in 10 to 20 drop doses of the tincture, or *Atropine Sulphate*, one grain in an ounce of water, given in doses of one drop for each year of the child at 4 and at 7, evenings, so

[1] W. M. Powell, *Annals of Gynæcology and Pediatry*, May 1, 1890.

as to have the pupils dilated during hours of sleep. The dose at bed-time need not be given if the child's pupils are well dilated (Baruch).

There are those[1] who claim success from belladonna and the bromides in cases where belladonna alone fails.

In the case of small, feeble children, great care must be taken in giving atropine.

When the case would appear to be due to lack of tone in the sphincter due to general debility, try *Rhus Aromatica*, especially in nocturnal incontinence of urine in children. Dose, from 4 to 10 drops of the fluid extract four times daily, gradually increased to from 8 to 20 or 30 according to age of child. May be given in a little sweetened water. Or children 2 to 6 years old may take 10 drops night and morning: other children, 15 drops. Its favorable effects may not persist.

Rhus Tox. has long been used.

Equisetum, *Eupatorium Purpureum*, *Pulsatilla* and *Gelsemium* are credited with cures.

Liquor Ferri Muriatici is recommended:[2] 2 drops in a wineglassful of water, tablespoonful every three hours during the day.

Ergot and electricity are used in cases of atony of the sphincter.

---

[1] *Ann. Univ. Med. Sci.*, 1889.

[2] *Homœopathic Recorder*, 1889.

In spinal cases, try *Strychnine*, third decimal.

In acute febrile disorders, the treatment should be directed to the febrile condition. If there is any reason for believing that there is congestion of the medulla oblongata, counter-irritation to the back of the neck, high up, in the form of dry cups, scarifications, or blisters.

Clinical note:

In the *Homœopathic Recorder* a case is reported cured by Sulphur 30: patient was a little girl, five years, with the following symptoms: Nocturnal enuresis, agg. during the full of the moon. Craves sweets; fretful; changeable; appetite changeable; don't care for meat or potatoes; urine very strong, staining yellow. Blonde, rosy cheeks, nervous temperament.

Ultzmann[1] holds that the best treatment is indirect stimulation of the sphincter vesicæ through the rectum. He uses the ordinary Dubois-Reymond sledge-battery, armed with one element. One pole of the induced current is a metallic pin size of a lead pencil and 7 c. m. long, with a wooden handle, which is well oiled and passed into the rectum. The other pole is an ordinary sponge-holder, which, in boys, is placed on the raphe of the perinæum, but in girls in the crease of the buttock. The current at first must be very weak and gradually increased. Sittings to be held daily, or every other day, and to last five or ten minutes. Treatment lasts 4 or 5 weeks.

The omnipresent *antipyrin* in two doses of 10 or 15 grains one at 6 and one at 8 o'clock evenings, is said to cure enuresis in two or three days.

EXAMINATION OF THE PATIENT IN MOTOR NEUROSES.

Impulse to urinate frequent, but more or less

[1] *Neuroses of the Genito-Urinary System*, translated by Gardner Allen, Boston, 1889.

inability to urinate: suspect *spasm of the external sphincter.*

Dribbling of the urine after micturition: suspect spasmodic contraction of the organic muscular fibres of the urethra throughout its whole length.

Frequent painless impulse to urinate during day and also during any sleepless nights: suspect cystospasm (spasm of the detrusors).

Long waiting necessary before urinating, with pressing and straining, urine falls feebly down, no satisfaction after urinating: suspect *paresis* of the bladder.

Involuntary evacuation of normal urine in children: *enuresis.*

CHAPTER XIII.

Diabetes Mellitus and Insipidus.

Does the urine contain sugar? Try the tests (pages 21 and 22) or especially the following:

1. Haines's[1] test:—Make the following test liquid: Pure sulphate of copper, gr. 30; pure water, fl. ounce, ½; make a perfect solution and add pure glycerine, fl. ounce, ½; mix thoroughly and add liquor potassæ, fl. ounces, 5.

A perfectly clear, transparent, dark blue liquid should result, which may be bottled and set aside for use. As usually made, it generally throws down a slight reddish deposit upon standing a week or two. This, however, does not affect its value as a test; in using, simply decant the clear liquid from the sediment.

Directions for use.—Take about one fluid drachm of the test solution and gently boil it, when no change should take place; now add six or eight drops of the suspected urine and again bring to a boil. If sugar is present, an abundant yellow or yellowish red precipitate is thrown down; if no such precipitate appears, sugar is absent.

---

[1] *Practical Directions for Clinical Urinalysis.*

N. B.—The white flocculent deposit thrown down, when non-saccharine urine is used in the above test, consists of the phosphates of calcium and magnesium of the urine, which the alkaline character of the test liquid has precipitated, and it should not be mistaken for an indication of the presence of sugar.

In applying the above test, never use more than eight or ten drops of the suspected urine; the use of a larger quantity is liable, at times, to lead to erroneous conclusions.

Haines's test has been found to be more delicate than that with Fehling's solution. Moreover the test liquid is perfectly stable, as Professor Haines has proved by recent successful use of a sample which had been in his possession for thirteen years.

The test is sufficiently delicate for clinical purposes and I will not here describe the phenyl-hydrazine test and hosts of others which are at present the subject of so much discussion pro and con.

2. Brücke's test:—freshly precipitated basic bismuth nitrate, 1.5 grams, mixed with 20 c.c. of water, heated to boiling and to it 7 grams of potassium iodide and 20 drops of hydrochloric acid added. This is known as Frohn's reagent. In order to test for sugar proceed as follows: put equal quantities of urine and of water into two separate test-tubes; to the one containing

water add hydrochloric acid till a drop of Frohn's reagent no longer produces cloudiness. Now add just as much hydrochloric acid to the urine as was added to the water, further add Frohn's reagent, and filter. The filtered liquid should not become cloudy on adding either hydrochloric acid or Frohn's reagent. Lastly boil the filtered liquid for a few minutes with excess of concentrated solution of caustic soda or potash, and, if a gray or black color results, sugar must be present.

Precautions in testing for sugar with solutions containing copper:—The mixture of urine and reagent must not be boiled too long, or partial reduction may take place due to presence of uric acid, hippuric acid, urates; much mucus, indican, hypoxanthin, glycuronic acid combinations, and much sugar in the urine of nursing mothers may sometimes render the test doubtful, especially if too much urine be added and the boiling kept up too long. The test may not succeed at all, especially if peptones be present in the urine. In all cases I set the tube aside for 24 hours before deciding. In urine containing peptones and sugar, the precipitate may not take place till 24 hours have elapsed.

Precautions in estimating the quantity of sugar by fermentation:—The method given in Chapter I., may not prove to be accurate, if the patient have taken some of the newer remedies now in

vogue. For example, saccharin, and other substances of antiseptic properties, if present in the urine, may retard fermentation in such a way as to render the estimation incorrect. Before making an estimation by the fermentation process, see that the patient does not take antiseptics internally.

WHEN TO TEST FOR SUGAR.

Examine the urine voided two or three hours after a meal, preferably the principal meal of the day. In mild cases sugar in considerable quantity will be found in the urine voided after a meal, when examination of the 24 hours' urine may give doubtful or negative results. In corpulent patients with lithæmic tendencies, watch the urine carefully for sugar. The onset of diabetes is often sudden and may escape notice. *Do not be too ready to blame a fellow practitioner for not detecting sugar.* In one case under my observation the urine was that of lithæmia for six months, except when under treatment. Suddenly sugar appeared in the urine. It was invariably found at a certain hour, but not always in the mixed 24 hours' urine.

If sugar is found, distinguish between *glycosuria* (symptomatic of some morbid condition other than diabetes) and true *diabetes mellitus.* Consult the following table:

TABLE XVI.

Differential Diagnosis Between Glycosuria and Diabetes Mellitus.

Symptomatic Glycosuria.	True Diabetes Mellitus
Cases not very common.	Common.
Sugar in the urine transient or intermittent.	Sugar persistent.
Very great fluctuations in amount of sugar and amount not heavy.	Fluctuations not so great and amount of sugar excreted heavy.
Influence of diet not so marked.	Diet exerts marked influence on amount of sugar.
Attendant upon some other morbid condition; functional derangement of the liver, result of plethora, gouty tendencies, conditions of debility or after diphtheria, blood poisoning, prolonged lactation, severe bodily and mental exhaustion, in weakness of old age. In women at "change of life."	No other morbid condition necessarily present.
Curable.	Relapses when restrictions of diet are relaxed.
Prognosis favorable in acute cases; unfavorable if tendency shown to become permanent and to pass over into confirmed diabetes mellitus.	Prognosis in general unfavorable; when uncontrolled by diet and medication, fatal within two years; mild forms may become suddenly aggravated and severe forms milder and stationary for a considerable period.

Early recognition of diabetes mellitus: whenever a patient passes more water than usual or is more thirsty than his fellows without apparent cause, the urine should be tested for sugar at once. If sugar is found in abundance and the quantity of urine ranges from six to twelve pints, the specific gravity from 1028 to 1045, the reaction highly acid and acidity increased by exposure to the air, the case should be at once referred to the table just given. In cases where the urine has not been examined but bodily debil-

ity is noted, the patient may notice whitish, sticky stains on his trousers, stockings, or boots which should direct his attention to his urine. The thirst of patients having diabetes mellitus is aggravated by starchy and saccharine food, and alleviated by repeated sippings of water, rather than by drinking large amounts at once.

If sugar is found in the urine, but there is neither weakness, thirst, nor excessive micturition, the disorder is probably *glycosuria* rather than diabetes mellitus, and especially in urines of specific gravity below 1020. "Cures" are most frequent in just such cases. Mild forms of true diabetes render the diagnosis often doubtful.

Diabetes Decipiens:—This term has been applied to a certain form of diabetes mellitus in which the urine contains sugar, but the quantity of urine is normal or below normal. The following analyses illustrate cases of this nature:

Case 1. Volume of urine in 24 hours, 625 c. c. Specific gravity, 1038. Urea per litre, 60 grammes. Urea per 24 hours, 38 grammes. Sugar per 24 hours, 13 grammes. In a second analysis I found urea 30 grammes in 24 hours, phosphoric acid, 2½ grammes. Patient, male adult, in fairly good general health.

Case 2:

	1st analysis.	2d.	3d.	4th.	5th.
Urine in 24 hours.	1080 c. c.	1620	1530	1320	1125
Specific gravity...	1040	1040	1040	1039	1034
Urea, per litre.....	....	....	16	14	20
Urea, per 24 hours	....	....	24½	18	22½
Phosphoric acid per litre.....	....	....	1.45	1.37	2.15
Phosphoric acid per 24 hours.....	....	....	2.21	1.7	2.41
Sugar, per litre....	64 gram.	61	67	.....	.....
Sugar, per 24 hours	76 gram.	100	92	82	35

Patient, female, adult, losing flesh slightly and complaining of debility. The first analysis shows that a considerable quantity of sugar may be present in urine below normal in 24 hours' volume.

Case 3:

Urine in 24 hours..	1040 c. c.
Specific gravity.....	1023
Urea, per litre.....	17 grammes.
Urea, per 24 hours.....	18 "
Phosphoric acid, per litre.....	1.10
Phosphoric acid, per 24 hours.....	1.16
Sugar, per litre.....	10.5
Sugar, per 24 hours.....	11

Patient, a pregnant woman, who went to full term, but child was still-born.

What to do in case of diabetes mellitus:—The quantity of urine in 24 hours should be collected as often as possible and measured, the specific gravity taken from time to time, and the quantity of sugar voided estimated. The only accurate method by which we may judge correctly

of the effect of our remedies, diet, and general treatment is by continued and systematic examination of the urine, and especially for the quantity of sugar, together with frequent weighing of the patient. If the case is stationary, the patient not losing weight and the amount of sugar in the urine not increasing, the condition may be reckoned, in absence of distressing symptoms, fairly good. Two forms of diabetes are usually recognized—one, the severe, in which the amount of sugar may be large, even 4 per cent., but in which the sugar is reduced more or less by strict diet: another, in which the percentage of sugar is less, and the sugar disappears entirely when the patient is put on a diet, but returns again when a mixed diet is resumed. The severe form may become milder, and the mild form much more severe.

Clinical method of estimating sugar with Fehling's solution:—Tyson[1] proceeds as follows:—One cubic centimeter of Fehling's solution is diluted in a large test-tube with four cubic centimeters of distilled water, and boiled as described for qualitative testing. Its purity being thus ascertained, 1-10 cubic centimeter of the suspected urine is added from a suitably graduated pipette. Heat is then reapplied, the precipitate watched, and then another 1-10 added, the

[1] *Practical Examination of Urine*, 6th Edition.

heat again reapplied, until it is found, after proper subsidence, that all the blue color is removed from the cubic centimeter of Fehling's solution. If, in doing this, 1 c. c. of urine has been added, it will have contained just half of one per cent. of sugar. If more than 1 c. c., it will have contained less than a half, but more than one-quarter per cent. If exactly 2 c. c. are used, it will have contained exactly one-quarter per cent. If, on the other hand, but half a cubic centimeter is used, it will have contained 1 per cent., one-quarter of a cubic centimeter, 2 per cent., and so on.

If the proportion of sugar is large, as indicated by the specific gravity or qualitative test, the urine should be diluted with a definite proportion of water, and this regarded in the estimation.

Fehling's solution is made as follows:—(*a*) Take pure sulphate of copper in crystals (preferably prepared by recrystallization a few days previously), roughly powder, press between folds of dry filter paper, and weigh off 34.639 grammes. Dissolve in moderately warm distilled water, and dilute the solution to 500 c.c. at the usual temperature, the solution being then kept in a well-stoppered flask.

(*b*) 173 grammes of Rochelle salt—sodium potassium, tartrate—in pure crystals, are dissolved in 100 c. c. of a solution of caustic soda of sp. gr. 1.34, and diluted to 500 c. c. with distilled water. This is preserved in a stoppered bottle, the stopper being smeared with paraffine so as to exclude the air. For using the solutions, exactly equal volumes of both are mixed and measured off with a pipette. On agitating, a

deep-blue liquid is obtained, of which 10 c. c.=0.05 gramme grape sugar.[1]

RELATION OF URICÆMIA TO DIABETES MELLITUS.

It has frequently been remarked that some mysterious relation seems to exist between uricæmia and diabetes mellitus. In one of my cases there were the usual manifestations of uricæmia in the urine for five or six months, when, suddenly, sugar appeared in the urine, during an indisposition, and since that time can be found persistently, *but only at a certain time in the day*, in the afternoon about four.

THE PROGNOSIS IN DIABETES MELLITUS.

It is probable that there are three kinds of diabetes:

First, "lean diabetes," so called, sudden, severe, and rapid, in which the prognosis is unfavorable. This form is thought to be accompanied by lesion of the pancreas.

Second, fatty, or constitutional, diabetes, which is an accompaniment of other pathological states, and in which the prognosis is better.

Lastly, traumatic, or nervous, diabetes, following nervous perturbation, traumatism, or shock; prognosis fairly favorable.

In general terms the prognosis is more unfavorable in young people than in the old. Mild cases sometimes suddenly become severe, and cases severe in the onset may grow milder. If, on modified diet and appropriate therapeutic agents, the patient appears about as well as

[1] For volumetric determination of sugar see any of the various Manuals, as Tyson, MacMunn, etc.

ever, both mentally and physically, and, although the urine contain sugar, the 24 hours' volume is normal, the chances are in favor of some years of life—six or more. If there is only a temporary improvement from diet and therapeutic means, and the patient becomes both physically and mentally weak, the chances are that life will not be prolonged beyond a few years at most.

Preynier claims that in diabetics in whom the tendon reflex is retained, surgical affections take a normal or slightly abnormal course, otherwise the prognosis is more unfavorable.

Unfavorable conditions arising in the course of diabetes mellitus.—Sugar is not controlled perceptibly by diet and medication; extreme weakness; lower extremities œdematous; tongue red, raw, and glazed; mouth and throat covered with aphthous patches; uncontrollable diarrhœa; acute inflammatory affection of the lungs, or, earlier in disease, chronic pneumonia. Sudden death from diabetic coma possible.

The urine, etc., in diabetic coma.—Examine the urine from time to time for *extreme acidity*, accompanied by sudden and unaccountable *diminution in quantity* of urine and in *amount of sugar*, especially if comatose symptoms have already set in. Odor of acetone (chloroform and acetic acid) in breath and urine of patient is noticed. Albumin in small quantity usually, but not invariably, found.

Early recognition of diabetic coma.—This is very difficult, and, in some cases, impossible, but it may be said in general that *any sudden improvement in objective signs not confirmed by subjective sensations on part of patient* should put the physician on his guard; reduction in the excessive appetite to below standard for healthy person; unexpected and unexplained loose movements when constipation has previously been the rule; peculiar acetone odor to breath already described; acid eructations and nausea, with or without vomiting; slave of general prostration and disinclination to exertion; tendency to drowsiness, during the day, and great despondency; attacks of intense vertigo, frontal headache, neuralgic pains; accelerated pulse, with or without decrease in volume. After variable period of indefinite symptoms like the above, the patient will complain of a feeling of depression, is restless at night, eats nothing, has colicky pains, vomits matters sometimes having acetone odor, has sense of constriction about thorax, causing deeper breathing than usual; mental condition varies from excitability to mild, talkative delirium, alternating with drowsy or stupid intervals.

[Gastro-intestinal derangements seem to stand in causal relation, and coma may follow any unusual strain on the digestion, as also after great fatigue, as of a railroad journey. If a

sudden onset of nervous symptoms is noticed when the patient has been put on a diet, it should be relaxed.]

Whether or not sugar has been found, try the ferric chloride reaction, as follows: Add a few drops of a solution of ferric chloride to the urine in a test-tube, and, if from excess of phosphates, the iron is precipitated in sufficient quantity to obscure the reaction, filter the contents of the tube and add a few more drops of the reagent to the clear fluid; if *diacetic* acid be present, a coloration results varying from a light claret to an opaque reddish brown, and dissipated by heating. When the above reaction is obtained, further test the urine for *acetone*. Ralfe's test for acetone is as follows: Boil 20 grains of potassium iodide in a fluidrachm of liquor potassæ; then float a fluidrachm of the suspected urine on the former. Where the urine comes into contact with the hot alkaline solution a ring of phosphates is formed, and, after a few minutes, if acetone or its allies are present, the ring will become yellow and studded with yellow points of iodoform; these in time will sink through the ring of phosphates, and become deposited at the bottom of the test-tube. Freshly-voided urine to be used.

In general, if the ferric chloride reaction is obtained, it is a sign that the diet is too strict, and that it should be relaxed. In one class of

cases no evidence of acetone is to be had, but in another acetonæmia is plainly marked. There may be acetone in the urine without diabetes, and the case is not necessarily fatal, *but no operation should be hazarded* (Churton).

Many of the drugs now given internally yield reactions in the urine with ferric chloride, which should not be mistaken for the diacetic acid reaction: for example, antipyrine gives a reddish color, salicylic acid a violet, thallin a purple, kairin a brownish-red, tannin a bluish-black.

SYSTEMATIC METHOD FOR THE CURE OF DIABETES MELLITUS.

I regard it as not now (1890) impossible that certain mild cases of diabetes may be cured, provided the patient be willing to go into "training for it"—to use a sporting phrase. There is very little hope, however, of anything beyond amelioration if the patient, "hasn't time" to attend to the particulars of diet, regimen, etc., which I shall specify.

I. Diet:—I have reduced the daily quantity of urine from 12 pints to 6 in three weeks by the following diet[1] alone, *without other measures or use of remedies:*

[The diet should be adopted gradually, *not too suddenly*, for fear of albuminuria and serious uræmic symptoms. The patient may begin, for example, by cutting off potatoes first; then, in a

[1] That of Austin Flint, Jr., as modified by the author.

week or so, desserts made of flour and sugar and sweet fruits; next, all bread and cake made with ordinary flour and sugar.]

Shell-fish and fish:—Oysters cooked in any way without milk or flour. Clam water. All kinds of fish, but sauces should contain no flour. Soft-shell crabs and fish roe for those with whom they agree; the same may be said of fish balls (made without potatoes or flour), shrimps and craw-fish.

Soups:—Consomme (beef, veal, chicken or turtle), with asparagus points, okra, ox-tail, turtle, terrapin, oyster or clam, but all without flour or milk; mock turtle soup, mullagatawny, tomato, gumbo fillet. Beef-tea.

Meats:—Beefsteak (with or without fried onions, according to digestion), broiled chicken, lamb chops, tender mutton chops, roast beef, roast mutton, game (for those with whom it agrees). Tongue, sweetbreads, lamb fries. Poultry should not contain dressing made of bread or flour; currie should not be thickened with flour. No liver allowed.

Vegetables:—Lettuce, spinach, *cauliflower*, *cabbage*, tomatoes, *radishes*, oyster plant, celery, *onions*, string beans, water cresses, mushrooms, asparagus tops. (Those in italics should not be given to patients whose digestion is weak.)

Relishes:—Pickles, sardines, anchovies, olives.

(Not to every patient, but according as they agree.)

Eggs:—Poached, scrambled with a little chipped beef, soft boiled; carefully made omelet or ham omelet in small quantity, eaten when warm. (In some cases omelets do not agree.)

Substitutes for sweets:—Brandy peaches, without sugar; wine jelly, without sugar; kirsch and rum jellies, without sugar; glycerin, saccharin. If saccharin is used with tea or coffee, add it before milk. A single grain suffices for a cup of coffee. Too much saccharin should be avoided. Many do not like it, and in some it causes serious gastric troubles.[1]

Miscellaneous:—Butter; cheese, if not too constipating; salads, except potato; lean patients, whose digestion is good, may take considerable fat. Sauces to be made without flour or sugar; if to be thickened, use gluten flour.

Desserts:—Blanc-mange, made of white of eggs, beaten up and flavored with vanilla, sweetened with a *little* saccharin. One apple, not sweet. A few almonds, hazelnuts, walnuts. Cheese, cranberries, strawberries, plums, cherries, lemons; if stewed, add a little sodium bicarbonate.

Bread:—Gluten bread, sparingly used. In cases where the patient is grievously disap-

[1] *Ann. of the Univ. Med. Sci.*, 1889.

pointed at giving up bread, allow him ordinary bread in *small quantity*, as a psychical measure. But if the loss in sugar overbalances the psychical gain, be sure to cut off the ordinary bread at once. The various gluten and diabetic flours usually contain more or less starch and should be sparingly used but can be allowed in greater quantity than ordinary flour. (Hoffmeister allows at first 100 grammes (2 oz. 3 dr.) of bread daily, gradually reduced to 60 grammes (2 oz.), but no bread substitutes. He recommends 100 to 150 grammes of fat and fat meats daily.) All food should be masticated thoroughly.

Drinks:—Tea, coffee without sugar but with a little cream. If thirst excessive, weak warm tea (with a slice of lemon), to be drunk little at a time. Immediately after meals, dry old claret, Burgundy, dry sherry, Bass' ale or bitter beer, (but no soda water, ordinary beer or sweet drinks) brandy and seltzer. koumis, cream with raw eggs, good spring water not iced. In cases of constipation, sour milk.

Tobacco:—One or two light good cigars a day for those who are unable to give up smoking.

Effect of the Diet:—If the patient's urine decreases gradually in quantity and he loses the feeling of languor so often complained of, if his weight remains the same and there are, in general, no distressing symptoms, the diet is doing him good. If on the other hand the urine

rapidly diminishes in quantity and albumin and casts appear, the diet should be relaxed for fear of uræmia.

Diet for gouty diabetics:—Corpulent plethoric patients with tendency to piles and uric acid gravel and without the usual symptoms of diabetes may not, though their urine is saccharine, be benefited by the diabetic diet. In such cases the skim milk diet may be used, chiefly for the reason that it keeps the patient in a state of semi-starvation, the natural cure for the effects of habits of gross feeding.

II. Rest and Exercise:—After every meal, rest from half an hour to an hour. For exercise, light work in a garden, billiard playing, use of light dumb-bells, moderate rowing, splitting wood, moderate walking, especially up hill, and horse-back riding; in hot weather, driving. All exercise should be gentle, and, in the beginning, even *cautious*. Passive exercise may be used at first.

III. Baths:—I have found the Turkish bath useful especially for fat diabetics. Schnée advises first a Turkish bath, followed by a short stay in a Russian vapor-bath at a temperature not above 100° F. after which the skin is cooled off by a lukewarm shower. The patient is finally allowed to have a secondary perspiration on a couch and to rest for upwards of an hour. After twelve baths of this kind he

claims that the thirst begins to cease. The patient should drink a cup of beef tea an hour before entering the bath. At home, sponge bathing daily with lukewarm water, quickly followed by rubbing.

IV. Residence:—Sleeping rooms should be well aired and ventilated. Houses on high grounds to be selected. *Hot, stuffy rooms* to be avoided. Open fire-places a desideratum. Temperature of dwelling rooms never below 60° nor above 72° F. Patient should, if possible, sleep in a room adjoining another in which the window is open, the door between being open. The air in dwelling rooms should not be too dry in winter. Water should be evaporated. In the winter, if the patient go abroad he should seek the Riviera, in the summer Carlsbad. The sea shore is better than high altitudes. In traveling, caution should be taken about fatiguing journeys. Frequent stops should be made and rests taken. Vestibuled trains to be preferred to the old fashioned coaches.

V. Massage and Electricity:—Massage, not too vigorous, may be employed daily between breakfast and dinner. Schnée advises a weak solution of mercuric chloride in alcohol with a little vaseline to be used in rubbing. In some cases, muscular tone is influenced by applications of electricity.

VI. Respirations:—Delicate patients to use pneumatic apparatus. In ordinary cases gentle and progressive hill-climbing, with great precautions, is of undoubted benefit.

VII. Miscellaneous:—The mouth and teeth should be well cleaned daily, with a solution of chlorate of potassium, 1 in 19, one teaspoonful in a pint of water to which a little alcoholic solution of thymol is added. The patient should take extreme care to void *all* the urine and even to remove any drops that may adhere by use of a soft handkerchief. The skin, if irritated by the last drops of urine, should be protected by vaseline or cold cream.

Out-of-door occupations are preferable. Mental strain and business anxiety to be avoided. "Early to bed and late to rise" should be the motto.

In case of accidents involving concussion of the brain and followed for considerable time by notable slowness of the pulse, all mental excitement and exposure to excessive heat of the sun should be avoided for a year.[1]

The patient should if in a warm enough climate, attend out-of-door concerts or places of amusement to keep him as cheerful as possible.

Enemata of oxygen gas may prove of service and are certainly worth a trial for the effect of

[1] A. H. Smith.

excess of oxygen in the portal blood in preventing excessive formation of sugar.

VIII. Mineral waters:—The hot alkaline waters of *Carlsbad* have, on the whole, the highest reputation in cases of glycosuria. They will not alone, however, cure the disease.

Hughes thinks *Silica*, as found in certain mineral waters, valuable. Andrew H. Smith thinks the natural *Chalybeate* waters of value.

Aerated water, charged with oxygen gas, is advocated by Le Blond.

IX. Remedies:—There is no specific for diabetes, but remedies are useful for alleviation of the sufferings of the patient. The following are often prescribed:

Arsenicum:—In emaciated patients, with great hunger and thirst, pallor, loss of strength, tending to gangrene, dryness of the mouth and throat, watery diarrhœa, dyspnœa on slight exertion.

Kreasote:—Heaviness, drowsiness, depression of spirits, head confused and dull; very severe chronic neuralgic troubles.

Phosphoric Acid:—Of value when the case is evidently of nervous origin; when there is loss of fluids, particularly seminal; patient is indifferent to all things; long-lasting diarrhœa.

Uranium Nitrate:—Languor marked and general. Excessive thirst. In cases originating in dyspepsia or digestive derangement.

Bryonia:—Dryness of the lips and tongue, persistent marked bitter taste in the mouth, invariably aggravated shortly after eating, or even drinking. Quantity of urine not so great, but specific gravity high. Pruritus vulvæ. Sleep disturbed and unrestful. Often loss of appetite and marked debility.

Lactic Acid:—Immense quantities of urine, inordinate thirst and hunger, gastric symptoms marked (acidity, sour burning risings), marked intermittent protrusion of the eye-ball, and great dilatation of the pupil.

Morning urine contains but little sugar; afternoon and evening, much.

Leptandra:—A case is reported by Laning,[1] in which five grain doses of *Leptandra,* 3d decimal, was found useful. The symptoms were those of portal stasis. The patient complained of an almost constant feeling of emptiness or goneness in the stomach, which seemed to be relieved by food only for a short time, if at all. After eating, he almost immediately was uncomfortable, and at times had a distressing fullness, which might be present even though he felt the need of food, so that, as he expressed it, he "felt full and empty at the same time." There was a frequent desire to drink, which he resisted as much as possible, for the reason

[1] *Clinique,* 1890, p. 227.

that it also produced the disagreeable sense of repletion. The skin was dry all over the body, and particularly of the face, it being rough and scaly, numerous bran-like flakes coming off on slight rubbing. The nose was red, swollen, and sore, especially on the alæ. This symptom was better or worse according as he ate much or little; indeed, it was made worse even by the free drinking of water, a condition that evidently was due to the degree of portal stasis.

Heyberger reports a case of diabetes mellitus in a woman 68, cured by *Kali Bromatum*, second decimal.

In cases of venereal origin, especially if hereditary, try *Kali Bichromicum* and *Merc. Cor.*

Von Mering has recently shown that *Phloridzin* (a glucoside found in the bark of the root of apple trees) causes sugar to appear in the urine.

Laning in the *Clinique* for June, 1890, speaks of the following:—

Podophyllum:—Head dull and heavy, with occasional sharp pains; tongue dry and foul in morning, at other times quite moist; urine variable in quantity; stools light colored; limbs often swollen from venous stasis.

Aurum Muriaticum:—Exceeding depression of spirits; intestinal and vesical catarrh; urine at times turbid from mucus, and of ammo-

niacal odor. Patient craves sour things and dislikes meat. Hands and feet icy cold. Palpitation of the heart common.

Mercurius Solubilis :—In early stages when there is coldness and clamminess of the thighs, (rest of skin dry) with increased urination. For the gastric symptoms and constipation; much debility.

Nitric Acid.—Patient craves fat meat. In early or prodromal stages of diabetes, when there are crops of boils, etc.

Graphites :—Itching eruption in the bends of the elbows, and in the popliteal spaces, frequent attacks of vertigo; hang nails and brittleness of the finger nails.

Miscellaneous:—The sands of the sea are hardly more numerous than the various remedies which have been prescribed for diabetes mellitus. Among the more modern are the following: pilocarpine, chromate of potassium and corrosive sublimate albuminate, iodoform, sulpho-carbolate of sodium, ergot, arsenic bromide, arsenic and lithia, alkalies, jumbul seeds, iodides of sodium and potassium, antipyrine, thymol, cocaine, morphine, codeine, salicylic acid, phenol, sodium salicylate.

Clinical notes :—

Pavy gives 5 grains of *codeine* daily.

Villemin gives *belladonna* and *opium* together; 1½ grains extract of belladonna and ¾ grain of opium at first.

Robin gives 45 grains of antipyrine daily, in 3 doses at 4 hour intervals, as far apart from meals as possible, except when there is albuminuria, then 30 grains in all, without restricting the diet. Then, after a week, discontinues anti-

pyrine and restricts the diet, and so on. If the amount of sugar is not at once reduced, it is useless to continue the antipyrine. He associates bi-carbonate of soda with antipyrine, in proportion of half a gramme of the latter to one of the former.

Tyson gives ergot in doses of half a drachm to a drachm three times daily.

Dujardin-Beaumetz uses Martineau's remedy (arsenic and lithia), as follows: Before each meal take in a tumblerful of Vichy or Vals water, one of the following powders, adding to the mixture two drops of Fowler's solution: Carbonate of lithia, ʒ iiss; divide in chart., No. XX.

Saundby gives 5 grain doses of jumbul seeds 3 or 4 times daily.

In gouty cases, Ralfe gives 20 grains bi-carbonate of soda, 10 grains phosphate of soda, 5 grains of carbonate of ammonia, all taken in a draught 2 hours after food.

Waring gives *phosphoric acid*, largely diluted, for the thirst.

Duchenne, for the thirst, gives the following mixture: *Potassium phosphate*, 2 parts; water, 75 parts. A teaspoonful three times a day in a little wine or hot tea.

Saundby gives *opium* and *potassium bromide*.

Gardner has used *pepsin*.

Wilson gives 15 grains of sodium salicylate and 5 drops of Fowler's solution, 4 times daily.

J. Mitchell Bruce, in very complete and laborious observations, has shown that, after the sugar has been reduced, to the minimum which diet brings about, the best effects are produced by 6 grains in all per diem of *morphine acetate* by the mouth, the dose being small at first and gradually increased. Bruce suggests that morphine be given in smaller doses till the amount of sugar daily is but 167 grains, a comparatively safe excretion.

(The dangers of the opium habit and the fact that the

beneficial effects do not last long, are great objections to opium in any form)

Korjensky cured a case by use of *strychnine* in 1-60th to 1-16th grain doses.

Wolkow gives *salol*, 25 grains, four times a day.

De Heune uses 6 to 10 drops of *ergotin*, subcutaneously, daily, to prepare diabetics for cataract operation. Permanent disappearance of sugar after 6 to 8 weeks' treatment.

Jacobi treats diabetes of infants and children by milk diet, salicylate of sodium, 5 to 8 grains, 3 times a day, in Seltzer or Vichy, and one drop or more of Fowler's solution, largely diluted, after meals, dose increased till 2 to 4 drops.

Valentine gives *kreasote* in 10 drop doses, three times a day. *Phosphorus* in doses of 1-30th grain, three times a day, is recommended by Squire.

Empirical treatment of diabetes mellitus by administration of powerful drugs, is the Louisiana lottery of modern medicine.

We hear of many who draw prizes, but no one can name the lucky combination which will win even in a scanty percentage of cases.

COMPLICATIONS OF DIABETES.

The symptoms of *diabetic coma* have already been mentioned in part. Dyspnœa, great excitement and wildness, benumbing of the senses, followed by coma, is often the order of symptoms.[1] The prognosis is grave. Treatment: administration of alkalies. Intravenous

[1] *Ueber Coma Diabeticum*, Kirstein.

injection of 8 ounces of a four per cent. solution of sodium carbonate has prolonged life.[1]

Other complications are albuminuria, phlegmonous and gangrenous processes, erysipelas, pruritus, eczema; various other complications are sometimes noted.

Pregnancy and diabetes:—J. G. Brooks[2] reports a case in which glycosuria (quantity of sugar not given) complicated pregnancy. After induction of labor patient recovered. Dr. Brooks found the diet treatment "worse than useless," and the patient recovered on generous mixed diet.

In several cases of pregnancy I have found 150 grains daily of sugar. In one case only have I subsequent history: patient went to full term, and was safely delivered, though of a still-born child. The child in Dr. Brooks' case survived.

Furuncles:—In cases of crops of boils examine the urine for sugar. Boils are often found in the initial stage of diabetes. Dr. R. Ludlam, Jr., reports several cases.[3] The treatment was diet and Uranium Nitrate, in one case Hepar Sulphur and Phosphoric acid.

DIABETES INSIPIDUS.

Diagnosis:—Suppose, now, that the patient

[1] *Deutsch. Med. Woch.*, No. 15, 1889. *Berlin. Klin. Woch.*, No. 19, 1888.
[2] *Amer. Pract. and News*, 1889.
[3] *Clinique*, 1890, p. 253.

is voiding much more urine than normal in 24 hours, but that both albumin and sugar are absent (or, if albumin is present in small quantity, there are no casts, and the quantity of urea, phosphoric acid, etc., is normal or above normal): suspect *diabetes insipidus.*

To make the diagnosis certain, find first whether the condition is temporary or permanent. Intermittent copious discharge of pale, watery urine, may be due to hydro-nephrosis. Be sure that there are no cardio-vascular changes as in renal sclerosis. Absence of sugar rules out diabetes mellitus. The differential diagnosis between diabetes insipidus and renal diseases depends largely on estimation of phosphoric acid, which, as I have shown, is decreased in Bright's disease, but is normal or increased in diabetes insipidus, form polyuria.

There may be phosphatic diabetes, and chlorine diabetes. Peptonuria is sometimes an associated condition.

Symptoms:—In hydruria the patient feels in poor health, is easily chilled, appetite capricious, sinking, gnawing sensation. As a rule alcohol increases the amount of urine. In polyuria we find debility, languor, loss of weight, neuralgic and rheumatic pains, and moderate thirst. Boils and cataract have been noted.

In some cases serum-albumin is found, but no casts at first. I hold that the appearance of

albumin is an unfavorable sign. In one case, after two years of great debility, in a young patient, with excessive flow of urine and one-tenth albumin, casts appeared and the patient became more or less œdematous.

Prognosis:—If the urine is of very low specific gravity (hydruria) and there is no excessive discharge of solids, it is possible that the patient may live as long as otherwise, but if there is a large amount of solids (polyuria) suspect the condition to be a prelude of serious constitutional disturbance, as cancer, tubercle, syphilis. In some cases marked nervous disorder or phthisis appears; in others, true diabetes mellitus.

Treatment:—In *hydruria* give nourishing food liberally, and allow patient to relieve thirst at pleasure, taking care to warm the fluids ingested in cold weather. Thicken the various drinks, as, for example, with a handful of raw oat-meal to a quart of boiling water, with a lemon sliced into it. Warm clothing, woollen preferable. Dry soil. Russian vapor baths, salt water douches. Winter, if possible, in South.

In *polyuria* the diet should be light, and, if urea is in excess, the nitrogenous articles should be limited. *Alcohol particularly to be avoided*, as also coffee.

Vapor baths, followed by salt water tepid douches. Change to dry, bracing climate.

Warm clothing, early hours, avoidance of fatigue and excitement.

Remedies:—Those already mentioned under Diabetes Mellitus.

Helonias is of value in polyuria. *Apocynum Cannabinum* has been used where there is the "sinking sensation" in the stomach.

Citrate of iron, quinine, and strychnine is of use.

With those who believe in using powerful drugs, *antipyrin* is the favorite remedy. Many cures are reported. Dose, 45 to 95 grains daily.

Jumbul is also said to be efficacious. *Ergot*, *atropine*, and *strychnine* are also recommended.

In children, with hydruria, cod liver oil and iron in some form, as syrup of the iodide.

In polyuria, cod liver oil, phosphorus, nux vomica, etc.

When there is history of syphilis, iodide of sodium, hydriodic acid, etc.

CHAPTER XIV.

MISCELLANEOUS:—PEPTONURIA.—THE URINE IN DISEASES OF THE LIVER.—THE URINE IN DISEASES OF THE NERVOUS SYSTEM.—THE TYPHOID FEVER REACTION.—AROMATIC COMPOUNDS IN THE URINE.—DISEASES OF THE UPPER AIR PASSAGES.—THE URINE IN CANCER.—POISONS IN THE URINE.

Suppose, now, that neither serum-albumin nor sugar has been found in the urine. Test for paraglobulin, hemi-albumose, and peptone.

1. Paraglobulin is found either alone or in excess of serum-albumin; if the latter, the condition is probably one of the following: (*a*) long-standing cases of chronic nephritis, complicated with lardaceous degeneration; (*b*) early stages of scarlet fever nephritis, especially in children; (*c*) functional albuminuria, associated with marked disturbance of the digestive organs. This condition is also noted in the intense hyperæmia following *cantharides* poisoning. In rare cases paraglobulin without serum-albumin may be found.

2. Hemi-albumose is found. This substance has been found in a case of osteo-malacia.

3. Peptones are found: either pus or inflammatory exudations are being absorbed somewhere or young cell forms are being formed in excess along some portion of the genito-urinary tract, or albumin is decomposing somewhere in the urinary passages. It is well known that peptone is formed as an early product of the decomposition of proteid matter by bacteria, so that cases of peptonuria cannot always be so easily understood as some authors would have us think.

Peptonuria is present in inflammation of the lungs before the crisis, in empyema, pneumonia, suppurative peritonitis, pleural exudations, cancer of the stomach, etc., etc.

The tests for the peptones are as follows:

Biuret test:—The urine is first to be made alkaline with caustic potash, and then 1-3 drops of a diluted solution of sulphate of copper are to be added, and if *albumin*, *hemi-albumose*, or *peptone* be present, a reddish violet solution is formed.

To test for *hemi-albumose* it is necessary, first, to remove the albumin. For this purpose, to the urine (or to any other fluid to be examined, as the contents of the stomach) 5 to 10 drops of acetic acid and ⅙ of its volume of a concentrated salt solution are added, and the whole heated. Then the albumin will be precipitated and should be removed while hot by filtration, while the filtrate is allowed to cool off. If a cloudiness now arise, on the addition of salt solution to the filtrate, then hemi-albumose is present. If too much salt solution be added, the precipitate of hemi-albumose cannot be redissolved by heat.

To test for *peptone*, 10 c. c. m. [2½ drachms] of a concentrated solution of sodium acetate and a few drops of a solution of iron chloride are added to 500 c. c. m. [1 pint] of urine until there results a permanent red color; then a caustic potash solution is dropped carefully into this mixture until it is slightly acid or neutral, and the mixture heated. After it has cooled off and been filtered, the filtrate, which, ought to be entirely free from albumin, is subjected to the biuret test.

(Peptone, in considerable amount, gives a pink color in the cold with Fehling's solution diluted with one-half water.)

DISEASES OF THE LIVER.

Bile pigment is found in the urine, or (using Oliver's test) great excess of bile-acid salts is found; some disorder of the liver is probably present.

TABLE XVII.

THE URINE IN DISEASES OF THE LIVER.

DISEASE.	CHARACTER OF URINE.
JAUNDICE.	Bile-acid salts increased in quantity before appearance of bile pigment and persist for some weeks after urine is free from pigment. Bile pigment if present gives urine a deep color—dark yellow or dark brown—and urine stains linen rag yellow.
ACUTE YELLOW ATROPHY.	Urine contains both pigment and bile acid salts early. As bile diminishes urea diminishes to even as low as one-fourth the normal figure. Urine contains leucin, tyrosin, urates in great excess. Color dark. Albumin may or may not be present.
FUNCTIONAL DISORDERS OF THE LIVER.	Excess of bile-acid salts during bilious attacks and in chronic biliousness.
CARCINOMA, AMYLOID DISEASE, CIRRHOSIS, TUMORS PROBABLY HEPATIC.	Excess of bile-acid salts. Urates in excess. Urea diminishes in malignant disease.

NOTE. The distinction between hæmatogenous and heptogenous jaundice is no longer made, as all jaundice is more or less heptogenous in character.

In certain forms of renal degeneration during pregnancy the liver is at fault and imperfectly performs its functions, and we have high colored urine loaded with excrementitious material.

In *pernicious anæmia* William Hunter has found large excess of iron in the liver. In such cases the urine is of remarkably *high color*, though neither nitrogenous diet nor febrile condition accounts for it. The coloring matter has all the characteristics, as regards its spectrum and chemical behavior, of *pathological urobilin*. He also finds *blood pigment*, and an increased excretion of *iron*.

CERTAIN NERVOUS DISORDERS.

Neurasthenia:—C. L. Dana[1] has shown that in this disorder we may have lithæmia, glycosuria, phosphaturia, or oliguria, polyuria, etc.

Hydruria he finds in spinal irritation, nervous old people, nervous disturbance of climacteric with angiopathic changes. Neurasthenic young people with anæmia. In these cases there is considerable urine of low specific gravity, but the total solids are deficient.

On the other hand, watery urine not abundant, but less than normal in 24 hours, he finds in certain neurasthenics who require simple and not very abundant diet. In one case of a depressive form of cerebro-spinal neurasthenia

[1] *Dietetic Gazette.*

with some anæmia, the urine averaged 1016 in sp. gr., and less than 960 c. c. in 24 hours, the solids being only about 37 grammes.

Neurasthenics of middle age sometimes pass enormous amounts of urine of low specific gravity.

Urine of high specific gravity he finds most often in those forms of neurasthenia occurring in adult life, associated with gastric disturbances, and due to overwork or mental strain. More specifically, they are the cerebral and gastric neurasthenias, irritative in character and associated *with lithæmia or a transient glycosuria.* Many such cases go by the name of cerebral hyperæmia. Haslett calls them neuroses of encephalic origin. One often finds specific gravities of 1028 and 1030, without albumin or sugar.

The phosphates and urates are in some excess, but the real cause of the heavy urine is the excessive amount of urea. In those cases in which Dana has measured the urine, its amount has not been very small— 35 to 45 oz. daily.

In one patient whose urine averaged 1026 the daily amount was 1200 c. c. in seven different tests, giving a daily discharge of about 75 grammes (Haeser's coefficient) of solids. The man was of average weight and build, with a fair appetite, and took a moderate amount of exercise.

Such cases have been classed as examples of lithæmia, but they are not always such, and often do not respond to any kind of anti-lithæmic or anti-rheumatic treatment. In neurasthenia, with heavy urines, we however, look for diathetic taints and for functional trouble in the stomach and liver. Such cases require, more than any other, careful attention to diet, and to the regulation of the bowels and the liver. Milk and bread or meat and bread form a good basis for the diet, with a plentiful supply of water between meals.

Insanity and Epilepsy:—According to Mairet, confirmed by Lailler, in acute delirium phosphoric acid and urea are eliminated in notable excess; in excitable mania the phosphoric acid is in slight excess, whilst the amount of urea is normal; and in simple insanity the urine has the normal composition. In acute or excitable lypemania, the amount of urea eliminated is abnormally high, whilst that of phosphoric acid is abnormally low. In simple lypemania the composition of the urine is normal.

In general paralysis the elimination of both phosphoric acid and urea is related to the general morbid conditions of the patient. At, or immediately after, epileptic seizures, the urine contains a high proportion of phosphoric acid and a low proportion of urea. If the seizures succeed one another rapidly, the proportion of

both phosphoric acid and urea is increased; in the interval between seizures the urine has the normal composition.

THE TYPHOID FEVER REACTION.

The diazo-reaction (Ehrlich) so-called, depends upon the fact that sulpho-diazo-benzole unites with different kinds of unknown aromatic substances of the urine to form colored compounds.

The solutions required in making the test are:

First, hydrochloric acid in water (five cubic centimeters of hydrochloric acid and one hundred of distilled water) to which a sufficient amount of sulphanilic acid is added to saturate it. (Add, therefore, sulphanilic acid, which comes in the form of crystals, little by little to the hydrochloric acid solution, shaking well each time, until finally no more is dissolved.)

Second, dissolve one gramme of sodium nitr*ite* (not nitr*ate*) in 200 cubic centimeters of distilled water. (Sodium nitrite comes in the form of sticks. Cut off from one of the sticks a piece little less than half an inch long, and this will weigh a gramme, roughly speaking.)

In order to perform the test proceed as follows:

Take 25 cubic centimeters of the solution first described, viz.: sulphanilic acid in dilute

hydrochloric acid; add to it one cubic centimeter of the sodium nitrite solution; mix well, and add to the whole about an equal bulk of the urine to be examined. Then further add $\frac{1}{8}$ the volume strong ammonia, mixing well, until the mixture turns red litmus-paper noticeably blue.

When the freshly-prepared solutions are added to the urine of typhoid-fever patients in the proper proportions, the mixture of urine and chemicals turns *red*, the color varying from yellow-red to ruby-red or darker. In severe cases of typhoid the red color appears quickly and is rich in hue.

In severe cases in the second or third week the precipitate of phosphates has a very marked dark-greenish tint. In milder cases and in those convalescing this green tint is wanting.

In severe cases the froth, on shaking the mixture, is pinkish.

The same chemical action is found in certain other diseases (pneumonia, phthisis, puerperal fever, measles) but none which can be confounded with typhoid fever. In cerebro-spinal fever the reaction does not take place. If the reaction is found in puerperal cases, there is danger of puerperal fever. Disappearance of the reaction in cases where it has been found is a good sign.

AROMATIC COMPOUNDS IN THE URINE.

Much interest is taken in the study of these substances. The most important at present are *indican*, *phenol*, *cresol-sulphuric acid*, *protocatechuic acid*, and *skatol*. Their presence in the urine in greater quantity is due to increase of putrefaction in the intestine. They are also increased in other conditions.

Indican in larger amount than normal is shown in the nitric acid test for albumin by a narrow blue or bluish zone resting on the ring of brown coloring matter on the border between the colorless acid and the urine. In such cases try Jaffé's test: to 10 c. c. of urine and an equal quantity of strong hydrochloric acid, well mixed, add one or two drops of a cold saturated solution of chlorinated lime. The mixture becomes bluish-black or violet, and, on adding a few c. c. of chloroform and shaking, the latter is colored blue. Large quantities of indican are found in the urine in diseases of the abdomen, in the urine of masturbators, after sexual excess or excitement, and the urine of nervous and hysterical women. Also in diseases of the central nervous system, as cerebro-spinal meningitis. After taking certain drugs, as turpentine, oil of bitter almonds, nux vomica, creasote.

DISEASES OF THE UPPER AIR PASSAGES.

Examine the urine for evidences of lithæmia in diseases of the upper air passages.

One of the most characteristic manifestations is a patchy or streaky irregular congestion of the mucous membrane of the larynx and pharynx. In the former case a dry, explosive cough accompanies; in the latter, uneasiness or positive pain is referred to the sides of the throat, occasionally extending to the ears. These cases are notably irritated and made worse by stimulant applications. Local sedatives and general antilithic treatment give the best results. Occasionally, acute naso-pharyngeal catarrh is a manifestation of an exacerbation of the lithæmic tendency. Alkaline and diluent medication, with proper diet, give more relief than local treatment. Obstinate relaxation of the nervous plexuses of the turbinated bodies in some individuals appears associated with lithiasis. Such cases stand operative—caustic—applications badly, and receive little or no benefit from them. Some of these cases are much improved by antilithics and general hygiene. Others are intractable on account of uncontrollable lithæmic tendencies.

Acute coryza, incessant sneezing, and symptoms such as seen in so-called "hay-fever," are often relieved by the diet and treatment usual in lithæmia. Spasm of the glottis and

many affections of the tonsils yield to the same treatment as do some cases of asthenopia and relapsing episcleritis.[1]

THE URINE IN CASES OF CANCER.

In cases where cancer is suspected, estimate the quantity of urea and of phosphoric acid. If these are found to be notably diminished while at the same time renal lesion is excluded, cancer may be suspected, if there are other and reasonable grounds for belief in its presence. Diagnosis of cancer from mere observation of a marked deficiency in phosphoric acid is absurd, since I have shown by scores of analyses that a deficiency in phosphoric acid is found in nearly all renal lesions of the diffuse or sclerotic type, and in suppurative lesions. If cancer of the stomach be suspected, decrease in urea and phosphoric acid, together with presence of peptone, may help to make the diagnosis more certain. If sugar is found in the urine in connection with symptoms of pyloric cancer, it may be assumed that the pancreas has become involved.

A marked indican reaction is often found in the urine of the cancerous, and with the Burgundy-red reaction with ferric chloride.

What to do in cases where cancer is suspected : Estimate urea and phosphoric acid. Test for

[1] W. Cheatham, in *Amer. Pract. and News*, 1890, p. 333.

peptone. Observe whether the indican reaction is marked, and whether any red coloration is obtained with a dilute solution of ferric chloride.

POISONS IN THE URINE.

Iodoform: — Bruce[1] finds the following test for *Iodine* in the urine more readily performed than the tests usually described:—to about 10 c. c. of urine add 1 c. c. of hydrochloric acid and about the same amount of a 10 per cent solution of ferric chloride (Fe_2Cl_6); shake vigorously, add 2 c. c. of carbon disulphide and shake again. The carbon disulphide gathers in a layer at the bottom of the test tube, and is colored a pinkish tint if traces only of iodine are present, but violet if iodine in noteworthy amount is present.

Carbolic Acid: — In poisoning by this agent the urine has a characteristic dark color.

Morphine:—I am skeptical in regard to the value of some of the "simple" tests for morphine in the urine which have appeared lately. To obtain morphine or other alkaloids from the urine, use the method of Dragendorff and Wislicenus, which is described by MacMunn in his "Clinical Chemistry of the Urine," 1890, p. 239.

[1] *Clinique*, June 15, 1890.

APPENDIX.

Tables for reference :— I have constructed some tables for the purpose of showing at a glance what per cent of the normal average any quantity of urine urea, etc., is. For example: Suppose, on analysis, we find a female patient voiding a total of 10 grammes of urea in 24 hours. Turning to Table III, Total Urea in 24 Hours, under Female Patients, we find 10 grammes the eleventh figure from the top. To the right of it is the figure 50, which means that if a female patient is voiding 10 grammes of urea in 24 hours, she is voiding 50 per cent of the normal average. Inasmuch as the normal averages vary according to nationality, I have adopted those of Yvon-Berlioz for the minimum (descending scale), and those of Parkes for the maximum (ascending scale).

TABLE I.

(*a.*)

URINE IN 24 HOURS.

DESCENDING SCALE.

	Male patients.			Female patients.		
	Fluid ounces.	Cubic centimeters.	% normal av'ge.	Fluid ounces.	Cubic centimeters.	% normal av'ge.
A	45.33	1360	100	36.66	1100	100
	43.	1290	95	34.83	1045	95
	40.83	1225	90	33.	990	90
	38.5	1155	85	31.16	935	85
	36.33	1090	80	29.33	880	80
	34.	1020	75	27.5	825	75
B	31.66	950	70	25.66	770	70
	29.5	885	65	23.83	715	65
	27.16	815	60	22.	660	60
	25.	750	55	20.16	605	55
	22.66	680	50	18.33	550	50
C	20.33	610	45	16.5	495	45
	18.16	545	40	14.66	440	40
	15.83	475	35	12.83	385	35
	13.66	410	30	11.	330	30
	11.33	340	25	9.16	275	25
D	9.	270	20	7.33	220	20
	6.83	205	15	5.5	165	15
	4.5	135	10	3.66	110	10
	2.33	70	5	1.83	55	5
	1.16	35	2½	0.83	25	2½
	0	0	0	0	0	0

(*b.*)

ASCENDING SCALE.

AI	50	1500	100	40	1200	100
	55	1650	110	44	1320	110
	60	1800	120	48	1440	120
AII	65	1950	130	52	1560	130
	70	2100	140	56	1680	140
	75	2250	150	60	1800	150
AIII	80	2400	160	64	1920	160
	85	2550	170	68	2040	170
	87	2625	175	70	2100	175
AIV	90	2700	180	72	2160	180
	95	2850	190	76	2280	190
	100	3000	200	80	2400	200
Etc.	125	3750	250	100	3000	250
	150	4500	300	120	3600	300
	175	5250	350	140	4200	350
	200	6000	400	160	4800	400
	225	6750	450	180	5400	450
	250	7500	500	200	6000	500
	275	8250	550	220	6600	550
Etc.	300	9000	600	240	7200	600
	325	9750	650	260	7800	650
	350	10500	700	280	8400	700
	375	11250	750	300	9000	750
	400	12000	800	320	9600	800
	425	12750	850	340	10200	850
	450	13500	900	360	10800	900
	475	14250	950	380	11400	950
	500	15000	1000	400	12000	1000

TABLE II.

(*a.*)

UREA RELATIVE TO WATER.

DESCENDING SCALE.

	Male patients.			Female patients.		
	Grains per fluid ounce.	Grammes per liter.	% of normal av'ge.	Grains per fluid ounce.	Grammes per liter.	% of normal av'ge.
	10.09	21.50	100	8.924	19.00	100
	9.56	20.42	95	8.478	18.05	95
	9.008	19.35	90	8.003	17.10	90
A	8.589	18.28	85	7.585	16.15	85
	8.007	17.20	80	7.139	15.20	80
	7.571	16.12	75	6.692	14.25	75
	7.068	15.05	70	6.246	13.30	70
	6.566	13.98	65	5.800	12.35	65
B	6.059	12.90	60	5.354	11.40	60
	5.556	11.83	55	4.908	10.45	55
	5.049	10.75	50	4.462	9.50	50
	4.546	9.68	45	4.015	8.55	45
	4.036	8 60	40	3.569	7.60	40
C	3.532	7.52	35	3.123	6.65	35
	3.332	6.45	30	2.919	5.70	30
	2.527	5.38	25	2.231	4.75	25
	2.019	4.30	20	1.784	3.80	20
	1.517	3.23	15	1.338	2.85	15
D	1.009	2.15	10	0.892	1.90	10
	0.507	1.08	5	0.445	0.95	5
	0.256	0.54	2½	0.225	0.48	2½

(*b.*)

ASCENDING SCALE.

	10.821	23.04	100	10.427	22.2	100
	11.362	24.192	105	10.948	23.31	105
	11.904	25.344	110	11.47	24.42	110
AI	12 445	26.496	115	11.991	25.53	115
	12.986	27.648	120	12.512	26.64	120
	13.527	28 8	125	13.034	27.75	125
	14.068	29.952	130	13.555	28.86	130
	14.609	31.104	135	14.076	29.97	135
AII	15.150	32.256	140	14.598	31.08	140
	15.691	33.408	145	15.119	32.19	145
	16.232	34.56	150	15.640	33.3	150
	16.773	35.712	155	16.162	34.41	155
	17.314	36.864	160	16.683	35.52	160
AIII	17.856	38.016	165	17.205	36.63	165
	18.397	39.168	170	17 726	37.74	170
	18.938	40.32	175	18.247	38.85	175
	19.479	41.472	180	18.769	39 96	180
	20 020	42.624	185	19.290	41.07	185
AIV	20.561	43.776	190	19.811	42 18	190
	21.102	44.928	195	20.333	43 29	195
	21.643	46.08	200	20.854	44 4	200
	24.349	51.84	225	23.461	49.95	225
Etc.	27.054	57.6	250	26.068	55.5	250
	29.760	63.36	275	28.675	61 05	275
	32.465	69.12	300	31.281	66.6	300
	35.171	74.88	325	33.888	72.15	325
Etc.	37.876	80.64	350	36.495	77.7	350
	40.582	86.4	375	49.102	83.25	375
	43.287	92.16	400	51.709	88.8	400

TABLE III.

(*a.*)

TOTAL UREA IN 24 HOURS.

DESCENDING SCALE.

	Male patients.				Female patients.			
	Grains.	Gram's.	Approx.	%	Grains.	Gram's.	Approx.	%
	410.75	26.50	27	100	312.75	20.50	21	100
	390.29	25.18	25	95	301.94	19.48	19	95
	369 675	23.85	24	90	285.975	18.45	18	90
A	349.215	22.53	23	85	270 165	17.43	17	85
	328.60	21.20	21	80	254.20	16.40	16	80
	307.83	19.88	20	75	238.39	15.38	15	75
	287.525	18 55	19	70	222.425	14.35	14	70
	267.065	17.23	17	65	206.615	13.33	13	65
B	246.45	15.90	16	60	190.65	12 30	12	60
	225.99	14.58	15	55	174.84	11.28	11	55
	204.875	13.25	13	50	158.875	10.25	10	50
	184.915	11.93	12	45	143.065	9.23	9	45
	164.30	10.60	11	40	127.10	8.20	8	40
C	143.84	9.28	9	35	111.29	7.18	7	35
	123.225	7.95	8	30	95.325	6.15	6	30
	102.765	6.63	7	25	79.515	5.13	5	25
	82.15	5.30	5	20	63.55	4 10	4	20
	61 69	3.98	4	15	47.74	3.08	3	15
D	41.075	2.65	3	10	31.775	2.05	2	10
	20.46	1.32	1	5	15.965	1.03	1	5
	10.23	0.66	⅔	2½	8.215	0.53	½	2½

(*b.*)

ASCENDING SCALE.

	Grains.	Grammes.	Per cent.	Grains.	Grammes.	Per cent.
	514.6	33.2	100	412.3	26.6	100
	540.33	34.86	105	432.915	27.93	105
	566.06	36.52	110	453.53	29.26	110
AI	591.79	38.18	115	474.145	30.59	115
	617.52	39.84	120	494.76	31.92	120
	643.25	41.5	125	515.375	33.25	125
	668.98	43.16	130	535.99	34.58	130
	694.71	44.82	135	556.605	35.91	135
AII	720.44	46.48	140	577.22	37.24	140
	746.17	48.14	145	597.835	38.57	145
	771.9	49.80	150	618.45	39.90	150
	797.63	51.46	155	639.065	41.23	155
	823.36	53.12	160	659 68	42.56	160
AIII	849.09	54.78	165	680.295	43.89	165
	874.82	56 44	170	700.91	45.22	170
	900.65	58.10	175	721.525	46.55	175
	926.28	59.76	180	742.14	47.88	180
	952.01	61.42	185	762.755	49.21	185
AIV	977.74	63.08	190	783.37	50.54	190
	1003.47	64.74	195	803 985	51.87	195
	1029.2	66.40	200	824.6	53.2	200
AV	1157.85	74.7	225	927.675	59.85	225
	1286.50	83.	250	1030.75	66.5	250
AVI	1415.15	91.3	275	1134.825	73.15	275
	1543.80	99.6	300	1236.9	79.8	300

TABLE IV.

(*a.*)

PHOSPHORIC ACID RELATIVE TO WATER.

DESCENDING SCALE.

	Male patients.			Female patients.		
	Grains per fluid ounce.	Grammes per liter.	Per cent	Grains per fluid ounce.	Grammes per liter.	Per cent.
AI	1.174	2.5	100	1.127	2.40	100
	1.117	2.38	95	1.070	2.28	95
	1.056	2.25	90	1.014	2.16	90
A	1.004	2.13	85	0.958	2.04	85
	0.939	2.00	80	0.901	1.92	80
	0.883	1.88	75	0.845	1.80	75
	0.821	1.75	70	0.789	1.68	70
	0 765	1 63	65	0.732	1.56	65
B	0.704	1.50	60	0.676	1.44	60
	0.648	1.38	55	0.66	1.32	55
	0.587	1 25	50	0 563	1.20	50
	0.530	1 13	45	0.507	1.08	45
	0.469	1.00	40	0.450	0 96	40
C	0.413	0.88	35	0.394	0.84	35
	0.352	0.75	30	0.338	0.72	30
	0 295	0.63	25	0.281	0.60	25
	0.234	0.50	20	0.225	0.48	20
	0.178	0.38	15	0.169	0.36	15
D	0.117	0.25	10	0.112	0.24	10
	0.061	0.13	5	0.059	0.12	5
	0.032	0.07	2½	0.028	0.06	2½
	0	0	0	0	0	0

(*b.*)

ASCENDING SCALE.

	0.986	2.1	100	0.939	2.0	100
A	1.035	2.205	105	0.986	2.1	105
	1.083	2.31	110	1.030	2.2	110
	1.134	2.415	115	1.080	2.3	115
AI	1.183	2.52	120	1.127	2 4	120
	1.233	2 625	125	1.174	2.5	125
	1.282	2.73	130	1.221	2.6	130
	1.331	2 835	135	1.268	2 7	135
AII	1.380	2.94	140	1.315	2.8	140
	1.430	3.045	145	1.362	2.9	145
	1.479	3.15	150	1.409	3.0	150
	1.528	3.255	155	1.456	3.1	155
	1.578	3.36	160	1.503	3.2	160
AIII	1.627	3.465	165	1.55	3.3	165
	1.676	3.57	170	1.596	3.4	170
	1.726	3.675	175	1.643	3.5	175
	1.775	3.78	180	1 690	3.6	180
	1.824	3.885	185	1.737	3.7	185
AIV	1.874	3.99	190	1.784	3.8	190
	1.921	4.095	195	1.831	3.9	195
	2 003	4.2	200	1.878	4.0	200
	2.220	4.725	225	2.113	4.5	225
	2.465	5.25	250	2.348	5.0	250
Etc.	2.712	5.775	275	2.583	5.5	275
	2.950	6.3	300	2.818	6.0	300
	3.205	6.825	325	3.053	6.5	325
	3.452	7.35	350	3.287	7.0	350
Etc.	3.698	7.875	375	3.522	7.5	375
	3.90	8.4	400	3.757	8.0	400

TABLE V.

(*a.*)

TOTAL PHOSPHORIC ACID IN 24 HOURS.

DESCENDING SCALE.

	Male patients.			Female patients.		
	Grains.	Grammes.	Per cent.	Grains.	Grammes.	Per cent.
	49.60	3.20	100	40.30	2.60	100
	47.12	3.04	95	38.285	2.47	95
A	44.64	2.88	90	36.27	2.34	90
	42.16	2 72	85	34.255	2.21	85
	39.68	2.56	80	32.24	2.08	80
	37 20	2.40	75	30 225	1.95	75
	35.72	2.24	70	28.21	1.82	70
	32.24	2.08	65	26.195	1.69	65
B	29.76	1.92	60	24.18	1.56	60
	27.28	1.76	55	22.165	1.43	55
	24.80	1.60	50	20.15	1.30	50
	22.32	1.44	45	18.135	1.17	45
	19.84	1.28	40	16.12	1.04	40
C	17.36	1.12	35	14.105	0.91	35
	14.88	0.96	30	12.09	0.78	30
	12.40	0.80	25	10.075	0.65	25
	9.92	0.64	20	8.06	0.52	20
	7.44	0.48	15	6.045	0.39	15
D	4.96	0.32	10	4.03	0.26	10
	2.58	0.16	5	2.015	0.13	5
	1.24	0.08	2½	1.085	0.07	2½

(*b.*)

ASCENDING SCALE.

	49 6	3.2	100	40.3	2.6	100
	52.08	3.36	105	42.315	2.73	105
A I	54.56	3.52	110	44.33	2.86	110
	57.04	3.68	115	46.345	2 99	115
	59.52	3.84	120	48.36	3.12	120
	62.00	4.00	125	50.375	3.25	125
	64.48	4.16	130	52.39	3.38	130
	66.96	4.32	135	54.405	3.51	135
A II	69.44	4.48	140	56.42	3.64	140
	71.92	4.64	145	58.435	3.77	145
	74.4	4.80	150	60.45	3.9	150
	76.88	4.96	155	62 465	4.03	155
	79.36	5.12	160	64.48	4.16	160
A III	81.84	5.28	165	66.495	4.29	165
	84.32	5.44	170	68.51	4.42	170
	86.80	5.6	175	70.525	4.55	175
	89.28	5.76	180	72.54	4.68	180
	91.76	5.92	185	74.555	4.81	185
A IV	94.24	6.08	190	76.57	4.94	190
	96.72	6.24	195	78.585	5.07	195
	99.20	6.40	200	80.6	5.2	200
	111.60	7.20	225	90.675	5.85	225
Etc.	124.00	8.00	250	100.75	6.50	250
	136.40	8.80	275	110.825	7.15	275
	148.80	9.60	300	120.9	7.80	300
Etc.	161 20	10.40	325	130.975	8.45	325
	173.60	11.20	350	141.05	9.10	350
	186.00	12.00	375	151.125	9.75	375
	198.40	12.80	400	161.2	10.40	400

INDEX.

How to Use the Index :— All therapeutic agents will be found in italics, thus, *Arsenicum.* The particular page on which the general indications for a remedy is given will be in face type, thus:

Arsenicum **115, 116, 159, 179, 183, 185, 188, 189, 190, 196, 204**

This means that while casual reference to *Arsenicum* is found on pages 115, 116, 159, 179, 183, 185, 188, 189, 190, 196, the particular page on which the general indications for the use of this remedy are given is page 204.

All other matter in ordinary type.

	PAGE.
Aberdeenshire	140
Abscesses	229, 223
Perinephritic	252
Accentuation	172
Acetate of Iron	210
of Potassium	180
Acetone	381
Acid, acetic	40
Citric	40
Nitric	13, 17, 40
Picric	40
Acidum, Boracicum	240
Carbolicum	206
Acidum, Citricum	334
Hydrocyanicum	196
Nitricum	115, 153, 213
Nitromuriaticum	113
Oxalicum	285
Phosphoricum	163, 214
Picricum	215
Salicylicum	282
Aconite	119, 122, 179, 188, **202**, 254, 316, 326, 358
Adenoma	308
Adirondacks	273
Adonidin	167

PAGE.
Adonis Vernalis.....167, 185, 207
Agaricus.....155, 196
Albumin 11
Tests..... 11
Estimation..... 16
Testing 198
Albuminimeter 17
Albuminoids 192
Albuminuria.....74 to 255
Diabetic..... 395
Functional 76
Organic .....77 to 255
In pregnancy..... 177
Tuberculous..... 299
Alcohol 132, 189, 396, 397
Sweats 178, 195, 197
Stupor..... 193, 194
Ale..... 133
Alkaline phosphates.....5, 38
Waters.....186, 208, 290, 330
Urine.....270, 287, 318
Aloes..... 185
Alum 187, 344
Ammonia.....40, 189
Aromatic 118
Ammonium carbonate..... 318
Muriaticum 154, 160, 190
Amyl Nitrite 121, 183
Amyloid disease of Kidney, see Lardaceous disease.
Amyloid Liver..... 401
Anacardium 196
Anæmia.....126, 129, 196, 210
Aortic..... 175
Pernicious 402
Analyses of Urine....148, 150, 171, 237, 264, 271, 302, 375, 395, 403, 405
Anæsthetics..... 182
Anasarca 197, 202, 213
Aneurism 183
Angina Pectoris.....170, 184
Angioma 308
Antimonium Crudum. ..... **203**, 32.
Antimonium Tart.....179, **202**
Antipyrin.....291, 367, 382, 392
Anuria 357
Aortic disease 173, 186
Apex beat... 168
Apium Virus..... 121
PAGE.
Apis.....121, 160, 179, 189, 196, **203**
Apocynum 157, 179, 186, **204**, 358, 398
Apollinaris 287
Apoplexy 106, 183, 193, 194
Apparatus, chemical 39. 41
Microscopical.....72
Argentum Nitricum.115, 116, 153, **204**, 278
Arkansas Springs.....128, 139
Arnica.....167, 183, 254, 291, 316, 358
Aromatic Compounds.....407
Arrow-root.....240
Arsenicum 115, 116, 159, 179, 183, 185, 188, 189, 190, 196, **204**, 278, 285, 291, 307, 361, 362, 389
Arseniate of Strychnine.....183
Arsenic, Bromide.....343
Arsenic, Iodide.....184
Arsenic and Lithia.....393
Arterial degeneration.....170
Tension.....171, 175, 177, 182, 209
Arterio-Sclerosis.....175
Ascending Nephritis 235
Ascites.....183
Asparagus 285
Aspiration 248
Asthma..... ....106, 183, 184
Astringents.....331
Atheroma.....175
Atropine Sulphate.....361, 365, 398
Atrophy, acute yellow 401
Atlantic Ocean.....141
Aurum Muriaticum.....161, **205**, 391
Australia.....142

Bacilli.....60, 298
Backache.....123, 124, 301
Bacteria.....27, 58, 59, 236, 237, 238, 243
Baltic..... 140
Barley water 240
Barium chloride 38, 40
Barosma.....246
Baryta Mur.....184
Baths, Cold.....364, 365
Hot Air..115, 118, 120, 145, 155, 164, 177, 182, 195, 196, 200
Hot.....244, 329
Steam.....196
Turkish.....185, 386

PAGE.
Baths, Russian 386
Warm 145, 233, 273, 290, 343
Beef Tea 167
Beer 133, 138
Belladonna 115, 127, 179, 180, 183, 185, 196, **205**, 254, 278, 285, 291, 328, 342, 361, 365
Benzoates 159, 162, 195, 199, 246, 361
Berberis 246, 278, 291
Bermuda 141
Bethesda Water 114, 132, 135, 292
Biborate of Ammonium 292
Bicarbonate of Soda 135
Bile in urine 401
Tests 19
Bile 117, 189
Bismarck Brown 72
Bismuth 158, 288
Biuret Test 400
Bladder, diseases of 316
Diseases in Females 332
Diseases of Neck of 339, 345
Epithelium 62
Hæmorrhage 324, 338
Hæmorrhage from Neck of 347
Spasm of 236
Stone in 323
Suppuration in 219
Treatment of Diseases of 325
Tumors of 235, 322
Urine in diseases of 320
Washing out 331, 335
Blaud's Pills 126, 210
Blood 25, 31, 75, 86, 91, 92, 241
Casts 63, 71, 86, 97
Corpuscles 54, 56
Clots 242
From Bladder 222
From Kidneys 222, 225, 255, 256
From Urethra 222
In tuberculous Disease 303
In malignant 303, 306
Boracic Acid **239**, 240, 247, 250, 266 290, 330, 337
Borax 247
Bordeaux 274
Boroglyceride 346
Boettcher's Crystals 351
Boudreau's Pills 126, 210

PAGE.
Bournemouth 140
Brandy 115, 132, 240, 287
Bræmar 140
Bromide of Potassium 33, 366, 391, 393
Bronchitis 183
Brücke's Test 370
Bryonia 113, 122, 278, 390
Buffalo Lithia Water 132, 276
Buttermilk **135**

Cachexia 306
Cactus 161
Caffeine 156, 126, 167, 186
Calcarea 163, 185, **205**, 278, 285, 291, 305
Calcium Oxalate 259, 283
Tests 28, 31, 49, 217
Calcium Phosphate 52, 333
Calculus 256
Analyses 263, 271
Oxalate 259
Phosphatic 260, 264
Renal 256
Situation 261
Treatment 272
Uric Acid 258, 264
Treatment 273
In both Kidneys 262
When to Operate for 293
California 139, 128
Calomel 130, 186, **212**
Camphor 196, 254, 308
Cancer 218, 227 251
Of Liver 401
Renal 303, 305
Of Stomach 400
Urine in 410
Cannabis 285, 326, 327, 342
Cannes 139
Cantani's Powder 277
Cantharides Poisoning 399
Cantharis 122, 155, 160, 179, **205**, 245, 278, 281, 285, 291, 293, 327, 342, 358
Cape Town 139, 140
Capsicum 327
Carbolic Acid 122, **206**
Carbolic Acid 72, 331
Carbonated Water 114
Cardiac asthma 184

PAGE.
Cardiac complications....121, 124, 155, 183
Condition....101
Dilatation....106, 126, 170, 171
Hypertrophy....106, 125, 168, 177, 183
Failure....106, 129, 170, 184
Lesions....183
Carlsbad...154, 188, 275, 284, 288, 293 387, 389
Carolina, South....139, 141
Castor oil....134
Casts....63
Blood....64, 71
Corkscrew....66
Fatty....66
Epithelial....65, 70, 71
Granular....51, 65, 70, 109
Hyaline....64, 71
Mucus....66, 70
Nucleated....65
Oil....66, 109
Pus....64
Yellow....66
Waxy....51, 109
Cataract....396
Catarrh of Bladder....325, 332
Of Kidney....164
Of Prostate....351
Of Urethra....352
Catarrhal Ulcerations....347
Catharsis....125, 156, 186
Catheter....223
Fever....337
Catheterism....335, 364
Caustics....344
Caustic Potash....72
Cavernous Tumors....308
Cells, epithelial....62, 63
Cellulitis....198, 252
Cerebral Symptoms....94, 115, 119, 120, 125
Chamomilla....179
Champagne....133, 283
Chelidonium....189, 190, **207**
Chimaphila....329
China....130, 155, 188, 196, 290, 311, 362
Arsen....159, 196, 240
Chloral Hydrate....126, 130, 180, 196
Chlorate of Potassium....254, 308, 388
Chloroform....180, 196
Chlorides....6, 32, 36

PAGE.
Chloride of Barium....40
Of Gold and Soda....162
Of Iron....**209**
Of Sodium....230
Chlorinated Soda....33, 40
Chromate of Potassium....392
Cider....132
Cirrhosis, renal....88, 104, 107, 111
Of Liver....166, 401
Citrate of Iron and Quinine....130
Citrate of Iron, Quinine, and Strychnine....398
Citric Acid....40
Clap-threads....353
Claret....132
Clinical Notes 179, 180, 196, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 254, 291, 329, 330, 344, 367, 392, 398
Climatology....128, 138
Cloudy Swelling....83
Clots....346
Clysmic Water....114, 135, 326
Cocaine....255, 331, 333, 351, 392
Coccus Cacti....123
Codeine....392
Cod Liver Oil....160, 162, 163, 305, 398
Coefficient of Hæser....7
Of Trapp....147, 150
Coffea....179
Colchicum....**207**
Cold....76, 364
Compress....285, 311
Colic, renal....263
Treatment of....290, 294
Collection of Sediment....44
Coloring Matter, biliary....19
Estimation of....39
Color of Urine....6, 9, 84, 86, 88, 89, 97
Coma....95, 130, 153, 193, 194
Diabetic....379, 394
Complications....106
Congestion, prostatic....349
Renal....166
Congress Water....275
Conium....196
Consistence of Urine....9
Constipation....114, 134, 165, 185
Convulsions....95, 102, 166, 182, 189, 196

PAGE.
Convallaria....126, 166, 186, 207
Copper Tests for Sugar....2, 369, 371, 377
Coronillin....167
Corrosive Sublimate, see *Mercurius Cor.*
Corrosive Sublimate Albuminate....392
Corpulence....76
Corpuscles, blood....55
Mucus....57
Pus....56, 58
Counter-Irritation....125
Cover-glass....46
Cramps....313
Creasote....240, 247, 394
Creolin....331
Crescentic Pad....310
Cresol-Sulphuric Acid....407
Crotalus....123
Croton Oil....125
Cuprum....115, 123, 180, 207
Cups....189, 195, 241, 254
Cyanotic Induration....105
Cylindrical Vessel....42, 72
Cystitis, definition....316
Etiology....316
Diagnosis....317
Prognosis....325
Treatment....325
Urine in....320
Cysto-pyelitis....300
Cystoscope....296, 321
Cystospasmus....362, 368
Cysts....226, 227, 232

Danger of opium habit....393
Denmark....140
Diabetes, complications of....394
Decipiens....374
Insipidus....39, 395, 396
Mellitus....369, 394
And Pregnancy....395
Prognosis in....378
Treatment of....382
Diagnosis of Acute Nephritis....96
Albuminuria, Functional....74
Cirrhosis....88
Chronic diffuse Nephritis....86
Chronic Hyperæmia....91
Chronic Interstitial Nephritis....88

PAGE.
Diagnosis:
Chronic Parenchymatous....84
Chronic Suppurative....234
Cysts of Kidney....232
Cystitis....316, 339
Calculus, renal....256
Calculus, vesical....323, 324
Carcinoma, renal....305
Diabetes Insipidus....395
Mellitus....373
Enuresis....365
Floating Kidney....309
Gonorrhœa....352
Growths in Bladder....322
Hæmaturia....220, 222
Hydronephrosis....229
Hyperæmia....91
Lardaceous Disease....89
Liver Diseases....401
Motor Neuroses....362
Nervous Disorders....402
Oxaluria....283
Peptonuria....399
Phosphaturia....286
Perinephritic Abscess....253
Pyelitis....242
Pyelo-nephritis....235
Pyonephrosis....248
Pyuria....218
Sclerosis....88
Suppurative Nephritis....234
Prostatic disorders....345
Tenesmus, renal....312
Tuberculosis, renal....298
Typhoid Fever....405
Upper-air Passages, diseases of....408
Uricæmia....272
Uræmia....194
Diaphoresis....117, 125, 130, 156
Diarrhœa....135, 185, 214, 305
Diazo Reaction....405
Diet in anuria....358
Acute Nephritis....114, 117
Subacute Nephritis....128
Renal Carcinoma....308
Chronic Nephritis....131
Diabetes....382
Diffuse Nephritis....137
Cystitis....325

PAGE.
Diet in enuresis 365
Lardaceous Disease 137
Lithæmia 273
Cardiac Complications 177
Oxaluria 283
Phosphaturia 287
Pregnancy 118, 180
Prostatic Diseases 351
Pyelo-Nephritis 240
Pyelitis 246
Pyonephrosis 250
Sclerosis 137, 162
Tuberculosis 305
Diffuse Nephritis 85, 99, 103, 111, 117
Digitalis ... 117, 121, 124, 125, 126, 129, 154, 155, 160, 165, 167, **208**
Dimness of Vision 178
Diphtheria 127
Diseases of the Liver 401
Distilled Water 131, 250
Dizziness 178
Diuretics ... 117, 123, 125, 156, 164, 180, 208
Doremus's Ureometer 32
Dropsy 74, 107, 121, 130, 183, 185, 186, 197, 200, 203, 204, 205, 207, 208, 211, 213, 215, 238
Drosera 291
Drowsiness 178
Dry soil 397
Dyspepsia 213, 260, 287
Dyspnœa 178, 209

Eclampsia 103, 192
Eczema 107, 395
Egypt 140
Elaterium 125, 156, 165, 195, 197
Empyema 400
Endocarditis 107, 184
Engadine 140
Enuresis 365
Eosin 72
Epilepsy 194
Epithelial cells 61, 62, 63
Epithelioma 322
Epistaxis 187
Equisetum 367
Erigeron 285
Ergot 307, 311, 338, 348, 351, 366, 398

PAGE.
Erysipelas 187, 207, 395
Esbach's Tube 17
Estimation of Albumin 16
Bile 20
Coloring Matter 39
Chlorides 36
Phosphates 38
Sulphates 38
Sugar 22, 376
Urates 38
Urea 32
Etiology of Renal Carcinoma 305
Cystitis 317, 339
Diabetes 370
Functional Albuminuria 76, 127
Floating Kidney 309
Incontinence of Urine 360
Nephritis 82, 84, 86, 88, 89, 91
Hydronephrosis 229
Oxaluria 283
Perinephritic Abscess 252
Phosphaturia 287
Prostatic Disorders 348
Pyelitis 242
Pyonephrosis 248
Renal Calculus 256
Tuberculosis 302
Uricæmia 272
Eucalyptol 241, 247
Eucalyptus 329
Euonymine ... 116, 154, 159, 179, 189, 208, 278, 348
Eupatorium **209**, 358, 367
Eureka Springs 139
Examination of the Patient in Anuria 358
Calculus 256
Carcinoma 307
Cystitis 340
Diabetes 372, 373, 379, 380
Floating Kidney 309
Hæmaturia 222
Hydronephrosis 225
Incontinence of Urine 360
Paresis of Bladder 363
Perinephritis 253
Prostatic Disorders 348
Pyelo-Nephritis 236
Pyelitis 242
Pyonephrosis 248

PAGE.
Examination in Pyuria....355
Suppurative Nephritis....234
Tenesmus, Renal....315
Tuberculosis....298
Tumors....228
Urethritis....352
Uricæmia....272
Examination of Urine in Albuminuria. 74
Diseases of Renal Pelvis....217
Hæmaturia....220, 222
Hydronephrosis....230
Pyelonephritis....235
Pyuria....219, 220
Pyelitis....243
Pyonephrosis....248
Perinephritic Abscess....253
Renal Calculus....257, 258, 259, 260, 261
Examination of Urine, chemical....5 to 42
Microscopical....43 to 72
Examination of Urinary Sediment,
Chemical....24
Microscopical....48
Exercise....145
Exudative Nephritis....126

Fatty Casts....66, 109, 195
Degeneration....83
Favorable Signs....100
Fermentation, alkaline....243
Saccharine....23
Febrile Symptoms....94, 236, 242
Fehling's Solution....20, 21, 40, 377
Ferric chloride reaction....381
Ferrum..119. 121, 123, 124, 126, 129, 130, 155, 156. 159, 160, 161 186, 188, **209**, 247, 290, 311, 328
Fer. et Chin. Citr.....130
Filtering....10, 40, 42
Fissure in vesical Neck....345
Floating Kidney....308
Fibrous Polypi....322
Flatulent Dyspepsia....287
Florida....139
Folkestone....140
Fowler's Apparatus....133
Fractures....107
France....139
Fremitus, hydatid....232

PAGE.
Friction of the Body....273
Fuchsin....48, 72
Functional albuminuria....74, 98, 399
Disorder of Bladder....332

Gangrene....187
Gastro-intestinal Symptoms....94, 187
Gelatinous Masses....234
Gelsemium....179, 180, 196, 311, 328, 366
Georgia....128, 139, 141
Geranium....338
Gizzards, things with....274
Glonoin....127, 139, 156, 179, 188, 190, **209**
Glottis....189
Gluten Bread....385
Glycerine....125
Glycosuria....372, 373, 395, 403
Gout....75, 157. 159
Gouty Pyelitis....247
Graduate....39
Granular Casts....57, 65, 70, 109, 195
Graphites....392
Growths in Bladder....324
Of Kidney....305, 308
Guaiac....29

Hæmaturia....220, 256, 293, 298
Treatment of....307 311, 347
Hæmoglobin....122, 221, 225
Hæmoglobinuria....220, 311
Hæmorrhage....224
Hæser's Formula....7, 147
Haines's Sugar test....22, 370
Hamamelis....311, 338
Hathorn water....275
Headache....123, 129, 188
Heart, dilatation of....170
Failure....126, 170
In Renal diseases....168
Hypertrophy of....168
Treatment....177, 183, 184
Helleborus....155, 179, 185, 210, 358
Helonias....211, 398
Hemi-albumose....399, 400
Hepar Sulphur....127, 245, 246, 395
Hepatic disorders....153, 159, 166, 192, 208
High tension, arterial....175
Hippuric Acid....6

PAGE.
Hissing in Uræmia 193
Holland 140
Hunyadi Janos 275, 293
Hyaline Casts 64, 71
Hydatid Cysts 232, 233
Hydrastinine 338
Hydrate, Sodium 32
Potassium 21, 40
Hydriodic Acid 398
Hydrochloric Acid 290, 405, 406
Hydrocyanic Acid 196
Hydronephrosis 226, 229, 230, 396
Hydropericardium 108, 189
Hydrothorax 109, 188
Hydruria 396, 397, 402
Hygiene of Acute Parenchymatous Change 115
Acute Diffuse Nephritis 117
Hemorrhage from Bladder 325
Acute Post-Scarlatinal Nephritis 120
Chronic Nephritis 130
Sub-acute Nephritis 128
Uricæmia 273
Hyperæmia 166, 399
Hypobromite process 32

Ice-bag 187
Idiopathic Nephritis 117
Ignatia 179, 359
Increase of urea 199
Increase of urine 199
Indican 39, 407
Indications for use of Remedies 202
Injections 336
Iodide of Iron 210
Iodoform 331, 351
Poisoning 331
Ipecac 211, 309
Insanity and Epilepsy 404
Interstitial Nephritis 111, 132, 215
Intestinal Ulceration 185
Iodides 290, 305, 357, 392
Iodine 190
Iodine Solution 30
Iodoform 392
Irritability of Bladder 365, 360
Prostate 350, 354
Isle of Wight 140
Iron 210

PAGE.
Jaborandi 180
Jaffe's Test 407
Jaundice 76, 108, **189**, 236, 401
Jumbul 392, 398

Kali Bichromicum 122, **153**, 183, 391
Bromatum 391
Iodatum 130, 158, 163, 211, 290, 305
Phosphoricum 305
Kalmia 130, 179, **211**
Kolpo-uretero-cystotomy 295
Kreasote 389, 394
Kreatin 191
Kreatinine 5
Kidney, casts 63
Epithelium 61, 62, **63**
Gouty 88
Hyperæmia of 91
Lardaceous 89
Large Red 89
Large White 83, 85
Pelvis, Diseases 217
Blood from 222
Pus from 219
Situation of 248
Small Red 87
Small Soft 86
Small White 86
Suppurative Diseases of 234
Surgical 235
Syphilis of 201

Labor, Induction of 181
LaBourboule 160
Lactuca 196
Lachesis 123, 179, 212
Lactic Acid 390
Lardaceous Kidneys .. 85, 89, 105, 111, 137, 164, 185, 399
Treatment of 163
Larynx 215
Leeches 125
Lemonade 115
Leptandria 390
Lesions, cardiac 183
Lesions of the Kidneys 87, 106, 115, 170
Acute 96
Complication of an Acute Disease 99

PAGE.
Complication Diffuse....92
In Mineral Poisoning....99
Parenchymatous....99
Lesions, retinal....190
Leucorrhœa....11
Limewater and Milk....114
Lithæmia....274, 280, 372, 402, 403, 404
Tendency to....135, 372, 408
Lithiated Hydrangea....292
Lithiasis....294, 408
Lithium Benzoate....159, 161, 162, 199, 361
Carb....161, 212, 392
Litmus Paper....11
Littré's Glands....62
Liver....166, 228
Cirrhosis of....166
Lipoma....308
Loofah....160
Londonderry Lithia Water....132, 159, 199, 250, 276, 361
Low Tension....177
Liquor Ammoniæ....12
Liquor Ferri Muriatici....366
Liquor Potassæ....12, 361, 370
Liquor Potassæ Test....21
Lumbar Incision....304
Lycopodium....280, 328
Lymphoma....308
Lyons's instrument....32, 35

Madeira....133
Islands....139
Malaga....139
Malaria....141, 157
Malpighian tuft....82
Malta....139
Manipulation....299
Marienbad water....275
Massage....129
And electricity....387
Meats....131, 137
Meat, raw....135
Medullary sarcoma....322
Meningitis....127
Mercurius....113, 116, 161, 245, 246, 254, 316
Corrosivus....118, 120, 122, 127, 129, 130, 158, 159, 162, 165, 179, 212, 213, 327, 361
PAGE.
Mercurius Cyanatus....122, 212
Dulcis....116, 213
Iodatus....158, 162
Solubilis....116, 361, 392
Metamorphosis....83
Mexico....139
Micrococci....59
Microscope....25, 26, 28, 29, 30, 45
Microscopical work....43, 47
Micturition....122, 223, 236, 257, 300, 306, 332, 362, 368
Milk....118, 133, 134, 135
" diet....136, 137, 404
" and bread....131, 404
" pudding....131
" skim....131
" sugar....167
Mineral waters....131, 154, 275, 326, 389
Miscellaneous Surgical measures....295
Mississippi Valley....139
Mitral diseases....172
" obstruction....172
" regurgitation....172, 174
Moselle wine....133
Motor neuroses....362
Mountain air....273
Movable kidney....308
Mucus....27, 30, 31, 243
Casts....70
Corpuscles....57
Prostatic....351
Mucous cloud....8, 28
Multiple renal abscesses....234

Nantucket....139, 140
Naples....139
Naso-pharyngeal catarrh....408
Neck of bladder....223, 339
Catarrhal ulceration of....342, 343, 347
Fissure of....345
Hemorrhages of....347
Inflammation of....341
Suppuration in....339
Varicose condition of....347
Nephrectomy....231, 308, 310
Nephritic complications....163
Nephritis....92, 96, 98, 109, 137, 164, 361
Acute....92, 111, 122, 125, 129, 165, 248, 358

PAGE.
Acute diffuse....99, 117
Acute exudative....98, 113, 126
Chronic... 92, 96, 101, 102, 111, 130 151, 399
Diffuse....160, 299
Chronic diffuse....85, 96, 99, 103, 104, 111, 157, 168
Chronic interstitial....111, 232
Interstitial....85, 104, 111
Post-diphtheritic.... 122
Post-scarlatinal....120, 121, 122
Puerperal.... 101
Scarlatinal....122, 399
Sub-acute....119, 127
Suppurative....177, 234, 235, 237, 252, 349, 359
Tubal.... 85
Nephrotomy.... 231
Nephro-lithotomy.... 294
Neuralgia of the bladder.... 324
Neurasthenia.... 402
Cerebral.... 403
Gastric.... 403
New England.... 141
New Mexico.... 284
Newport.... 139
New growth in bladder.... 324
Nitric Acid....19, 21
Nitric Acid....123, 213, 392
Nitric Acid test.... 14
Nitro-muriatic Acid.... 285
Normal constituents.... 32
Nux Vomica...113, 155, 161, 163, 213, 278, 280, 281, 288, 290, 291, 398, 407

Objects (microscopical) having color.... 49
No color.... 49
Ocimum.... 280
Odor of Urine.... 8
Œdema of glottis.... 189
Of lungs or of glottis.... 107
Oil of bitter almonds.... 407
Oliguria....357, 402
Oliver's test.... 401
Opaque cloudiness.... 38
Open fire-places.... 387
Opium....196, 308, 392, 394

PAGE.
Ordinary constituents of urine.... 48
Organic albuminuria....74, 98
Osteo-malacia.... 400
Osteoma.... 308
Oxygen gas....126, 145, 160, 196
Enemata.... 388
Oxygenated water.... 133
Oxalate crystals....323, 361
Oxalic Acid.... 285
Oxaluria....283, 291, 294
Oxynaphthoic Acid.... 67
Oysters....131, 137, 383

Papaine.... 280
Paraglobulin.... 399
Paraldehyde.... 167
Paralysis of detrusor.... 363
Of sphincter.... 363
Parasites.... 324
Pareira Brava.... 280
Parenchymatous (acute) degeneration....99, 117
(Chronic) metamorphosis.... 100
Change.... 103
(Acute)....113, 115
(Chronic).... 151
Paresis of the bladder.... 363
Treatment of.... 364
Paroxysmal albuminuria.... 75
Pasadena.... 139
Pau.... 139
Peptone. pulverized.... 20
Peptone, tests for....20, 401
Peptones.... 400
Peptonuria....396, 399, 400
Pericarditis.... 107
Perinephritic abscess.... 252
Perinephritis.... 252
Peripheral arteries.... 170
Pernicious anæmia.... 402
Peritonitis.... 107
Suppurative.... 400
Petroleum....213, 246, 281
Phenol....392, 407
Phimosis.... 361
Phloridzin.... 391
Phosphate calcium....26, 52
Triple....26, 53

PAGE.
Phosphate of soda 393
Phosphates..32, 54, 217, 286, 323, 361, 362, 403
Alkaline 38
Earthy 26, 37, 289
Phosphate of Strychnine 288
Phosphaturia 287, 361
Phosphoric Acid 150, 163, 214, 289, 389, 396, 404, 405
Phosphorus 123, 155, 166, 213, 246, 281, 285, 290, 394, 398
Phthisis 107, 406
Phytolacca 215
Pichi 280, 281, 330
Pickles 383
Picric Acid 130, 215
Pilocarpine 118, 179, 200, 392
Piper Methysticum 280
Place of residence 138
Pleural Exudations 400
Pleuritis 107
Plumbum 215
Pneumonia 107, 400, 406
Podophyllum 113, 391
Poisons in the Urine 399
Poland Water 114, 135
Polyps, Fibrous 322
Polyuria 396, 397, 398
Post-Scarlatinal Nephritis 206
Potassium, see Kali.
Potassium Iodide 224
Poultry 383
Precautions in Testing 371
Pregnancy, Albuminurias of 177
Complicated by Bright's Disease 181
And Diabetes 395
Prognosis in Acute Hyperæmia 105
Acute Nephritis 96, 98, 99, 109
Acute Parenchymatous Degeneration 99
Acute Suppurative Nephritis 235
Albuminuria. Functional 98
Albuminuria, Organic 98
Carcinoma 307
Chronic Hyperæmia 105
Chronic Nephritis 99, 104, 105, 108
Chronic Parenchymatous Metamorphosis 99
Chronic Renal Tuberculosis 304

PAGE.
Prognosis:
Complications of Renal Lesions 106
Condition of the heart 110
Cystitis 325
Diabetes Insipidus 397
Diabetes Mellitus 378
Floating Kidney 309
Gouty Kidney 104
Hydatids 233
Hydro-Nephrosis 230
Lardaceous Disease 105
Parenchymatous Change Associated with Diabetes 105
Perinephritic Abscess 253
Puerperal Nephritis 101, 102, 105
Pyelitis 243, 244
Pyelo-Nephritis 238
Pyonephrosis 249
Renal Colic in Children 295
Renal Tenesmus 316
Retention 358
Ureteritis 316
Prostate 312, 352
Hemorrhages from 347
Prostatic Congestion 349
Disorders 348
Hypertrophy 323, 348, 349
Irritability 350
Prostatic Urethra 347
Prostatitis 323
Chronic 349
Protocatechuic Acid 407
Protiodide of Mercury 212
Psychical Influences 143
Puerperal Cases 406
Convulsions 182
Fever 406
Kidney 235
Pulque 133
Pulsatilla 245, 281, 328, 366
Pulse 169
Pus 26, 29, 30, 57, 60, 74, 217, 236, 248, 257, 340, 341, 355, 400
Corpuscles 56, 57, 58
Laudable 56
Plugs 64
Sediment 299
Pyelitis 241, 242, 243 245, 248, 255, 341, 342

PAGE.
Pyelitis calculous 281
Chronic 243, 245, 246 247, 340, 342
Primary 341
Secondary 341
Secondary Acute 342
Secondary Chronic 342
Pyelo-Nephritis 234, 235, 237, 238, 243
Pyelo-Nephrosis 335
Pyonephrosis 241, 242, 247, 248, 255
Pyo-Salpinx 235
Pyridin 167
Pyuria 243

Quality of the Urine 147
Quantitative estimation of Sugar 22
Quantity in 24 hours 1
Quantity to collect 9
Estimation of 16
Of Normal Constituents 32

Ralfe's Test for Peptones 20
Reaction 7, 11
Reagents and Apparatus 39
Reagents and Apparatus for Microscopical Examination 72
Raw Meat 135
Remedial Measures in Acute Diffuse Nephritis 118
Remedies 184
Acute Diffuse Nephritis 118
Acute Hyperæmia 164
Chronic Nephritis 151, 157
Gouty Cases 159
Incontinence of Urine 361
Lardaceous Disease 163
Malarial Cases 159
Nephritis 202
Parenchymatous change 151
Perinephritic Abscess 254
Phosphaturia 288
Pyelo Nephritis 240
Renal Colic 291
Renal Complications 190
Tenesmus 316
Sclerosis 161
Suppurative Nephritis 240
Uricæmia 278

PAGE.
Renal Calculus 256, 258, 263
Renal Colic 290
Renal Colic in Children 294
Renal Diseases, Complications of 183
Renal Hæmaturia 311
Renal Lesions 106
Renal Pelvis 234
Renal tenesmus 314, 315
Renal tuberculosis, chronic 297
Retinal lesions 190
Rheum 122
Rhus Tox 119, 215
Rough method of estimation of albumin 16

Saccharin 329
Salol 184, 185, 330
Salicylates 282
Salicylic Acid 282, 392
Santa Barbara 139
San Francisco 142
Saratoga 139, 142
Sarsaparilla 285
Scilla 186
Sclerosis, complications 161
Of coronary arteries 184
Sclerosis, treatment 107
Sclerotic conditions 186
Scoparius 168
Sediment 24, 25, 26, 51, 53, 60, 286, 289
Collection of 44
Of earthy phosphates 289
Selection of 43
Sediments of triple phosphate 290
Sediments, formation of 285
Sepia 179, 245, 281
Septicæmia 191
Silica 254, 278, 285, 389
Simple pyelitis 244
Situation of calculus 612
Skimmed milk 133
Skin 253
Sleeping rooms 387
Solania 119
Sodium chloride 36
Sodium salicylate 392
Solids 7
Solvent treatment of calculus 277

PAGE.
Soups 131
Southern States 141
Spasm of glottis 408
Spasmodic contraction of ureter 229
Specific gravity 7, 10
Spectroscope 221
Squibb's urea instrument 33
Stigmata Maidis 281
Stomach 285
Stone in the bladder 322, 324
Stramonium 196, 216
Strangulation of the kidney 310
Strophanthus 184
Struma 107
Strychnine 185, 216, 367, 394
Sub-acute nephritis 127
Sugar 20, 21, 22
Sulphates 32, 38
Sulpho-carbolate of Sodium 392
Sulphur 245, 254, 281
Summary of prognosis 111
Suppurative diseases of bladder 312
Kidneys 234
Ureter 312
Urethra 312
Suppuration of neck of the bladder 339
Symptoms of renal tuberculosis 298
Syphilis 107, 157
Of the kidney 201

Tabacum 285, 291
Tallahassee 139
Tarantula 328
Tartar Emetic 202
Tenesmus of bladder 328
Renal 312
Tension, high 103, 175
Low 177
Texas 139
Terebinthina 118, 120, 122, 124, 159, 160, 179, **216**, 246, 288, 293, 358
Test for Albumin 12
Bacteria 28
Bile 19
Bile, acid salts 20
Blood 25
Calcium oxalate 28

PAGE.
Test for Chlorides 36
Coloring matter 39
Micro-chemical 53
Mucus 27, 29
Peptones 20
Phosphates 26, 37
Pus 26, 29
Sodium chloride 36
Sugar 20, 369
Sulphates 38
Ulcers in neck of bladder 345, 347
Urates 25
Urea 32
Uric Acid 25
Tests, apparatus for 40
Test solutions 40
Thlaspi 281
Thomasville 139
Thuja 154, 361
Tides, acid 270
Alkaline 270
Tobacco 385
Torquay 140
Torulæ 59
Total Phosphoric Acid 148
Solids in 24 hours 7
Urea 148
Urine in 24 hours 148
Uric Acid 148
Transparency of urine 8
Tricuspid disease 174
Tube casts 63
Blood 63
Epithelial 65
Fatty 66, 214
Granular 65, 195
Hyaline 64
Illustrations of 51, 70, 71
Mucous 66
Pus 64
Yellow 66
Tuberculosis of bladder 297
Renal 296
Tubercle bacilli 60, 298
Tumors, of bladder 322
Non-renal 228
Renal 227, 305, 308
Turkish bath 386
Typhoid fever 405

PAGE.

Uranium Nitrate.....389, 395
Urates 5
Estimation..... 38
In neurasthenia..... 403
Uræmia.....75, 97
Chronic 199
Symptoms of.....114, 178, 194
Treatment of.....117, 191, 195, 199
Urea 5, 148
In cancer.....401, 410
In diseases of liver..... 401
Estimation of..... 32
In neurasthenia..... 403
In albuminuria..... 75
In pregnancy..... 182
In subacute nephritis..... 129
In urine of poor quality..... 150
In insanity..... 404
In epilepsy..... 404
Urethritis 320, 352
Chronic 354
Gonorrhœal 352
Ureters, calculus in..... 261
Constriction..... 230
Diseases of..... 312
Treatment 316
Suction of..... 295
Uricæmia.....272, 378
Headache in..... 282
In children..... 294
Uric Acid calculus..... 264
Uric Acid in diseases of upper air passages 408
In neurasthenia..... 403
Uric Acid diathesis, see Uricæmia...
Urinary analysis.....pp. 5 to 72
Urine, alkaline from fixed Alkali.... 287
Volatile Alkali..... .....8, 286
Characters, physical..... 6
Color.....5, 6. 84, 86, 88, 89, 91, 97, 402
Consistence..... 6, 9
Constituents 5
Normal 5
Odor..... 6, 8
Quantity in 24 hours.....5, 9, 148
Reaction.....e..... ..6, 7, 11
Sediment 24, 31, 48
Specific gravity.....6, 7, 10
Transparency 6, 8

PAGE.

Urine in abdominal disorders..... 407
Albuminuria (functional)..... 74
Anæmia (pernicious)..... 402
Calculus, renal.....256, 257
Calculus, vesical 323, 324
Cancer.....303, 306, 409
Chronic renal lesions..... 97
Cirrhosis 88
Cystic degeneration..... 232
Cystitis 317, 320, 341
Diabetes.....373, 374, 396
Diabetic coma..... 379
Diffuse lesions..... 86
Epilepsy 404
Functional disorder of bladder.... 332
Growth in bladder..... 322
Hydruria..... .. 397
Hæmaturia 220, 222
Hyperæmia 91
Hydronephrosis 226, 229
Incontinence..... 360
Interstitial disease..... 88
Insanity 404
Lardaceous disease..... 89
Lithæmia 258
Liver diseases..... 401
Motor neuroses..... 362
Neurasthenia 403
Oxaluria.....259, 283
Parenchymatous changes.....82, 83, 84
Paresis of bladder..... 363
Perinephritis..... 253
Peptonuria..... 400
Phosphaturia.....286, 289
Polyuria 396
Pregnancy 178
Prostatitis 320, 323, 349, 351
Pyelitis.....243, 303
Pyelo-nephritis..... 236
Pyonephrosis. 248
Pyuria.....219, 355
Sclerosis 88
Subacute nephritis 128
Suppurative nephritis.....236
Tuberculosis 298, 301
Typhoid fever..... 406
Upper air passages (diseases of)... 408
Uræmia 198
Ureteritis 312

	PAGE.
Urethritis	352
Uricæmia	258, 273
Uva Ursæ	293, 329
Vaginal epithelium	62
Vals	275, 277
Valvular lesions	96
Varicose conditions	324, 347
Vascular tension	76
Tumors	322
Vascular thickening of kidney	104
Vaseline	335, 388
Veratrum Vir	179, 180, 196
Vertigo	175
Vesical, see bladder and cystitis	
Vichy	114, 154, 247, 275, 277
Villous tumors	322
Volume of urine	148
Vulvitis	361
Waters, drinking in cystitis	325
In lithæmia	276
In oxaluria	284
Watery urine	226
Washing out, bladder	331, 335
Stomach	285
Waxy kidney	89
Whisky	284
Whole wheat bread	274
Womb, diseases of	332
Woollens	118, 273, 397
Wormwood	244
Zooglœa	59
Zymotic diseases	248

THE WORKS OF

NICHOLAS SENN, Ph.D., M.D.,

Professor of The Principles of Surgery and Surgical Pathology, Rush Medical College, Chicago.

I.

EXPERIMENTAL SURGERY.

Contents—Fractures of the Neck of the Femur, with special reference to Bony Union after Intra-Capsular Fracture. II. Experimental Researches on cicatrization in Blood Vessels after Ligature. III. An experimental and clinical study of Air-Embolism. IV. The surgery of The Pancreas as based upon experiments and clinical researches. V. An experimental contribution to Intestinal Surgery, with special reference to the Treatment of Intestinal Obstruction. VI. Rectal Insufflation of Hydrogen Gas as an Infallible Test in the Diagnosis of Visceral Injury of the Gastro-Intestinal Canal in Penetrating Wounds of the Abdomen.

Complete in One Handsome Volume, 8vo. Cloth $5.00; Half Mor. $6.00.

The different parts of this volume have been published from time to time in Transactions of The American Surgical Association, and in periodicals not readily accessible to the majority of the Medical Profession. In response to a very general demand they have been revised by the Author and published in a convenient sized volume, carefully indexed.

II.

INTESTINAL SURGERY.

Contents—The Surgical Treatment of Intestinal Obstruction. II. An experimental contribution to Intestinal Surgery with special reference to the Treatment of Intestinal Obstruction. III. Rectal Insufflation of Hydrogen Gas as an Infallible Test in the Diagnosis of Visceral Injury of the Gastro-Intestinal Canal in Penetrating Wounds of the Abdomen. IV. Report of cases.

One Handsome Volume, 8vo. Cloth $2.50.

From The American Journal of Medical Science.

In a work characterized not only by careful arrangement and clear exposition, but also by a patience of research and an originality of conception which promise the author a lasting fame in the annals of surgery, there must necessarily be much to praise; and again, it is a poor book in which there is nothing to criticise.

The most striking, the most valuable of Senn's original conceptions or applications are:

1. The uses of gaseous enemeta both for diagnostic and therapeutic purposes.
2. Lateral approximation by decalcified bone plates.
3. The application of omental grafts in abdominal surgery; and,
4. The mechanical irritation of peritoneal surfaces between which it is desired that adhesion should take place.

The value of all these methods has been experimentally proven, and they have been successfully applied by Senn and by other surgeons who have carefully reviewed his work. It is difficult to determine whether the enthusiasm and the confidence with which he writes should be praised or condemned. After completing his book, the surgeon lays it down with the conviction that at last the difficulties and dangers of abdominal work have been overcome, that the definite rules of operative procedure are established, that this branch of surgical knowledge is completed from Alpha to Omega. In the toil and travail of an obscure case there may be a tendency in the mind of the operator to resent this "cock-sure" style which filled his mind with such joyous anticipation, but when one or another of Senn's brilliant expedients has finally brought him to a successful termination, he may be disposed to look more forgivingly on this fault.

The greatest value of Senn's work is its suggestiveness. He has set surgeons in all countries to thinking and planning. His methods as such may none of them be permanent, but he has given an impetus to abdominal surgery the outcome of which none can foresee, but which is full of promise. He is in the very van of progress, a leader who is not infallible, but who has earned by hard work and ability the enviable place he holds in the scientific world.

The gaseous enemeta which he advocates as an infallible test in the diagnosis of wounds of the gastro-intestinal canal will probably not be found to sustain this claim, yet no one can deny the immense value of this method, nor withhold admiration for the genius which prompted its application. Finally, his book should be read to be duly appreciated, and no higher tribute can be paid to its value than that it stimulates the surgeon to better thought and better work.

W. T. KEENER,

Medical Publisher, Importer and Bookseller,

96 Washington Street, CHICAGO.

NOW READY!

RECTAL AND ANAL SURGERY,

WITH A DESCRIPTION OF THE

SECRET METHODS OF THE ITINERANTS.

By EDMUND ANDREWS, A.M., M.D., LL.D.
Senior Surgeon of Mercy Hospital, Professor of Clinical Surgery in Chicago Medical College.

—AND—

E. WYLLYS ANDREWS, A.M., M.D.
Surgeon of Mercy Hospital and Adjunct Professor of Clinical Surgery in Chicago Medical College.

SECOND EDITION. REVISED AND ENLARGED.

The rapid sale of the First Edition now compels the publication of a Second Edition, which has been entirely rewritten and considerably enlarged.

While still keeping to the idea of a practical working treatise, rather than one devoted to the historical and theoretical sides of the subject, it has been felt necessary in the new edition to introduce a chapter upon the special Anatomy of the Rectum and Anal Region, for ready reference in daily practice, and to make clear and unmistakable the exposure of that shallow pseudo-pathology which ignorant or venal specialists have tried to foist upon the public and even upon the profession.

A new chapter has also been added upon "Proctitis" and its most approved treatment.

In the matter of new operations, such as Whitehead's, an endeavor has been made to introduce the latest results of clinical trial as found in periodical literature down to the time of publication, as well as in the newer treatises.

The subject of Anal Fissure has been more fully examined and illustrated than in the last edition, and all the known methods of treatment, including the itinerant and the so-called "systems," carefully considered.

It has been the endeavor in this edition, as in the former, to give relatively a large place to the more common Rectal Diseases which are so constantly coming before the practitioner, and less to the rare and unusual cases which practically are of less moment.

Accompanying the general descriptions of the various forms of treatment, the formulæ which experience has proven most useful have invariably been introduced. The aim has been to select these formulæ so far as possible from the best sources, eliminating those which are untried or have not stood the test of trial.

Another new feature is the FORMULARY at the close of the book, containing over fifty practical working prescriptions, and including all of any note of the best Foreign and American surgeons, as well as some new ones, and those employed by traveling or local "Rectal Specialists" for injection of hæmorrhoids and other purposes.

This Formulary may be relied upon as nearly a complete compilation of the remedies advised by Curling, Van Buren, Ball, Kelsey, Allingham, Esmarch and others, and, for hurried reference, it is believed it will be found a practical benefit to the average practitioner and oftentimes save him the turning over of many volumes when time is precious.

One Volume, 8vo, Cloth. Profusely Illustrated. $1.50 net.
Mailed, Postpaid, on Receipt of Price.

W. T. KEENER, Medical Publisher, Importer and Bookseller.

96 Washington St. CHICAGO.

Branch Store: Northwest corner Congress and Honore Streets.

NOW READY!

INSOMNIA

—AND—

OTHER DISORDERS OF SLEEP.

—BY—

HENRY M. LYMAN, A.M., M.D.

Professor of Physiology and Diseases of the Nerves in Rush Medical College.
Prof. of Theory and Practice of Medicine in The Woman's Medical College.
Physician to Presbyterian Hospital of Chicago.

CONTENTS:

I.—Nature and Cause of Sleep. II.—Insomnia or Wakefulness. III.—Remedies for Insomnia. IV.—Treatment of Insomnia. V.—Dreams. VI.—Somnambulism. VII.—Artificial Somnambulism or Hypnotism.

'Insomnia and Other Disorders of Sleep,' by Dr. Henry M. Lyman, (Chicago: W. T. Keener), is a medical book whose matter and style carry it into the higher grades of literature. It represents thought and knowledge, and to students interested in psychical research the last half of the book should be useful and attractive. The first half is limited in its adaptability to practising physicians.—*The Nation.*

It is pleasant to find a book which is clearly the result of a natural literary effort and the author's fondness for his theme—a book not written to "supply a long-felt want" or "to fill an existing gap." Dr. Lyman's is such a one, and shows that the subject of which he writes has been a pleasant study. It is readable and full of interest, and is quite up to the times, which is important, as the last work upon Sleep, a very good one by the way, was written by Dr. Hammond nearly fifteen years ago. Dr. Lyman agrees with Mosso that sleep depends rather upon molecular disturbance than upon fluctuations in the blood-supply, which is the modern and generally accepted theory.

His considerations of the pathological states which induce wakefulness are especially full and practical, and his therapeutical suggestions, despite a tendency to polypharmacy and rather heavy dosage, are in the main excellent.—*The New York Medical Journal.*

Those who would like to acquaint themselves with what science has to say on these topics and learn how they are regarded by the wisest students of this age, may turn with profit to the pages of this book. The author is well known, not only as a skilled physician and accomplished teacher, but as one of the most polished writers of the American Medical Press.—*Philadelphia Medical and Surgical Reporter.*

The author has evidently brought to bear upon the subject, extended research, and close observation. Insomuch that there are few medical practitioners who may not find in it much that is both interesting and profitable, that is practical * * * * * It is the best book on the subject.—*The Sanitarian.*

ONE VOLUME. 12MO. CLOTH, - - $1.50.

W. T. KEENER,

Medical Publisher, Importer and Bookseller,

96 Washington St., CHICAGO.

Branch Store: ***Northwest*** *corner Congress and Honore Streets.*

NOW READY!

Indigestion and Biliousness.

—BY—

J. MILNER FOTHERGILL, M.D.,

Member of the Royal College of Physicians of London; Senior Assistant Physician to the City of London Hospital for Diseases of the Chest (Victoria Park); late Assistant Physician to the West London Hospital; Associate Fellow of the College of Physicians of Philadelphia.

"Dr. Fothergill's writings always command attention; they are sprightly and full of instructive facts, drawn mostly from his own large experience. This volume is written from a physiological standpoint, and begins with an account of natural digestion, by way of introduction or antithesis to the main topic of the book. As the liver is the great storehouse of supplies for the use of the system, four chapters are devoted to its functions and their disturbances. In referring to the influence of mental strain and worry, Dr. Fothergill says: 'Talking one day with Mr. Van Abbott, whose biscuits for diabetics have such a well-deserved renown, I asked him, "Who are your diabetics mostly?" The reply was very significant. "Business men, comparatively old and gray for their years; men who look as if they had a deal on their minds." This was the response. It stands in suggestive relationship to the fact of acute diabetes being set up by shock or other mental perturbation, or of its artificial production by the puncture of the floor of the fourth ventricle.' The whole book is practical and interesting reading."

"The relation of digestion to habits of life, to methods of living, and to the perfect nutrition of the body, are treated in a masterly manner, and abound in practical hints of the greatest possible utility to the practicing physician. Altogether, the work is a remarkably comprehensive study of a subject which is too little understood by the majority of medical men."

—*New York Medical Record.*

One Volume, 12mo., Cloth, $2.25.

Mailed postpaid on receipt of price.,

W. T. KEENER,

PUBLISHER,

96 Washington Street, CHICAGO.

Branch Store: Northwest corner Congress and Honore Streets.