VET-114
Animal Anatomy and Physiology 2

Webinar – Chapter 16

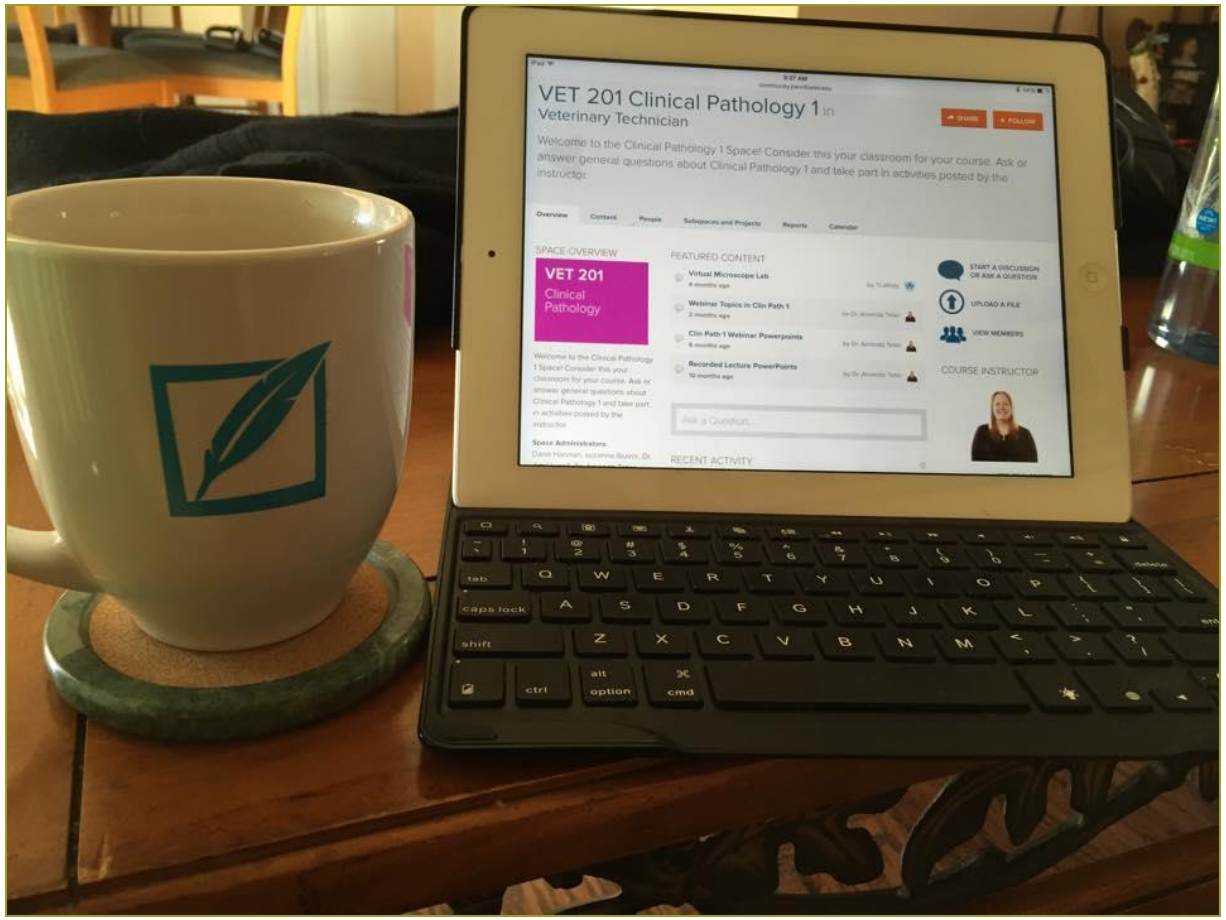
Urinalysis

A Warm Welcome from My Faculty TEAM and Me!!! ☺

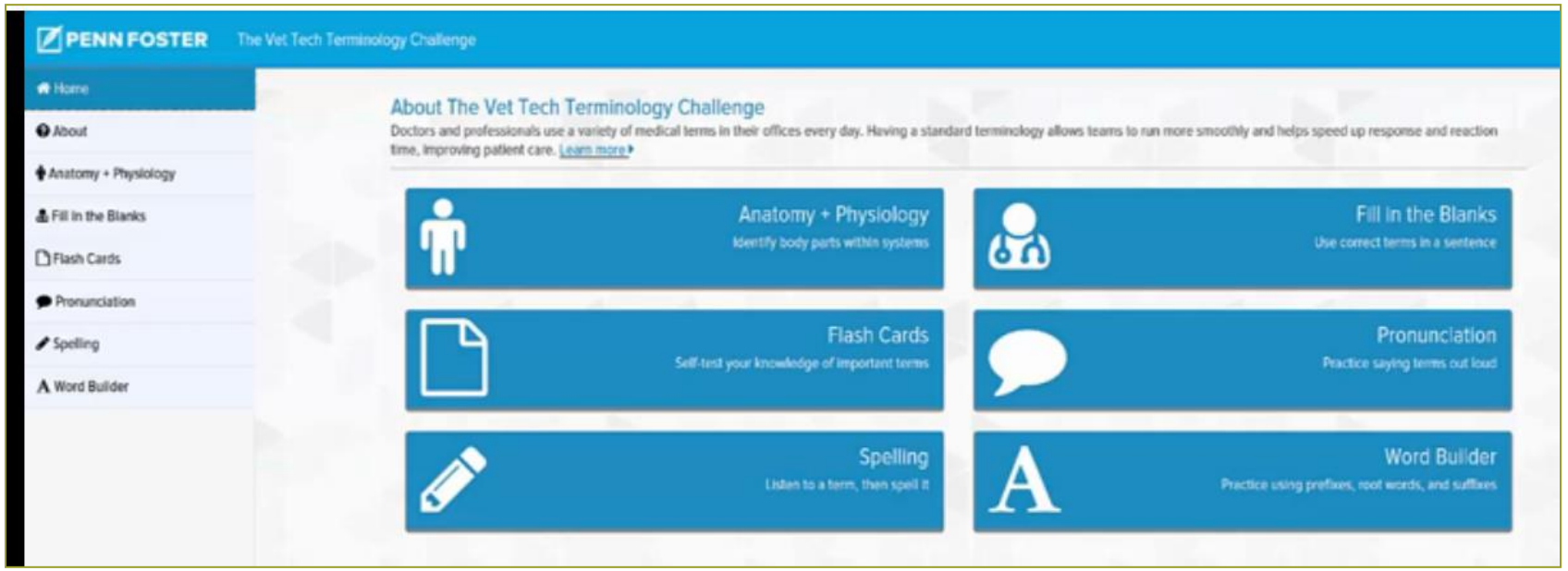
The Pledge of Allegiance

Tribute to Our Military Students and Their Spouses!

Are You Using the Course Spaces?



New “Medical Terminology Game”!

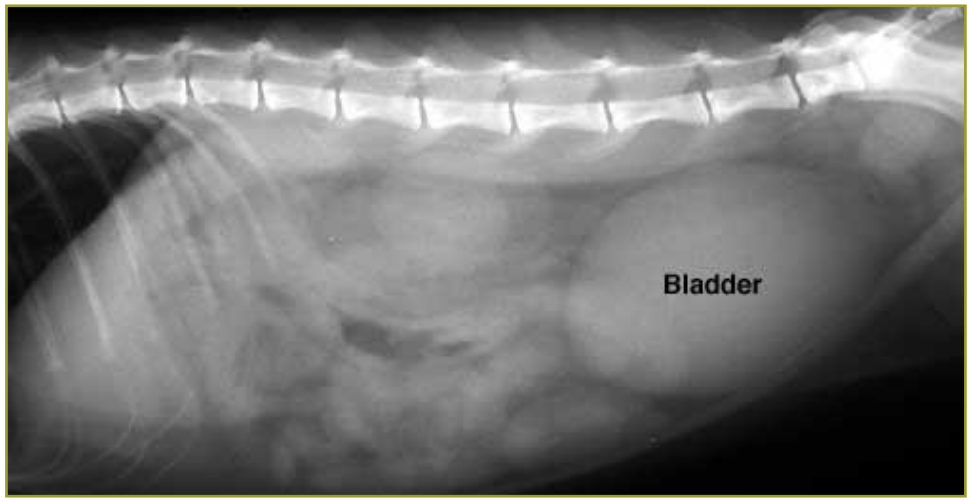


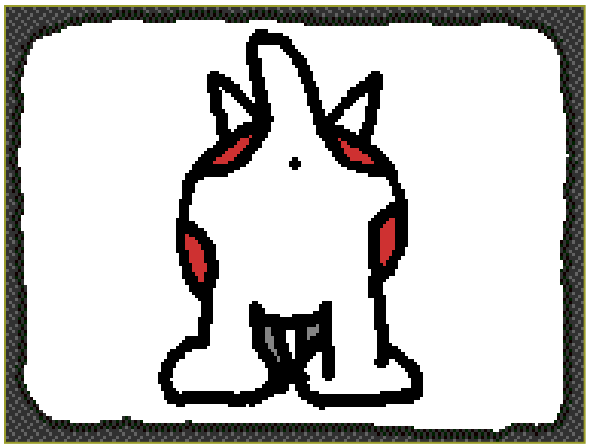
You Better Believe It! ☺

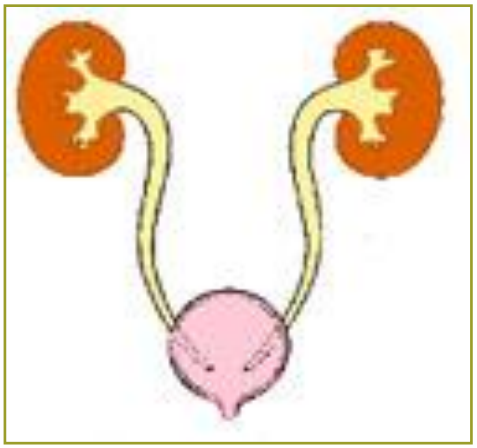
http://www.youtube.com/watch?v=jBTMfKTvhms&app=desktop

The Urinary System

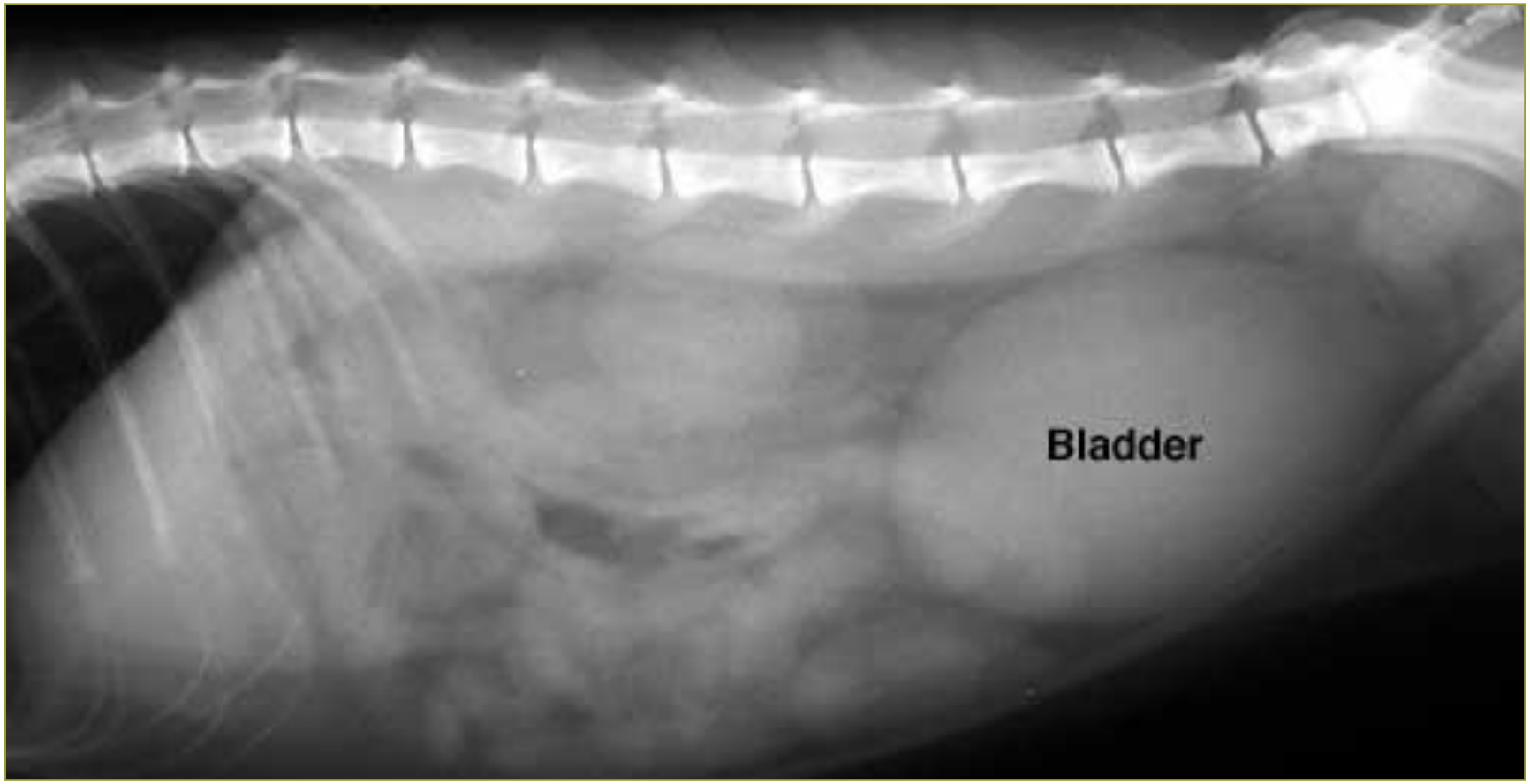
Chapter 16 – Pages 374-386







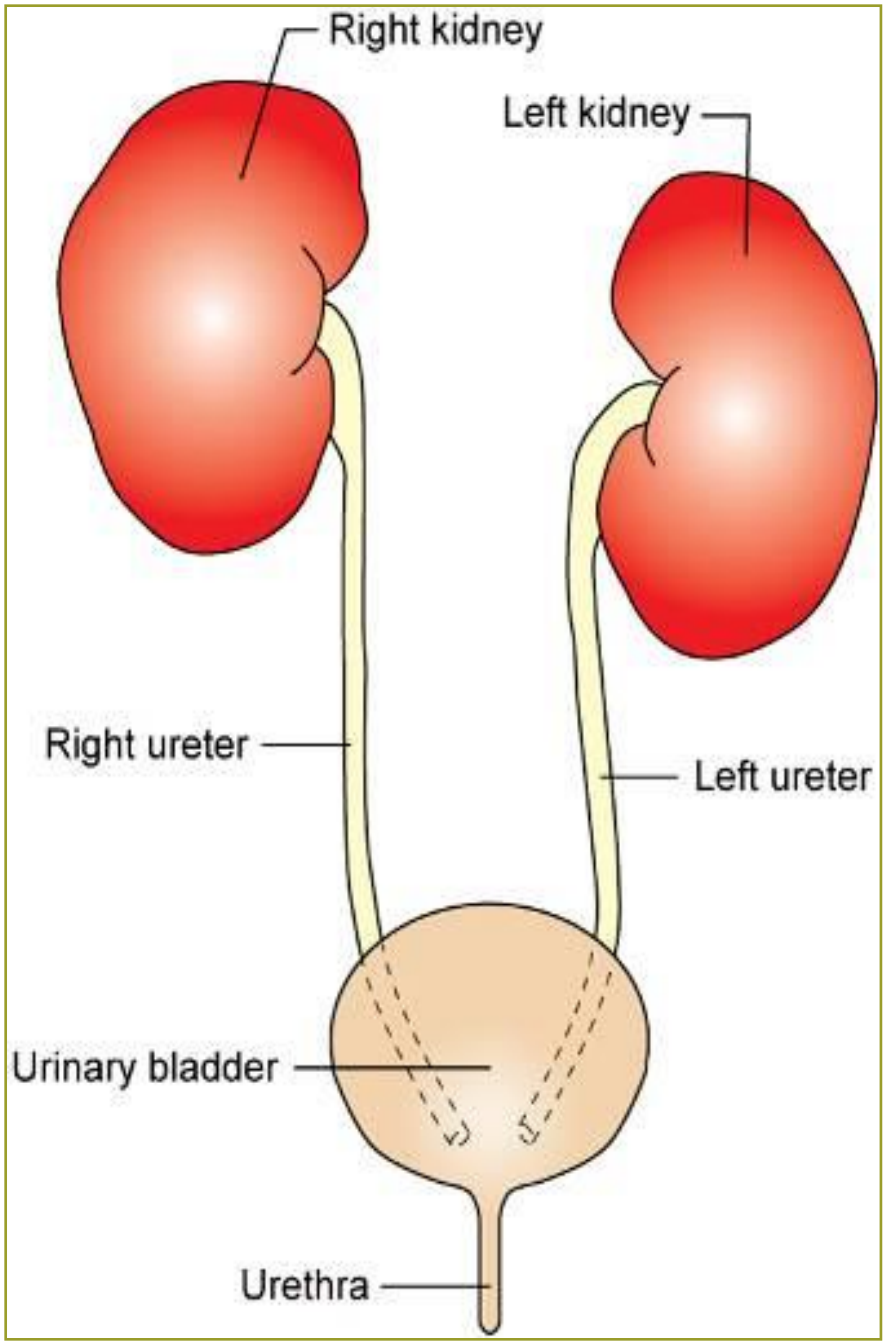
Kidneys, Urinary Bladder



Urinary System Gross Anatomy

Figure 16-1, Page 375

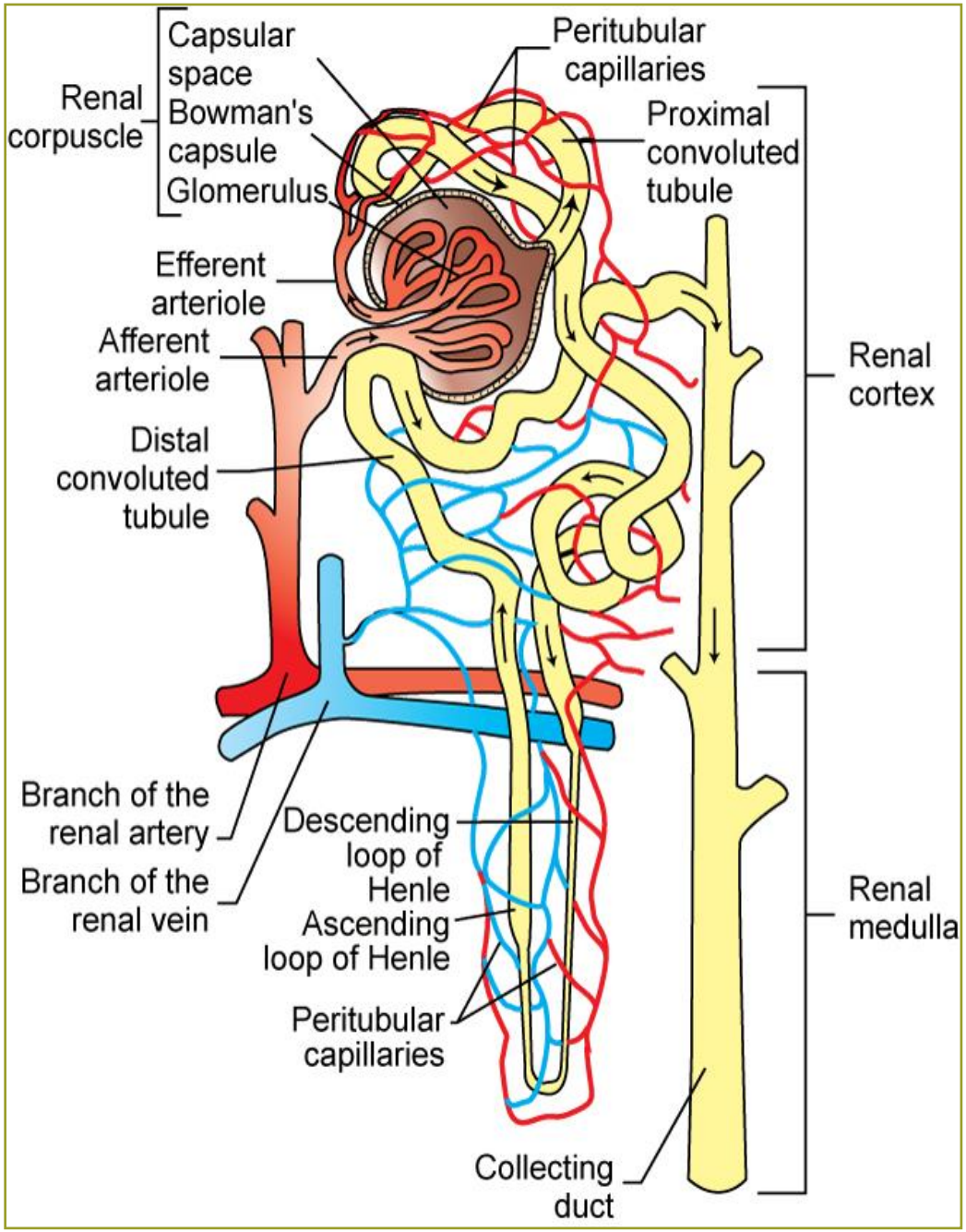
- Urology
- Kidneys
- Ureters
- Urinary bladder
- Urethra



Nephron Structure

Figure 16-3, Page 377

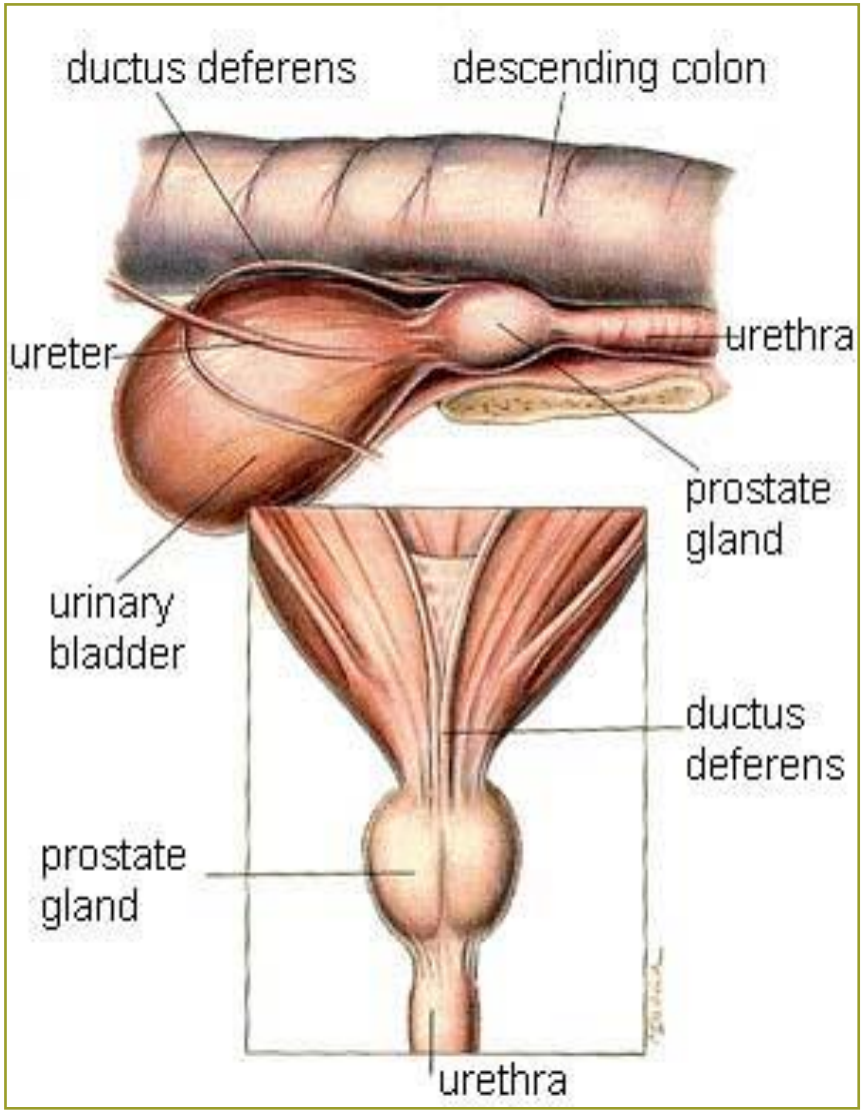
- Glomerulus
- Bowman’s capsule
- Glomerular filtrate
- Proximal convoluted tubule (PCT)
- Loop of Henle
- Distal convoluted tubule (DCT)
- Collecting ducts

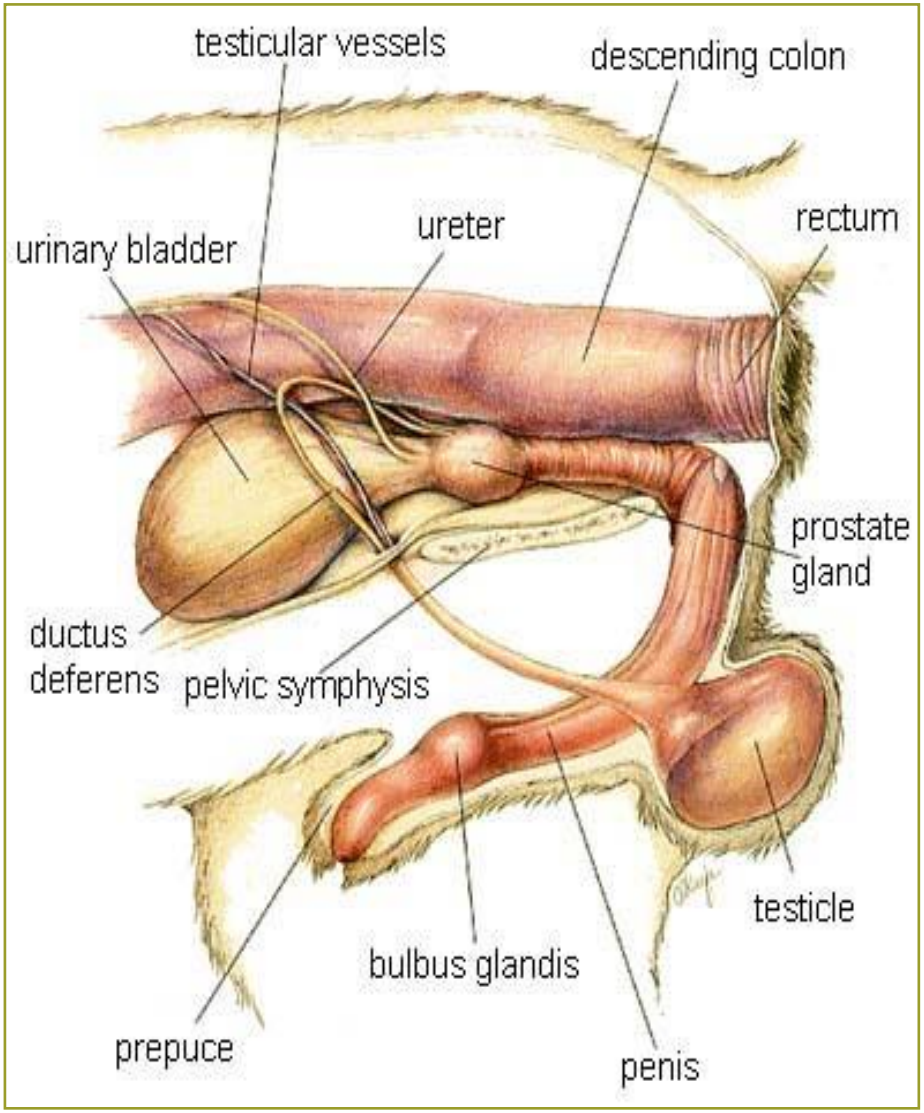


Urethra

- The female urethra is shorter and straighter than the long, curved male urethra
  - In the female the urethra opens on the ventral portion of the vestibule of the vulva
- In the male the urethra runs down the center of the penis and also functions in the reproductive system

Canine Male Urethra





Canine Female Urethra

Bassert Lab Manual – Page 400

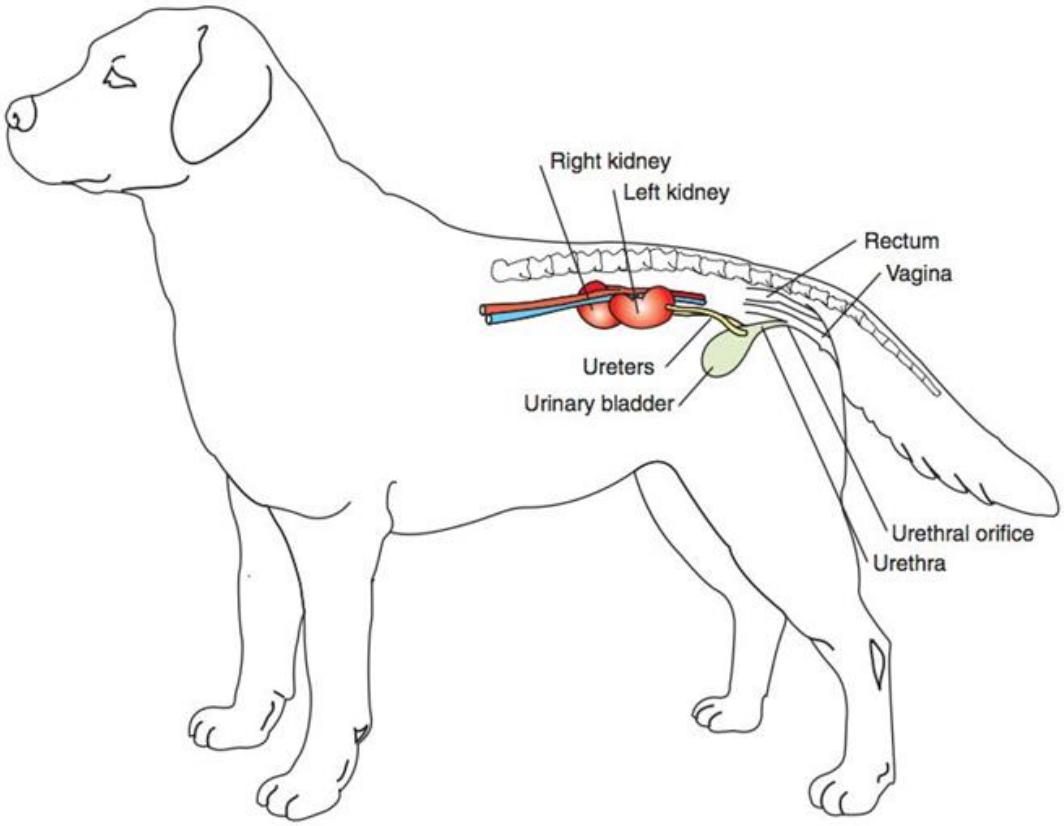


Figure 14–17 In the female (in this case a dog), the urethra opens onto the floor (ventral surface) of the vulva, not directly to the outside of the animal.

Urinalysis

Clinical Application – Page 375

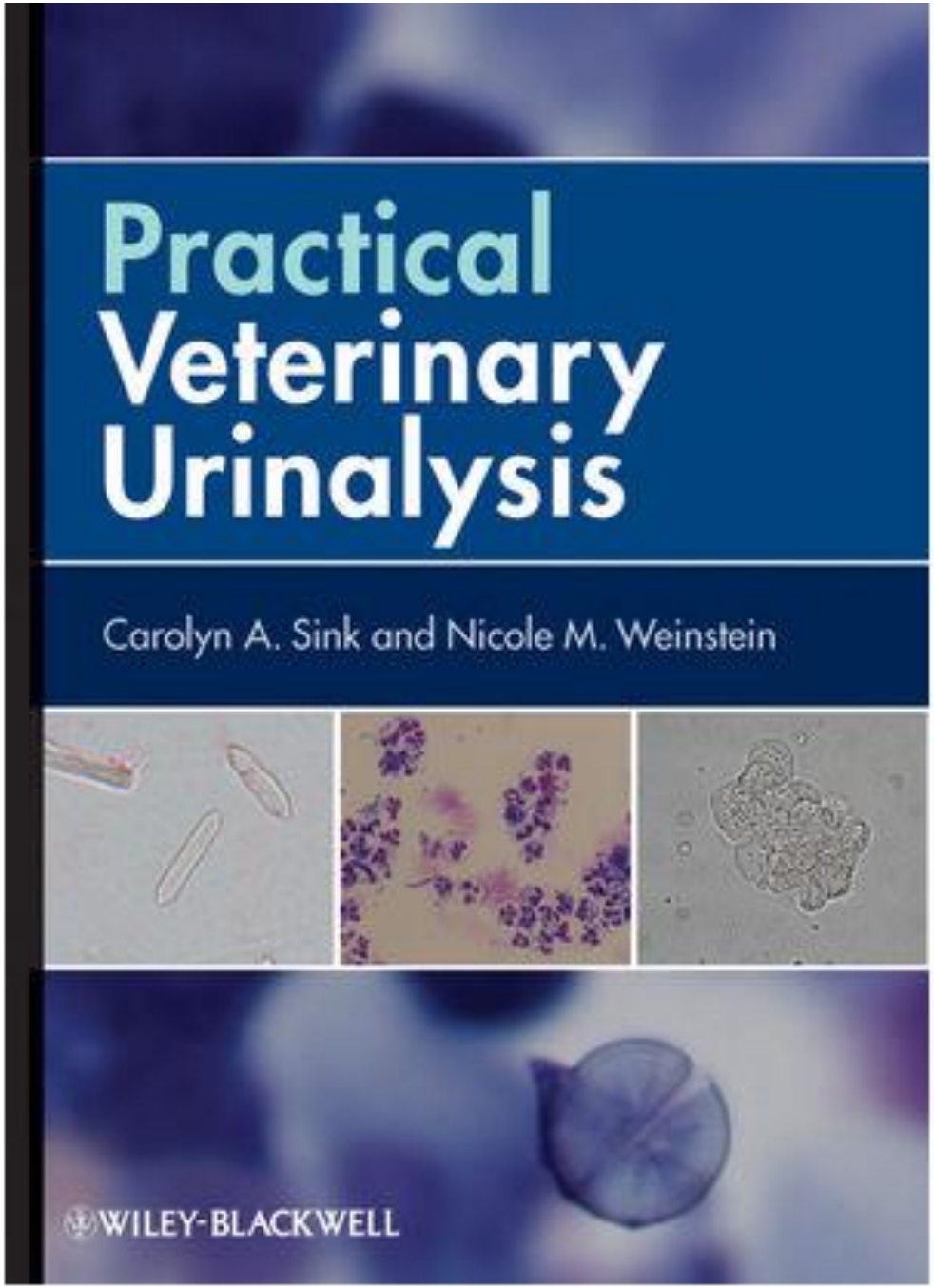
CLINICAL APPLICATION

Urinalysis

Urinalysis (UA) is the laboratory examination and evaluation of a urine sample. It involves a gross (unmagnified) examination for color and clarity, a microscopic examination for formed elements, and a chemical analysis for dissolved substances. A lot of information about how well the kidneys are working and the state of an animal's health can be gleaned from looking at the composition of its urine. A urinalysis is often part of a routine physical examination. Normally urine is about 95% water. Nitrogenous wastes from protein breakdown, electrolytes (e.g., sodium, potassium, bicarbonate, ammonium), and pigments from red blood cell breakdown, foods, or drugs are dissolved in the water. Formed elements such as red blood cells, white blood cells, parasites, and crystals may be present in abnormal conditions.

Get “Armed & Dangerous” in the Lab! ☺

Optional Textbook

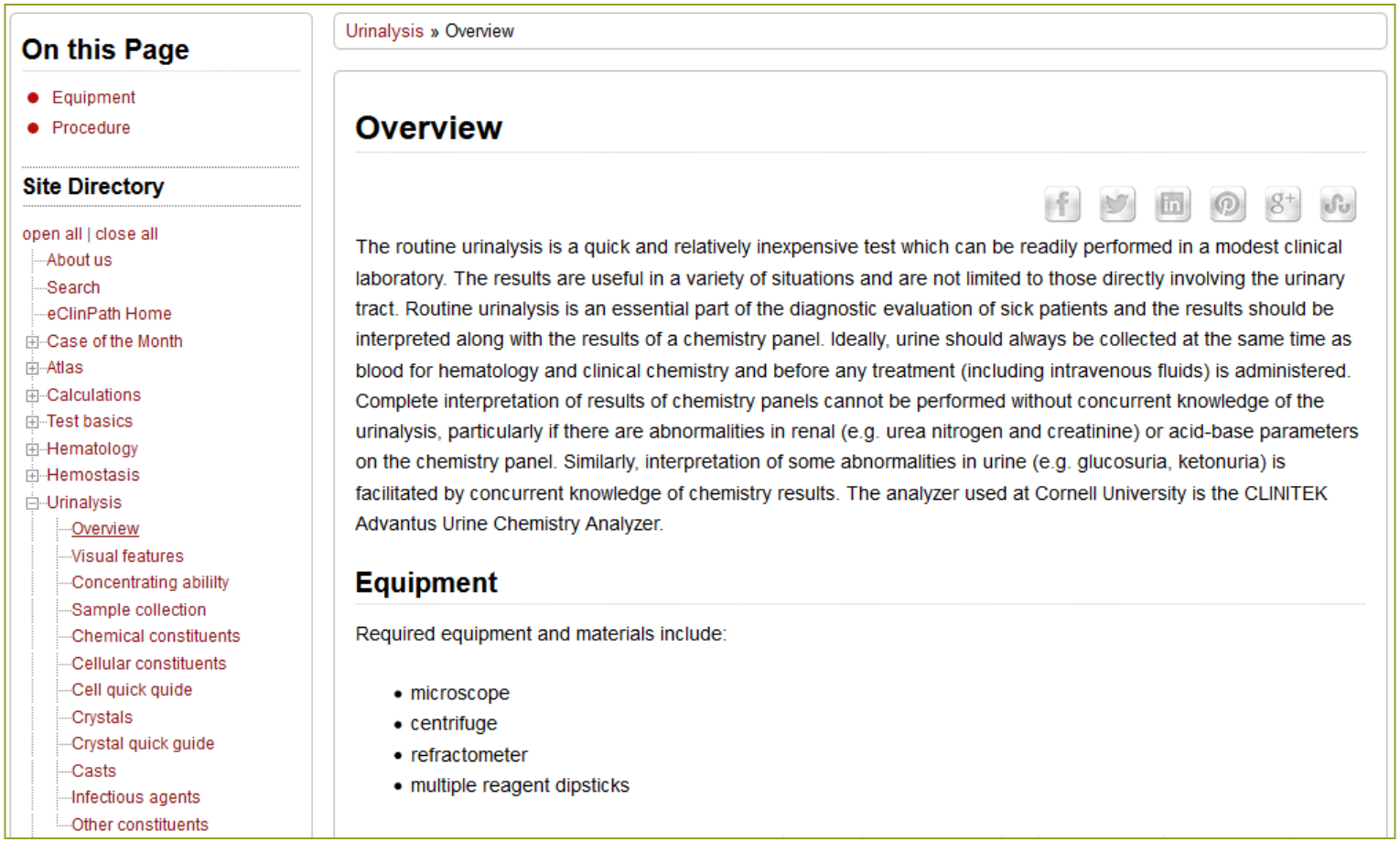


Great Urinalysis Overview

http://www.eclinpath.com/

Urinalysis Topics

http://www.eclinpath.com/urinalysis/overview/



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- Procedure

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  - Crystals
  - Crystal quick guide
  - Casts
  - Infectious agents
  - Other constituents

Urinalysis » Overview

Overview

The routine urinalysis is a quick and relatively inexpensive test which can be readily performed in a modest clinical laboratory. The results are useful in a variety of situations and are not limited to those directly involving the urinary tract. Routine urinalysis is an essential part of the diagnostic evaluation of sick patients and the results should be interpreted along with the results of a chemistry panel. Ideally, urine should always be collected at the same time as blood for hematology and clinical chemistry and before any treatment (including intravenous fluids) is administered. Complete interpretation of results of chemistry panels cannot be performed without concurrent knowledge of the urinalysis, particularly if there are abnormalities in renal (e.g. urea nitrogen and creatinine) or acid-base parameters on the chemistry panel. Similarly, interpretation of some abnormalities in urine (e.g. glucosuria, ketonuria) is facilitated by concurrent knowledge of chemistry results. The analyzer used at Cornell University is the CLINITEK Advantus Urine Chemistry Analyzer.

Equipment

Required equipment and materials include:

- microscope
- centrifuge
- refractometer
- multiple reagent dipsticks

Great Urinalysis Overview

http://library.med.utah.edu/WebPath/TUTORIAL/URINE/URINE.html

Urinalysis

Return to the tutorial menu.

Images available as described below range in file size from 50 to 150k.

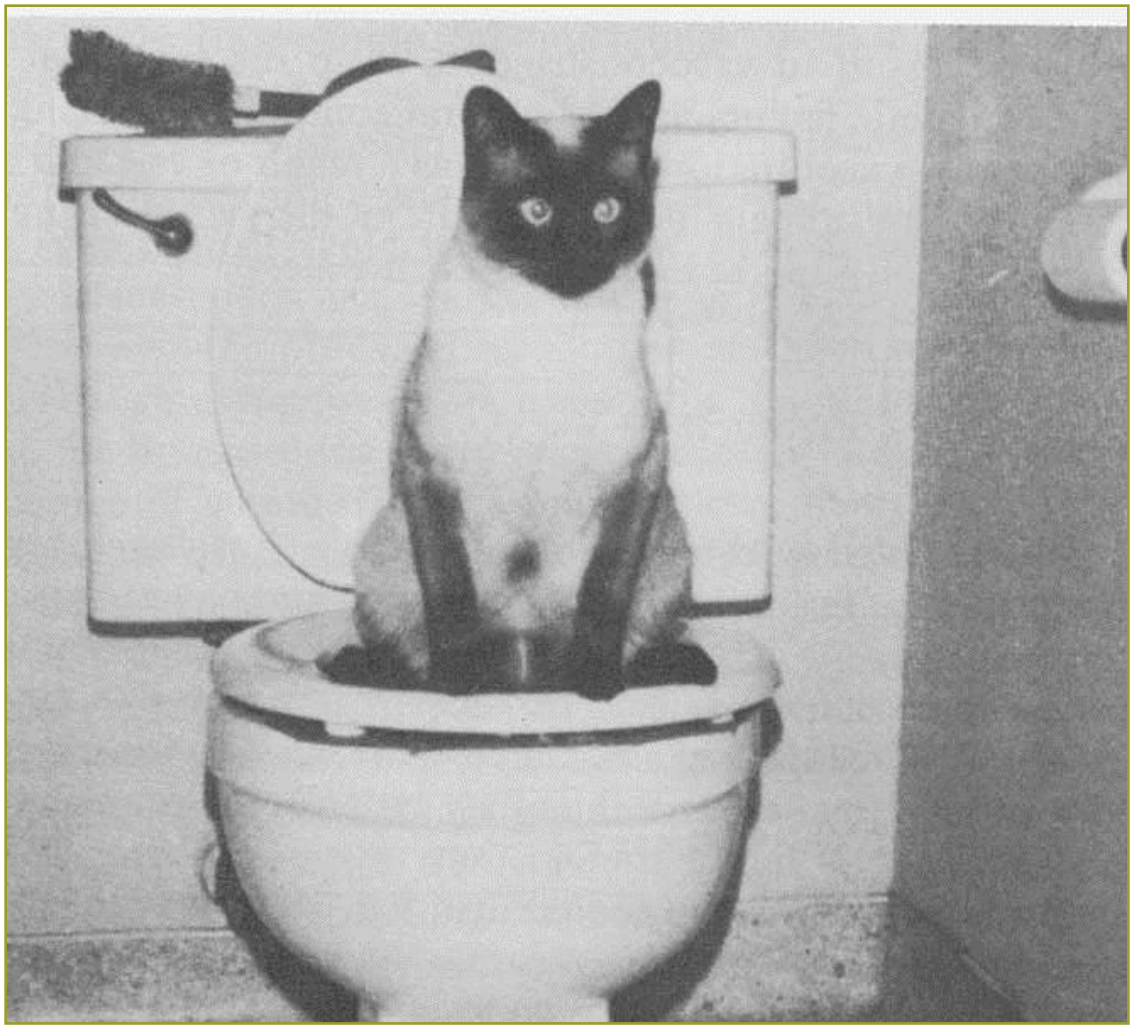
Urinalysis can reveal diseases that have gone unnoticed because they do not produce striking signs or symptoms. Examples include diabetes mellitus, various forms of glomerulonephritis, and chronic urinary tract infections.

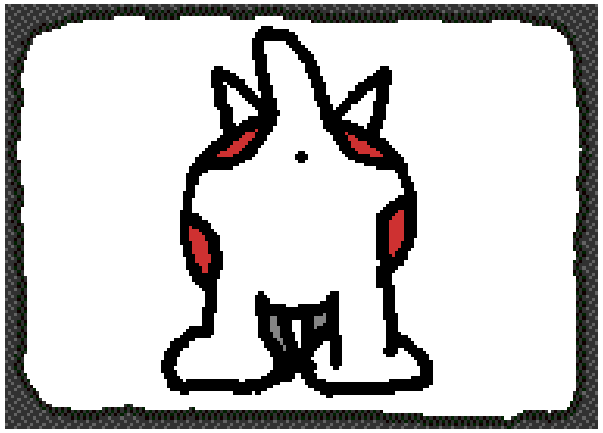
The most cost-effective device used to screen urine is a paper or plastic dipstick. This microchemistry system has been available for many years and allows qualitative and semi-quantitative analysis within one minute by simple but careful observation. The color change occurring on each segment of the strip is compared to a color chart to obtain results. However, a careless doctor, nurse, or assistant is entirely capable of misreading or misinterpreting the results. Microscopic urinalysis requires only a relatively inexpensive light microscope.

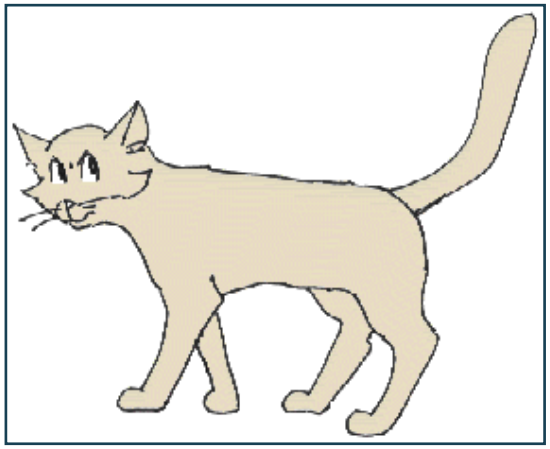
MACROSCOPIC URINALYSIS

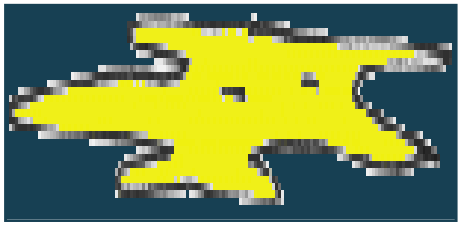
The first part of a urinalysis is direct visual observation. Normal, fresh urine is pale to dark yellow or amber in color and clear. Normal urine volume is 750 to 2000 ml/24hr.

Let’s Get a Urine Sample!









How To Collect?

Voided “Free Catch”

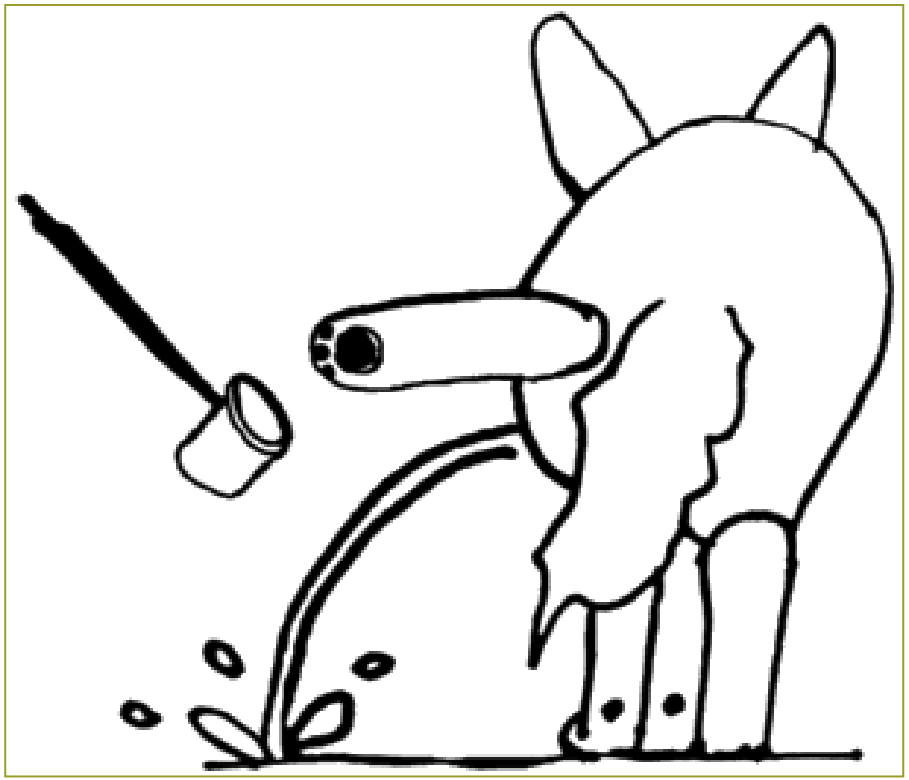
Bladder Expression

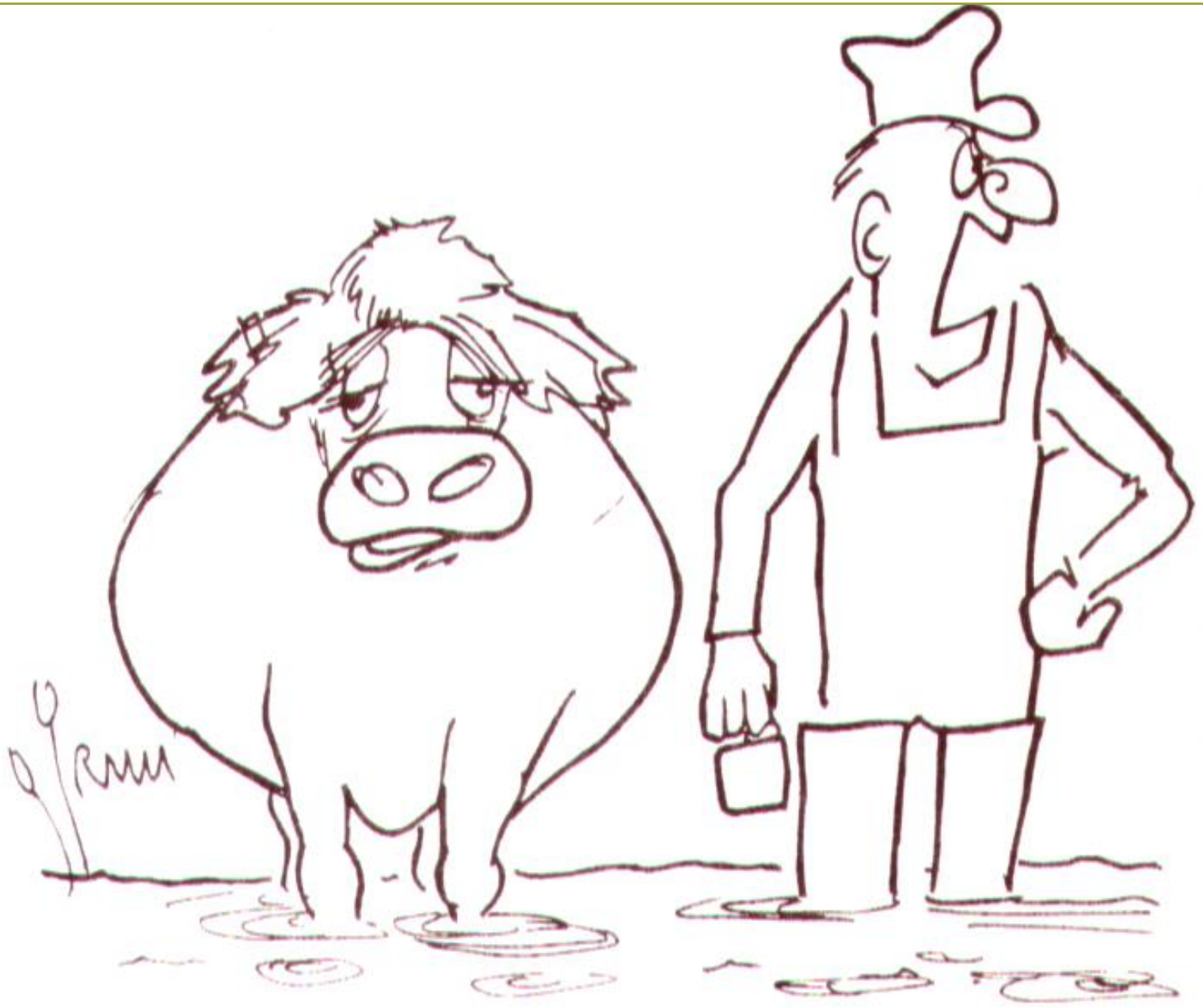
Urinary Catheterization

Cystocentesis

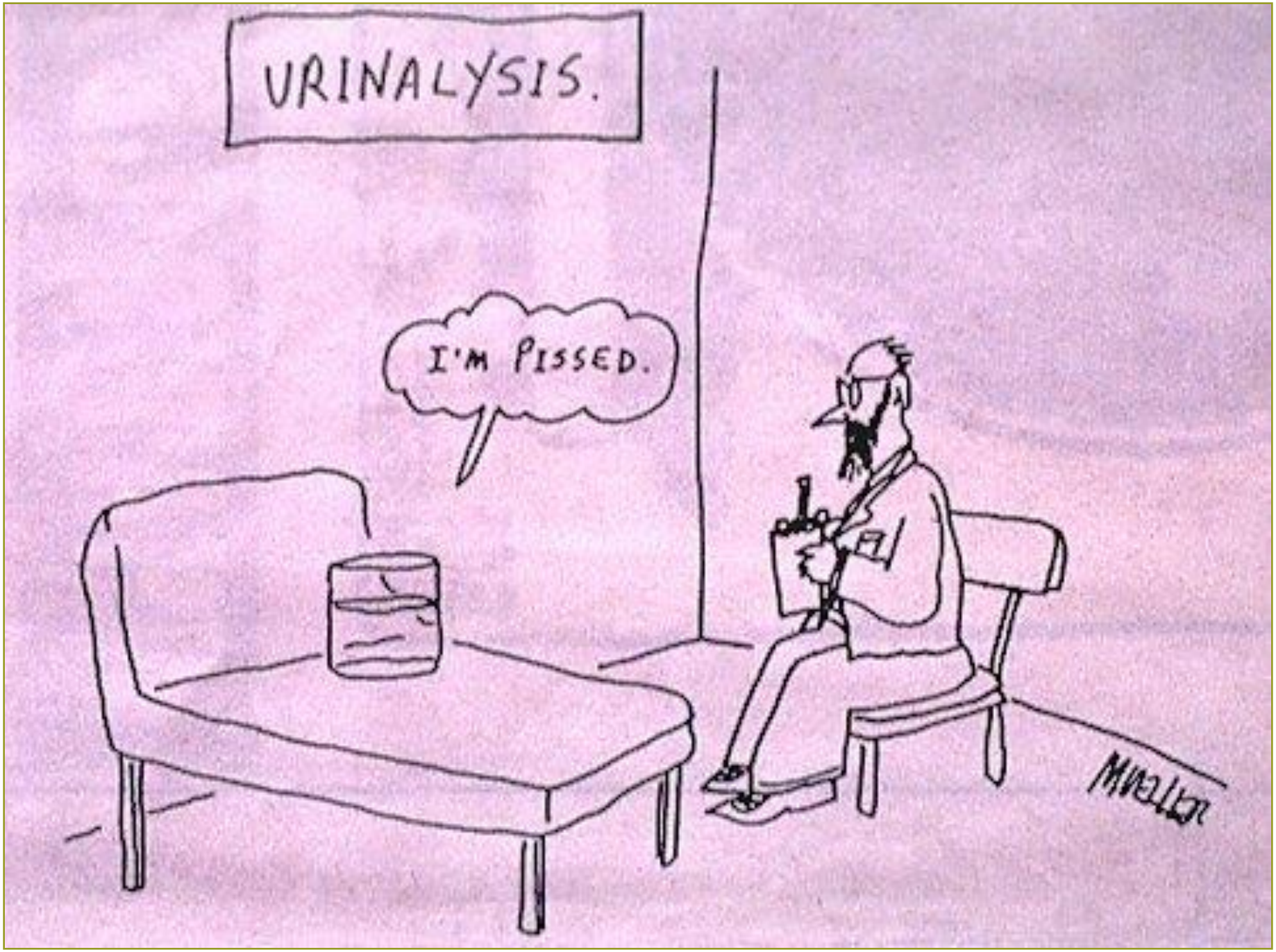
Voided “Free Catch”

- Free flow (clean catch)
- Midstream sample
- Not good for urine cultures
  - Why?





What do you think I'm doing? The Doctor told me to collect a mid-stream urine specimen!"


URINALYSIS.
I'M PISSED.

What Is Urine?

- Definition - The waste product secreted by the kidneys that in mammals is a yellow to amber-colored
- Rich in end products of protein metabolism together with salts and pigments
- 95% water

Urine

0.05% Ammonia
0.18% Sulphate
0.12% Phosphate
0.6% Chloride
0.01% Magnesium
0.015% Calcium
0.6% Potassium
0.1% Sodium
0.1% Creatinine
0.03% Uric acid
2% Urea

95% Water

Reasons for Urinalysis

- Routine diagnostic test
- Surgical patient
- Geriatric patient (part of “Geriatric Profile”)
- Suspected diseases
  - Renal disease
  - Cystitis
  - Diabetes mellitus
  - Neoplasia

GLASBERGEN

Normal or Nuts? ☺

Total Urinalysis

Physical Examination

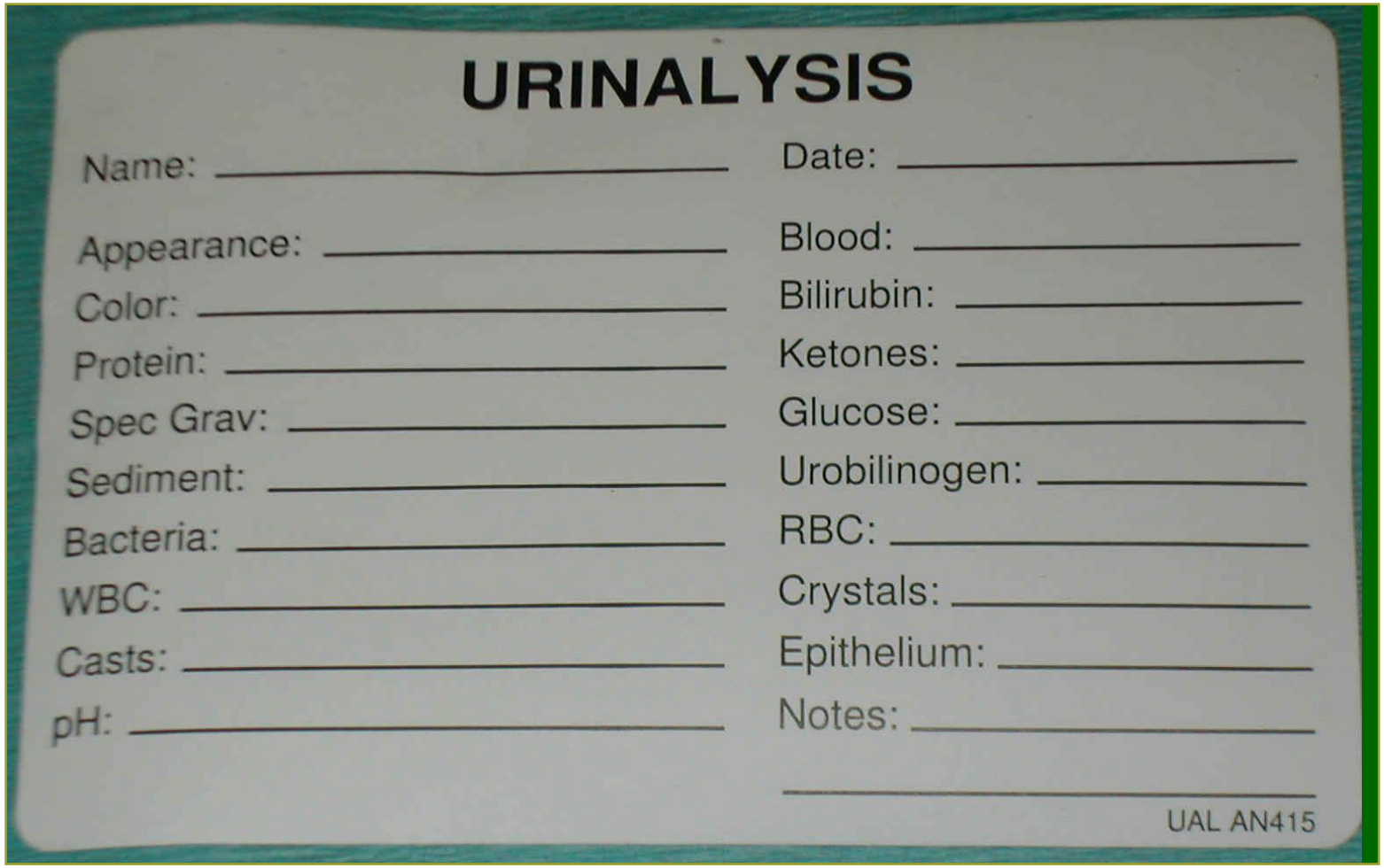
Chemical Examination

Microscopic Examination (“Urine Seds”)

Total Urinalysis

- Definition
  - Provides information on state of the kidneys
  - Provides information on animal's ability to filter & excrete metabolites
- Physical examination of urine
- Chemical examination of urine
- Microscopic examination of urine

Urinalysis Report



1. Physical Examination of Urine

Physical Examination of Urine

- Urine Volume – think "Saltwater Aquarium"
  - 12-20 cc's per pound per day
  - Example – 50 pound dog = 600-1,200 cc's
  - Varies with diet, fluid intake, environment
- Color – depends on concentration of urine
- Transparency – how clear is the urine?
- Odor – bad smell? No taste tests! ☺)
- Specific gravity – density of urine

Observe Colors of Urine

Normal or pathology?

2. Chemical Examination of Urine

Chemical Reagent Strips

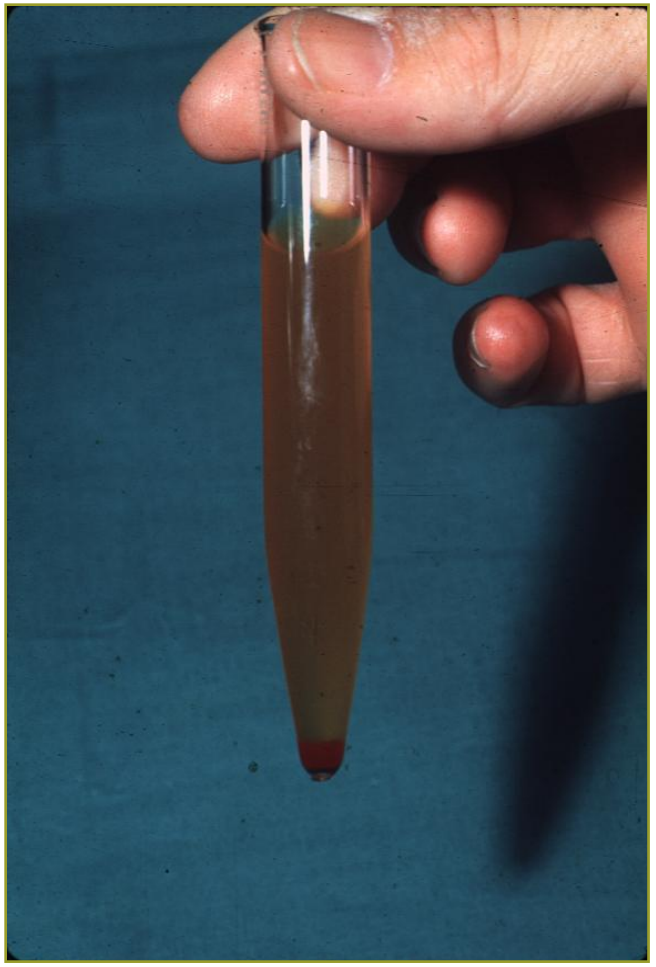
- Usually performed with chemical reagent strip (Chemstrips, Multistix, Dipstix)
- Dip strip into urine
- Read tests results based on color changes
  - Some test results are time-based

Read the Colored Boxes! ☺

3. Microscopic Examination of Urine Sediment ("Urine Seds")

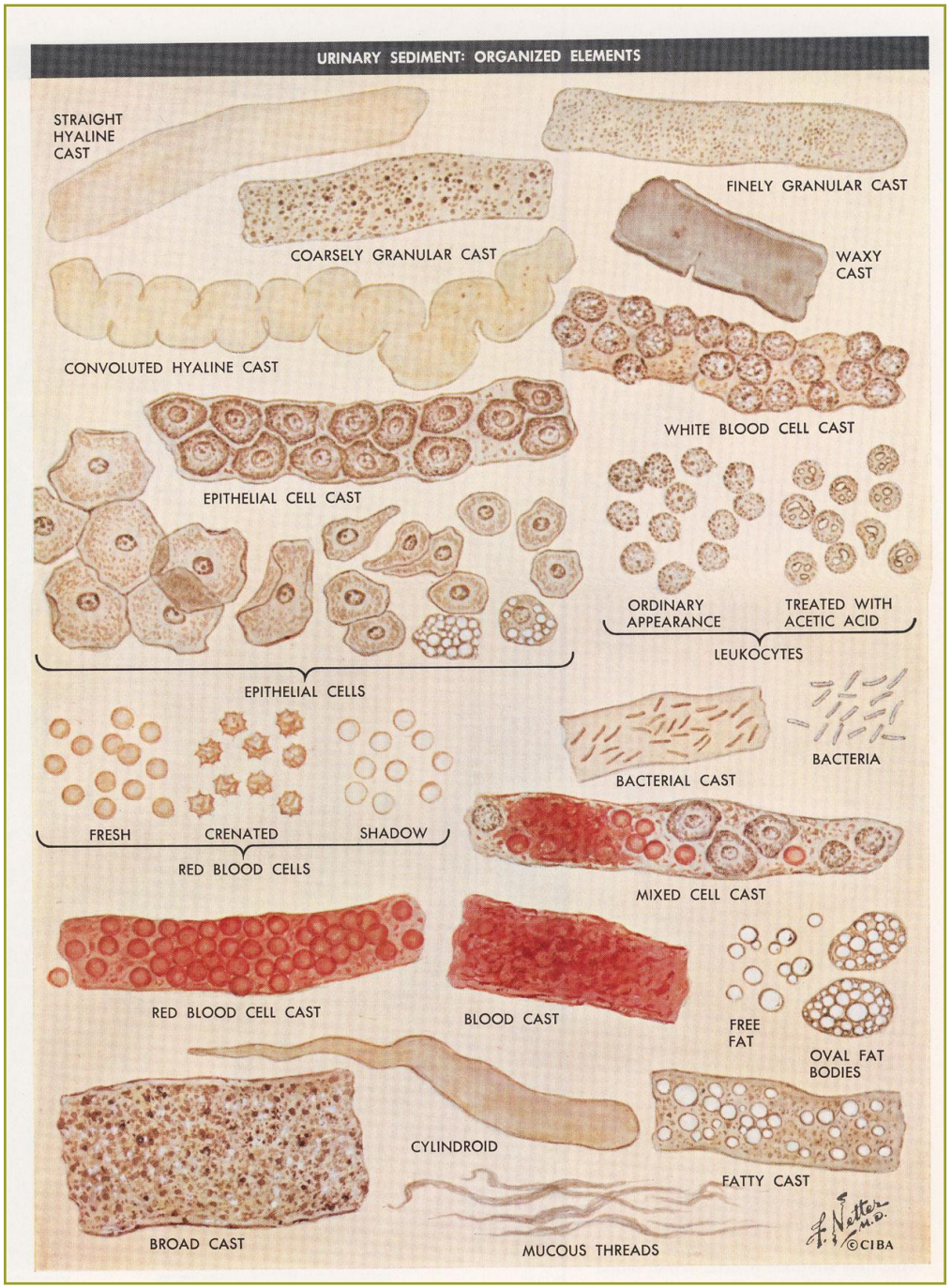
Overview

- Extremely important part of urinalysis
- Should **ALWAYS** be performed
- If not performed, NOT a total urinalysis
- Centrifuged urine sample
  - Use the sediment portion for examination
  - 5 cc's for 3-5 minutes @ 1,000-2,000 rpm's

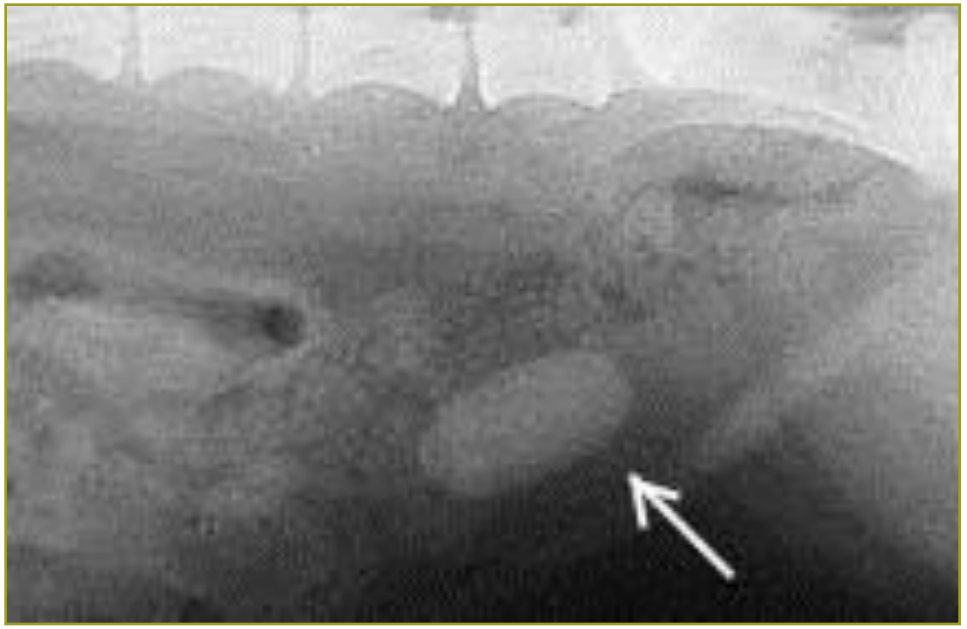


Constituents of Urine Sediment

- Erythrocytes (RBC's)
- Leukocytes (WBC's)
- Epithelial Cells
- Casts
- Microorganisms
- Crystals
- Spermatozoa
- Parasite Ova



Clinical Applications and Diseases of the Urinary System




I'M CONFUSED
...wait, maybe I'm not.

Clinical Applications

- Urinalysis **(Page 375)**
- Renal threshold of glucose **(Page 380)*****
- Urine production review **(Pages 381-382)**
- Renal dysfunction & uremia **(Page 385)**
- Uroliths & urolithiasis **(Page 386)**
- Feline lower urinary tract disease (FLUTD) **(Page 385)**

Clinical Terms

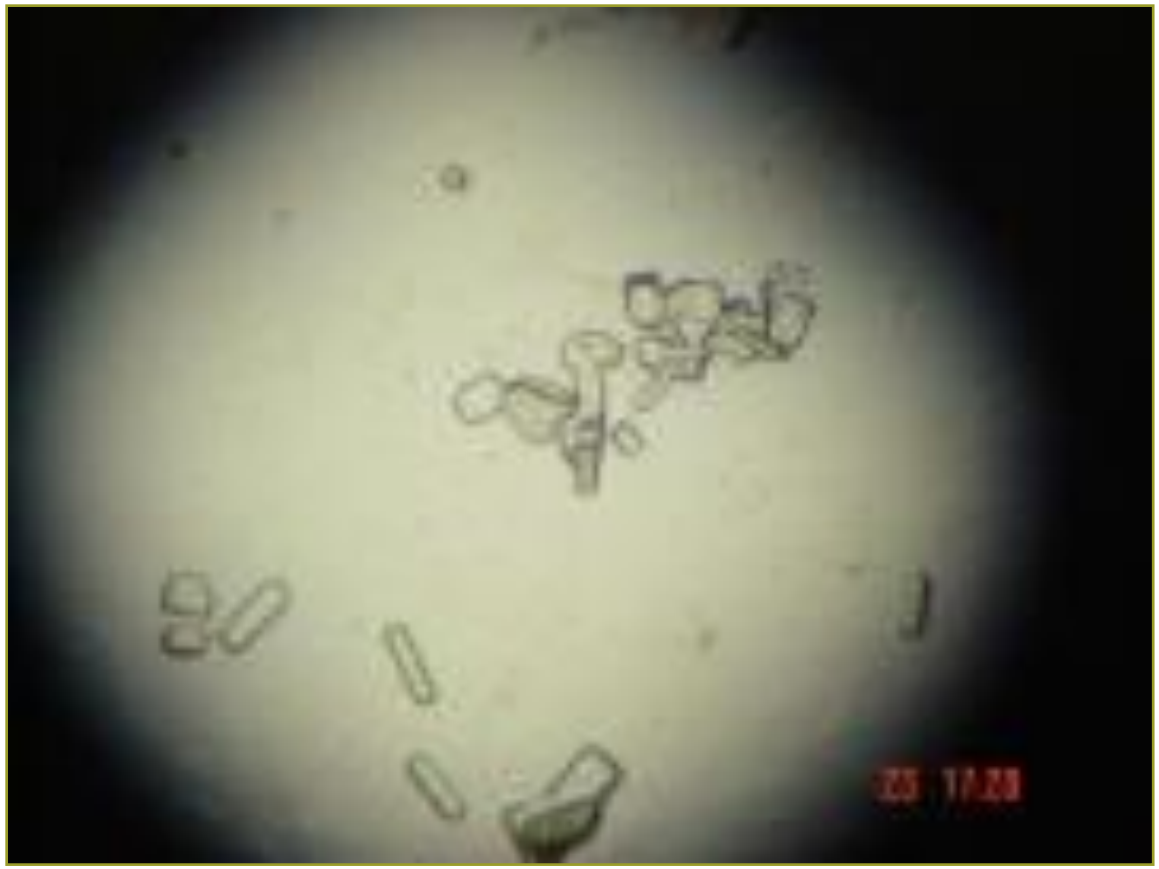
- Diuresis
- Micturition
- Polyuria/Polydipsia
- Express the bladder
- Cystocentesis
- Cystotomy
- Pneumocystogram
- Perineal urethrostomy (PU)

Micturition

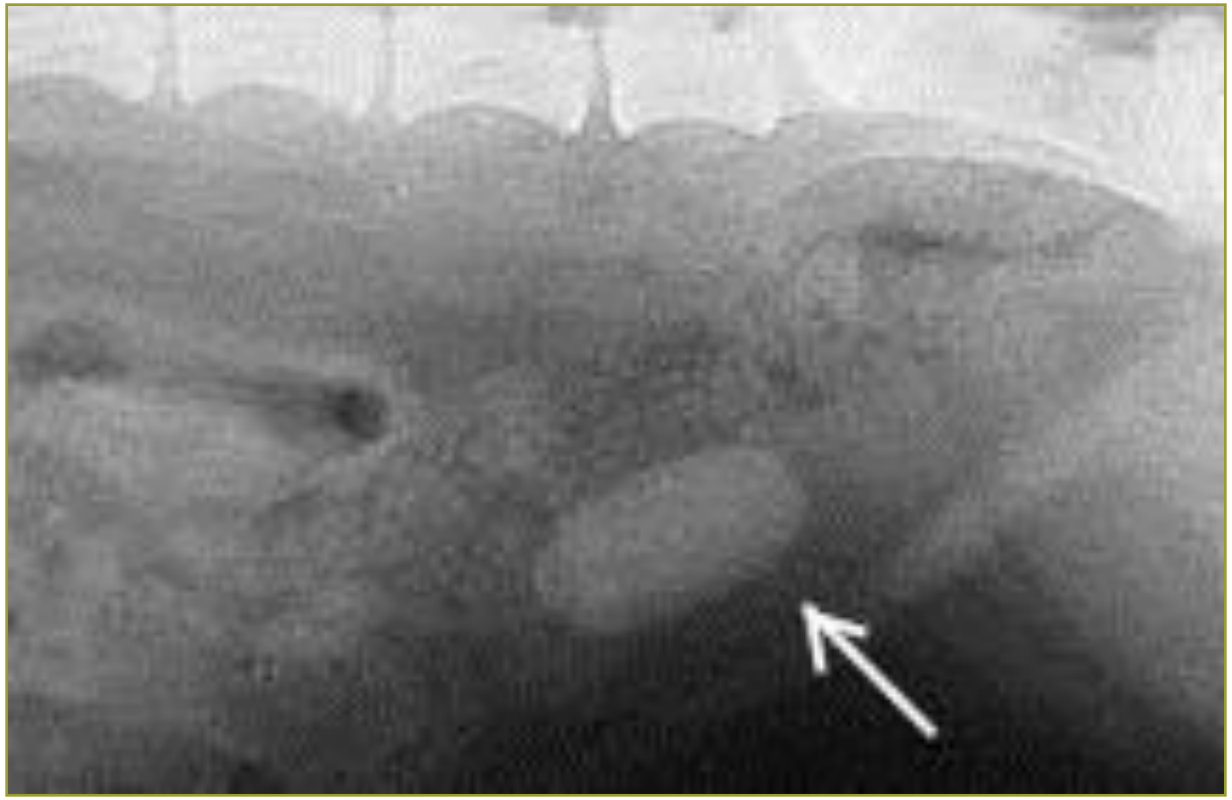
- Micturition or uresis: expulsion of urine from the urinary bladder into the urethra
- Urine accumulates until pressure of the filling bladder activates stretch receptors in bladder wall

Urinary System Pathology

- Hematuria
- Uremia
- Anuria
- Oliguria
- Cystitis
- “Blocked cats”
- Nephritis
  - Renal failure
- Ethylene glycol poisoning



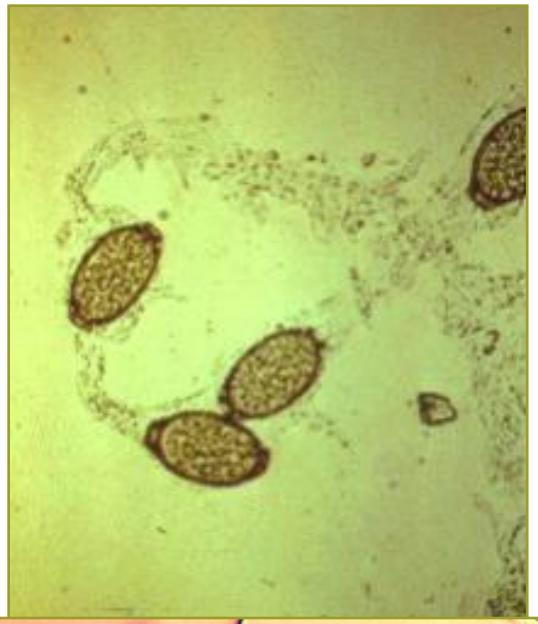
Urinary Bladder Stones

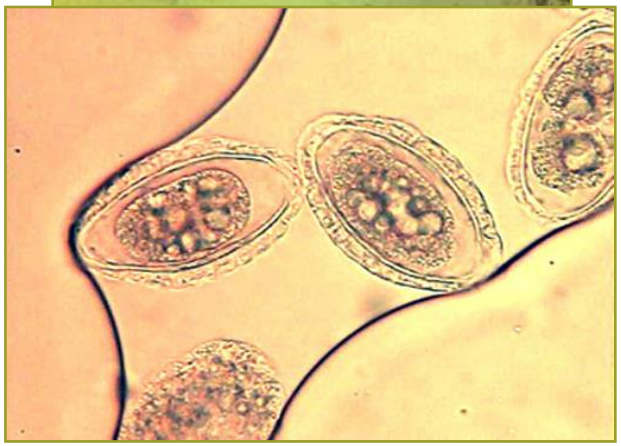


BIG Stone! ☺

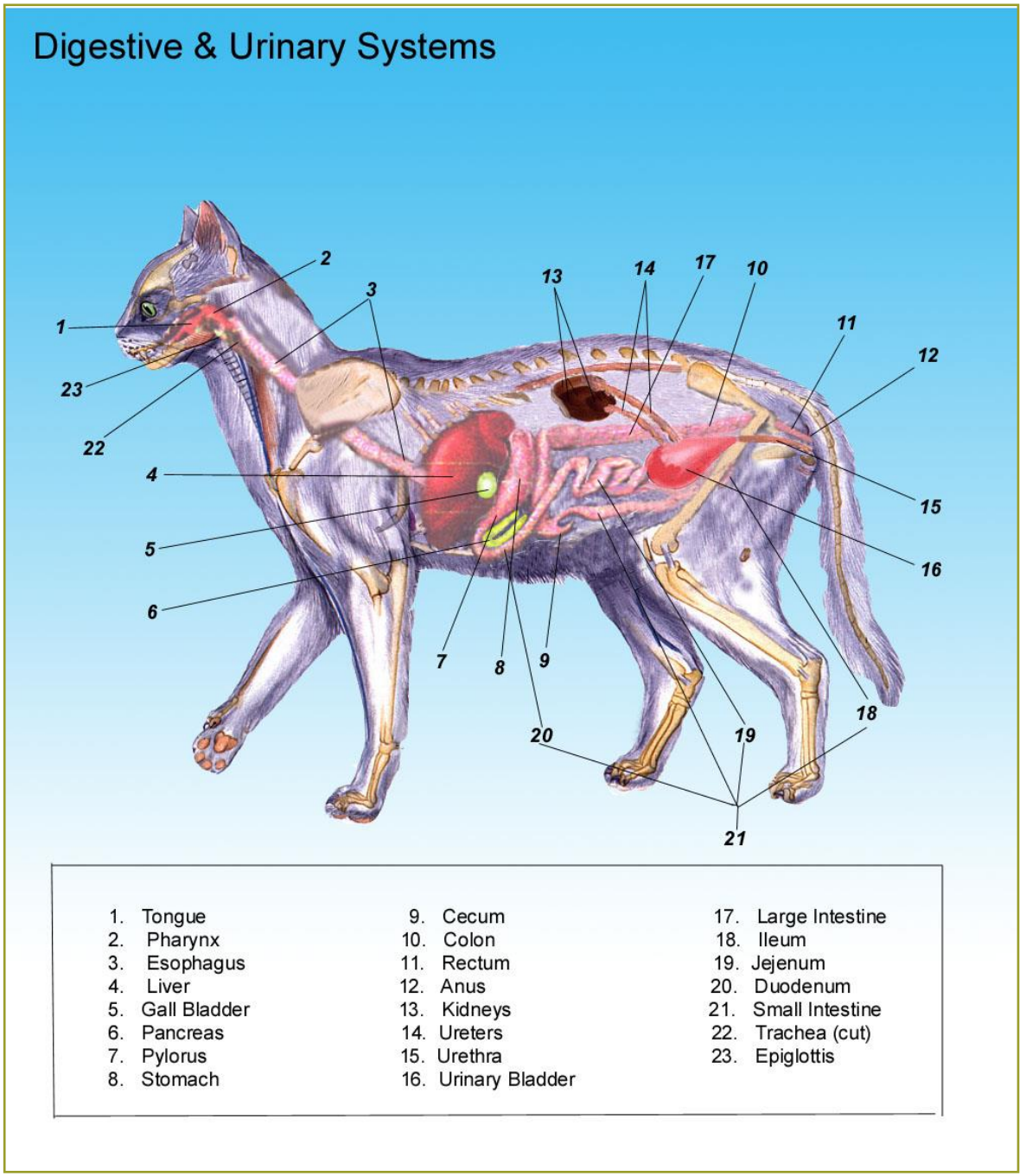
Parasites of the Urinary Tract

- *Capillaria plica* – bladder worm
  - Eggs in urine – bipolar plugs
- *Dioctophyma renale* – giant kidney worm
  - HUGE eggs in urine





Review of Urinary System



Test Yourself

KNOW THESE IN EVERY CHAPTER!

Pages 378, 383, 383, 384, 386

Clinical Applications

Pages 375, 380, 381, 381-382, 385, 385, 386