


Urine analysis and culture



By Dr Farhad Nikkhahi

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- 
- **Bacteriuria**
 - **Cystitis**
 - **Cystostomy**
 - **Dysuria**
 - **Nephrostomy**
 - **Pyelonephritis**
 - **Pyuria**

- **Urethritis**
- **Urosepsis**
- **Urostomy**
- **Uncomplicated UTI**
- **Complicated UTI**
- **Asymptomatic Bacteriuria**

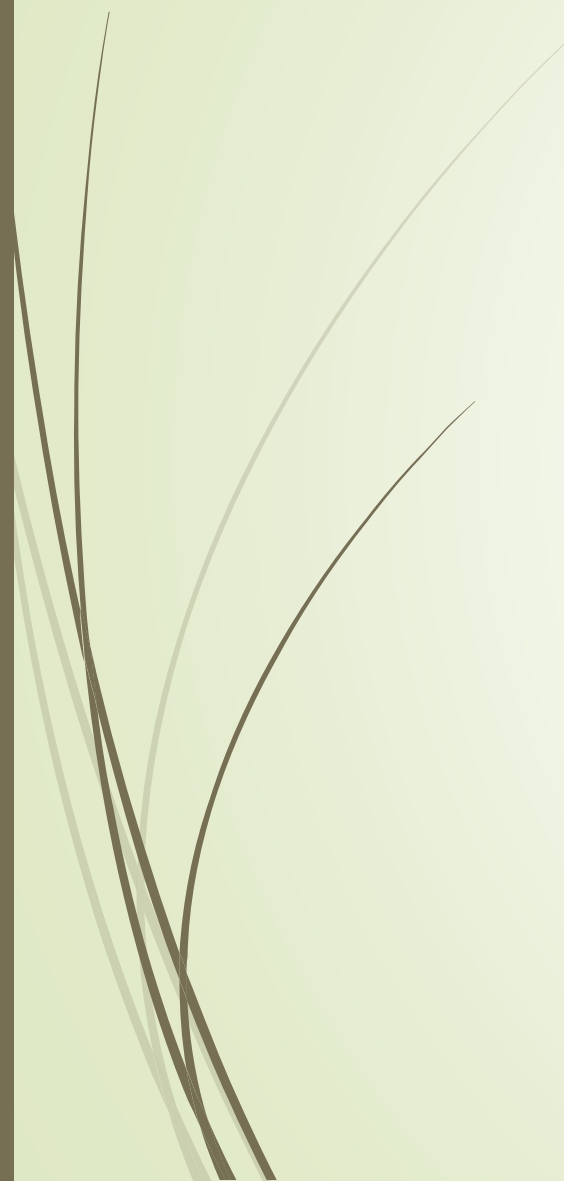
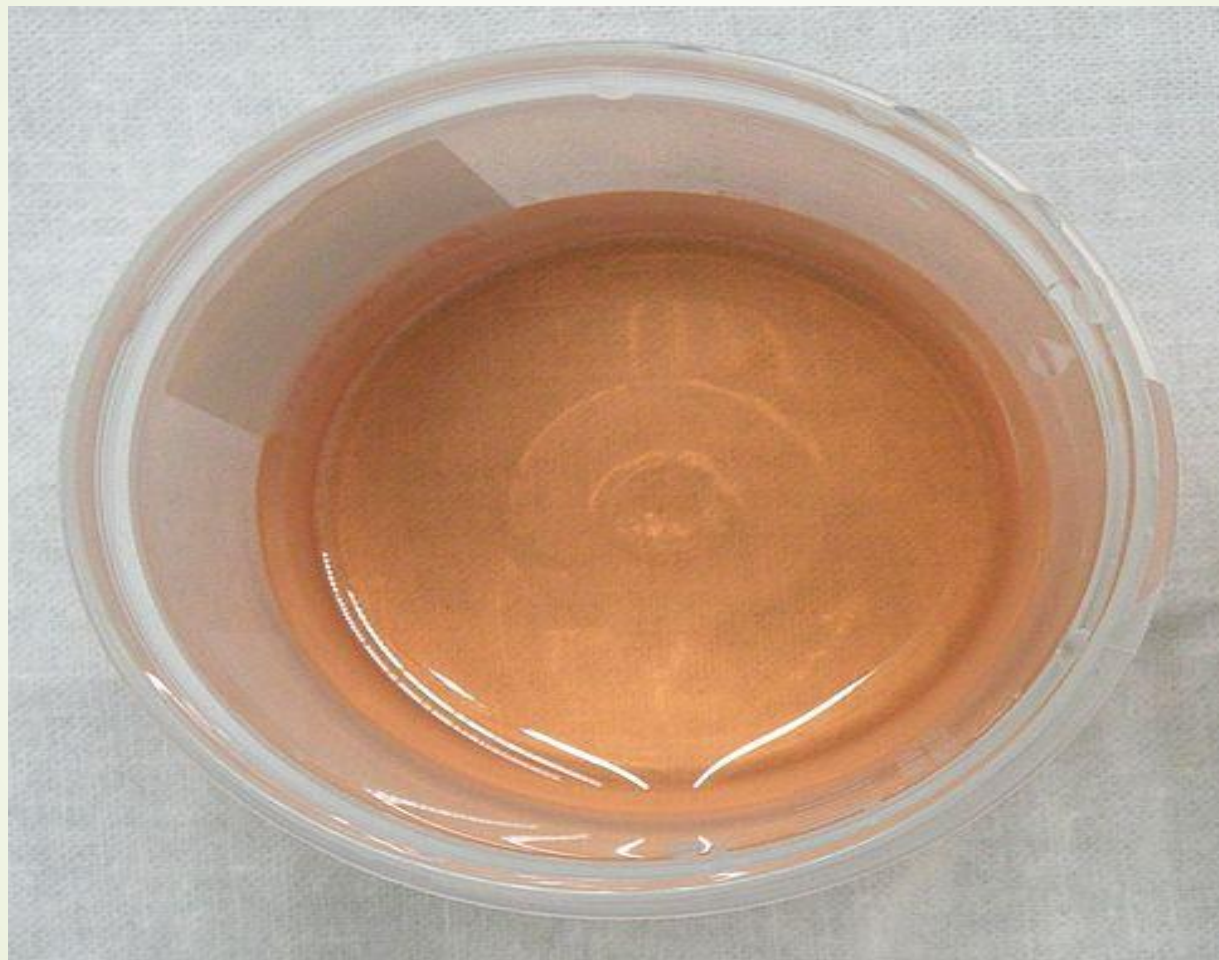
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- **Dark yellow urine** is often indicative of dehydration.
 - **Yellowing/light orange** may be caused by removal of excess **B vitamins** from the bloodstream. Certain medications such as **rifampin** and **phenazopyridine** can cause orange urine.
 - **Bloody** urine is termed **hematuria**, a symptom of a wide variety of medical conditions.
 - **Dark orange to brown urine** can be a symptom of **jaundice**, **rhabdomyolysis**, or **Gilbert's syndrome**.
 - **Black or dark-colored** urine is referred to as melanuria and may be caused by a **melanoma** or non-melanin **acute intermittent porphyria**.
 - **Pinkish** urine can result from the consumption of **beets** (**beeturia**)
 - **Greenish** urine can result from the consumption of **asparagus** or foods or beverages with green dyes.
 - **Reddish or brown** urine may be caused by **porphyria** (not to be confused with the harmless, temporary pink or reddish tint caused by **beeturia**).
 - **Blue** urine can be caused by the ingestion of **methylene blue** (e.g., in medications) or foods or beverages with blue dyes. Blue urine stains can be caused by **blue diaper syndrome**.
 - **Purple** urine may be due to **purple urine bag syndrome**.













What Causes Blue Urine?






Urine Physical Examination: Test Procedure, Results and more

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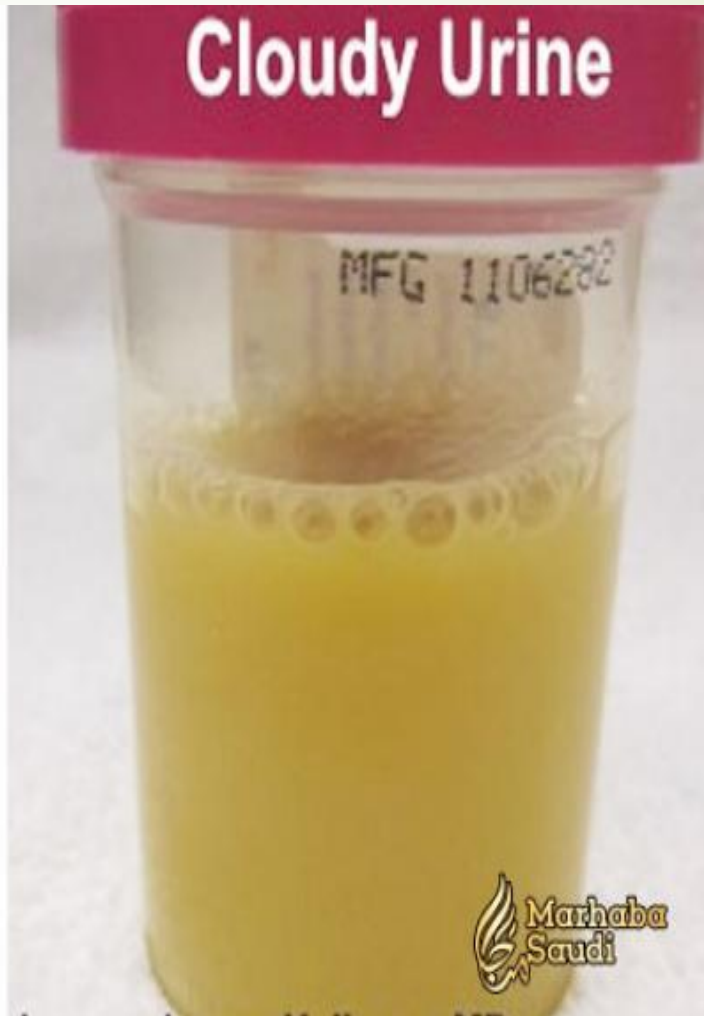


Urine odor



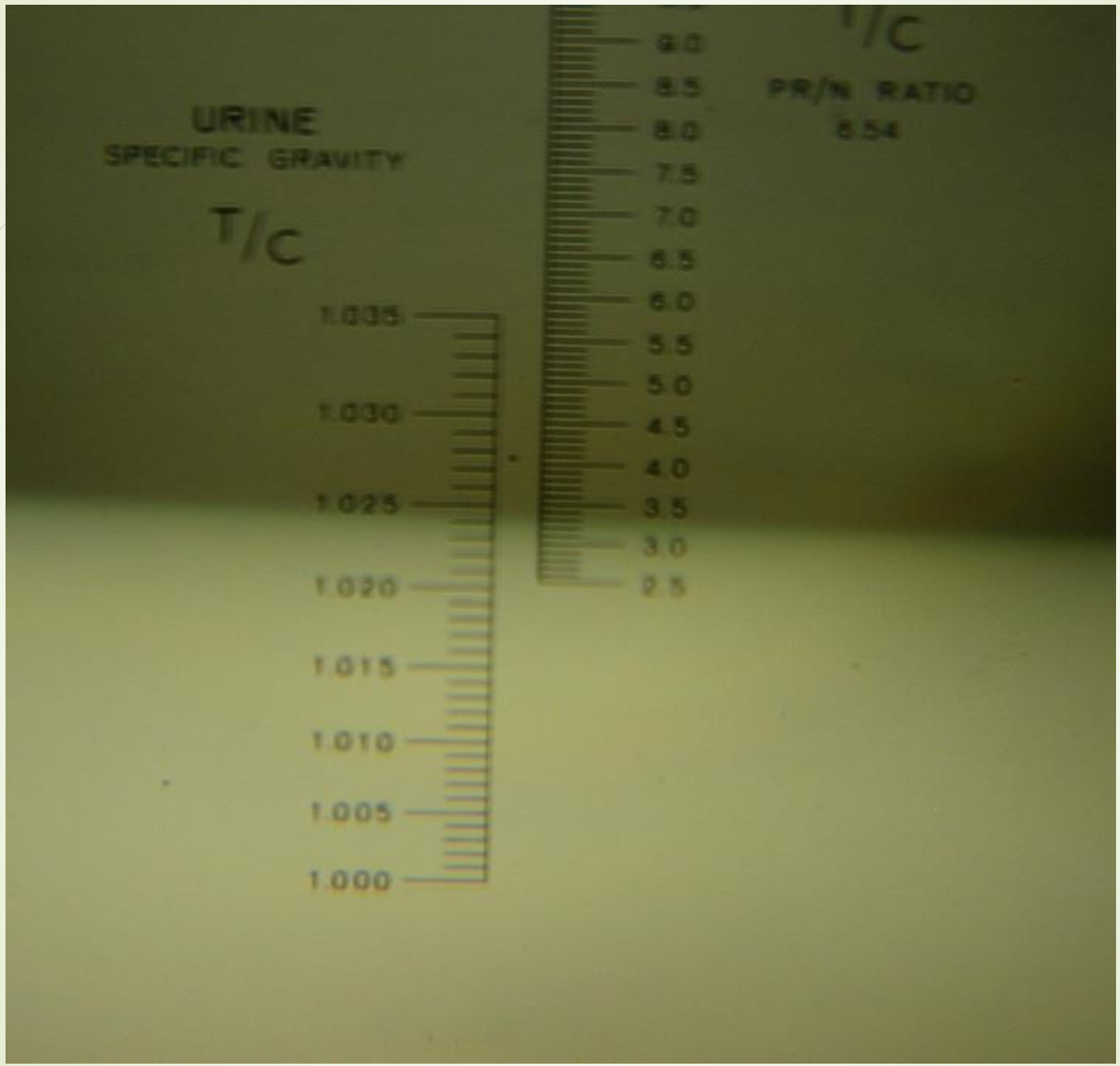
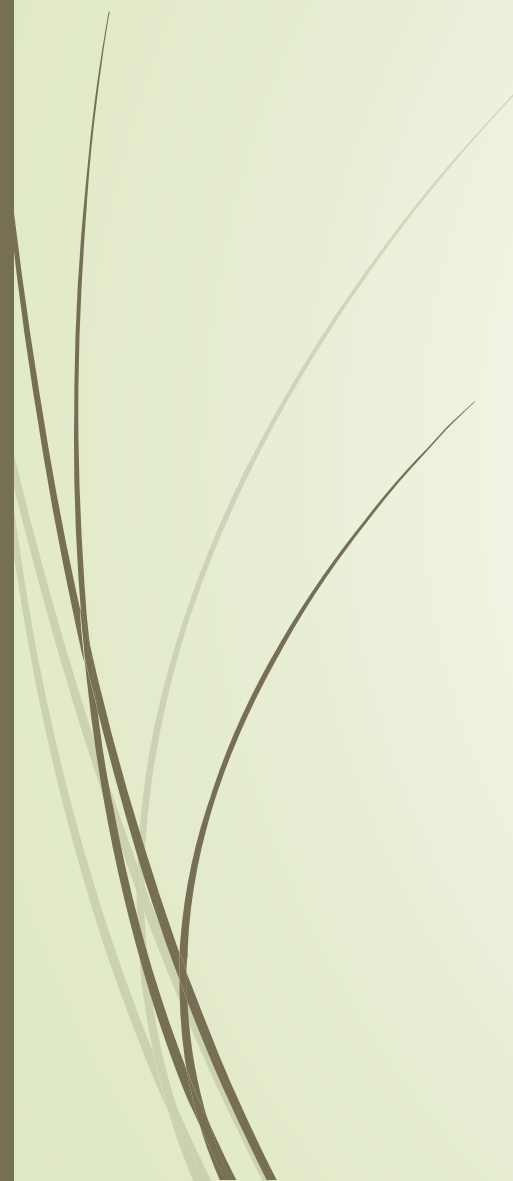
- "fish-like"

- sweetened urine odor












Urine Specific Gravity










Multistix

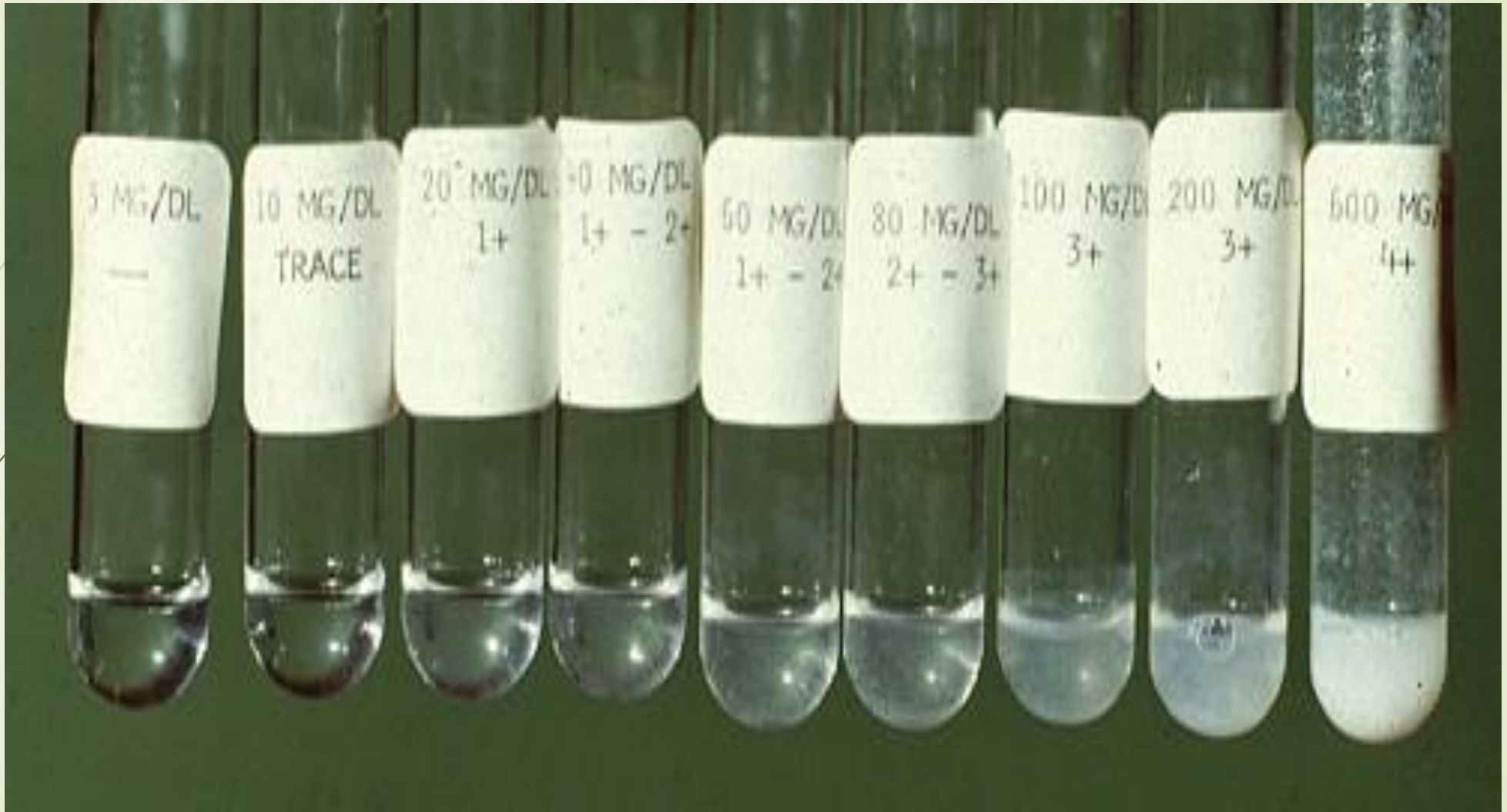
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SPECIFIC GRAVITY 45 seconds							

This is for educational purposes only and not intended for use to interpret test results. The colors as they appear may not be the exact color on the official product labeling.

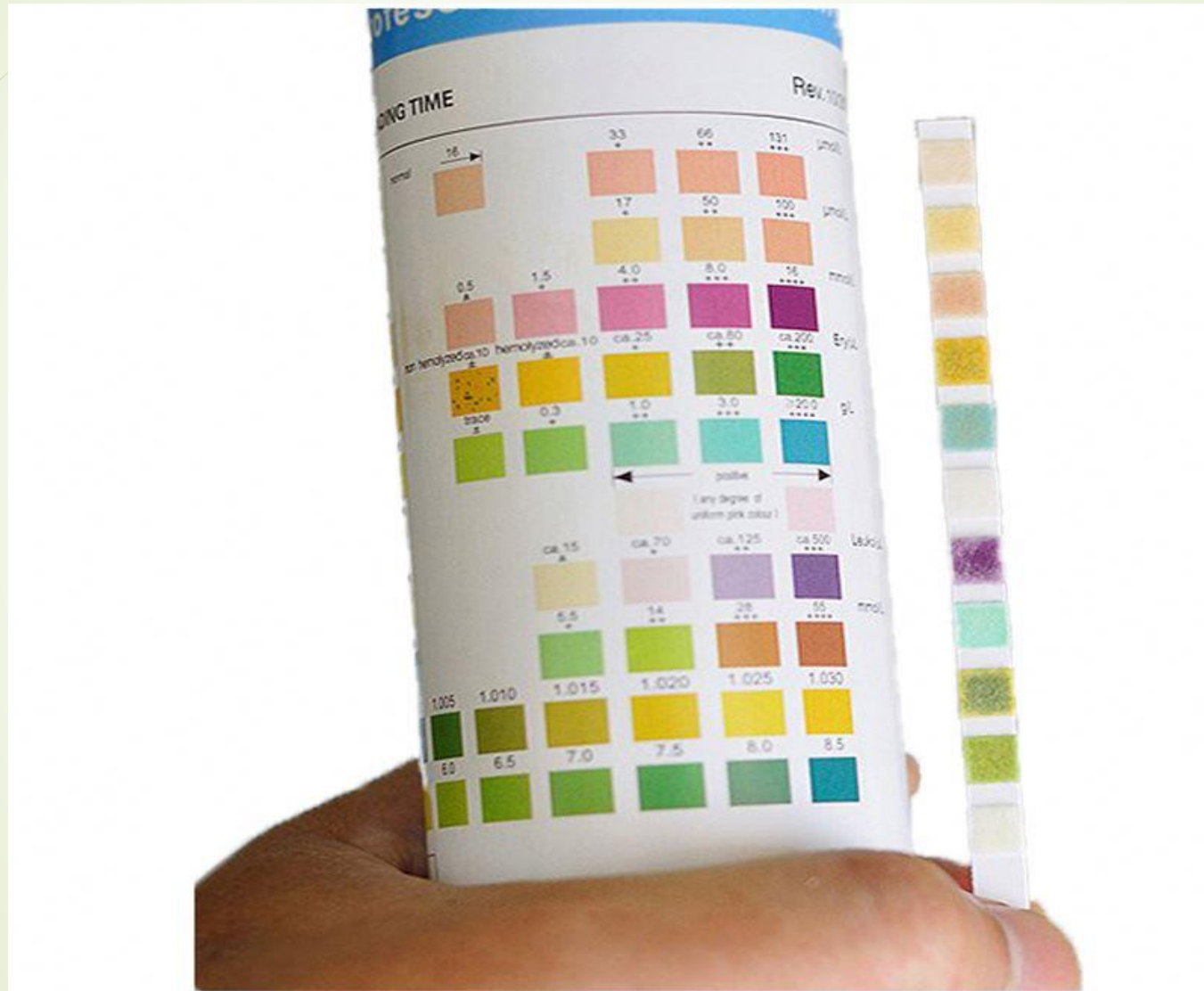
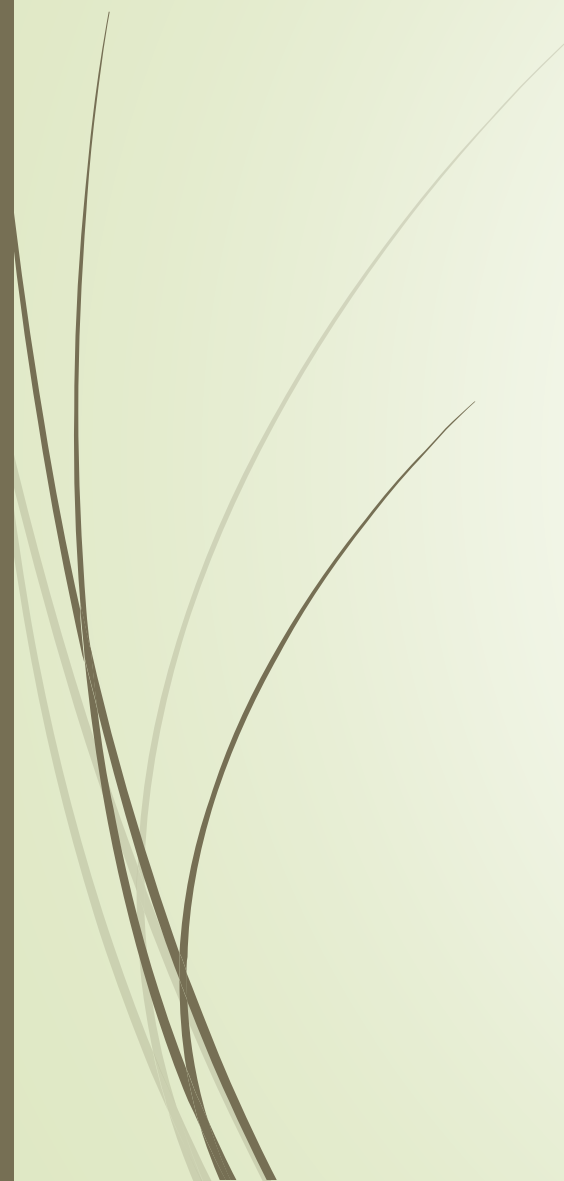
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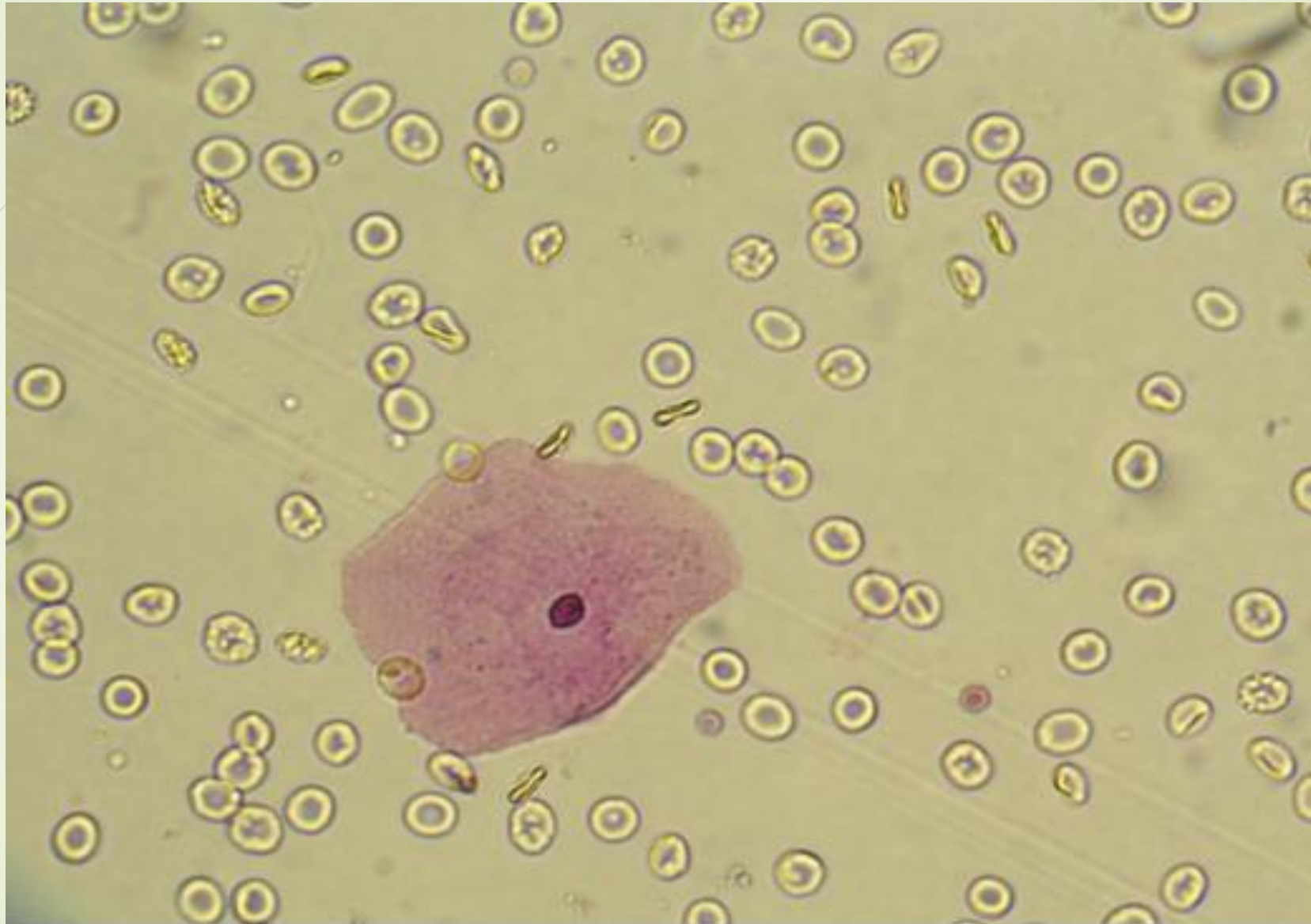
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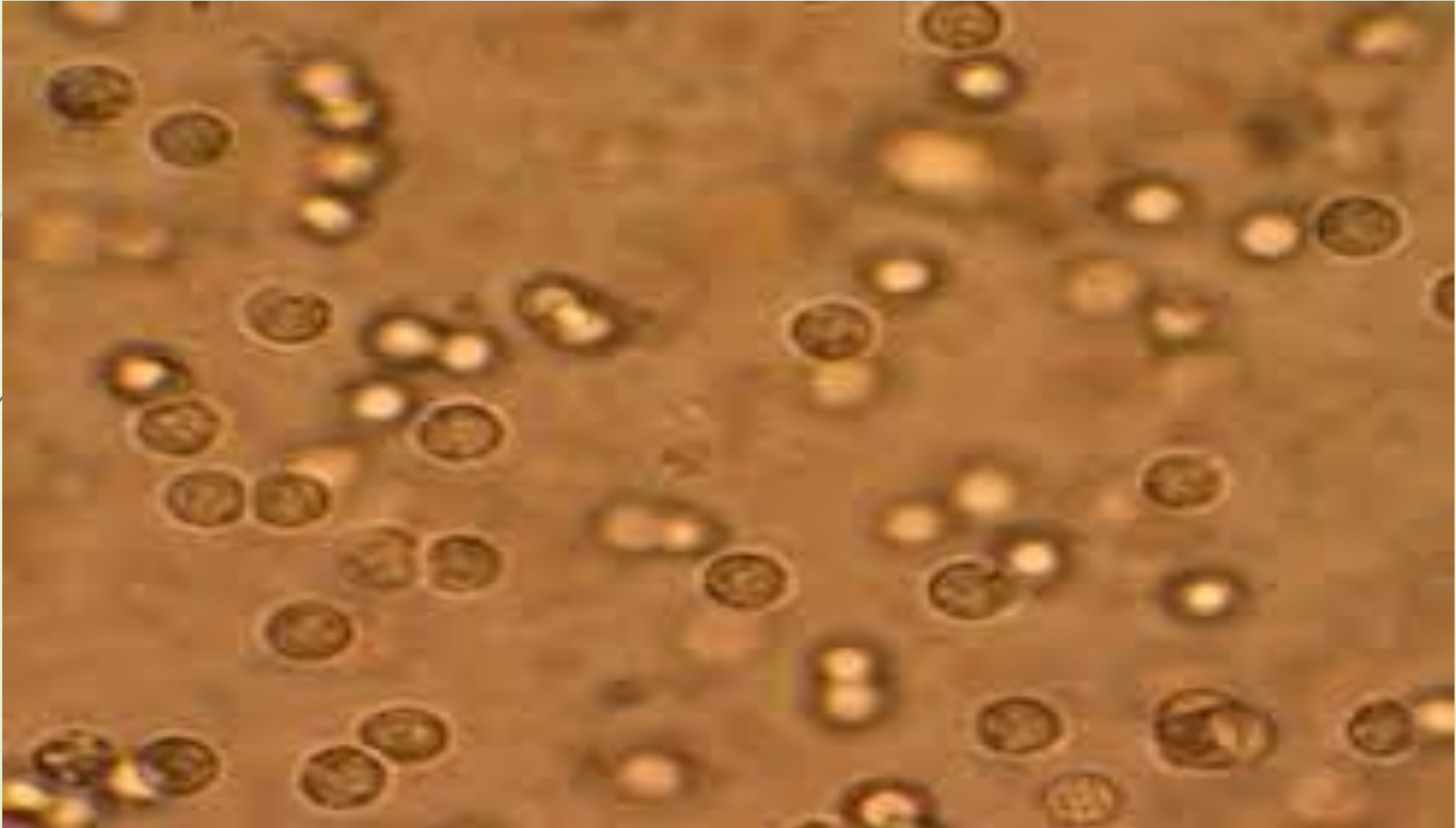


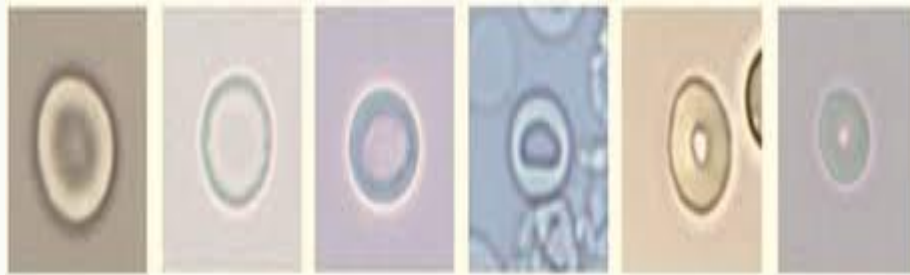




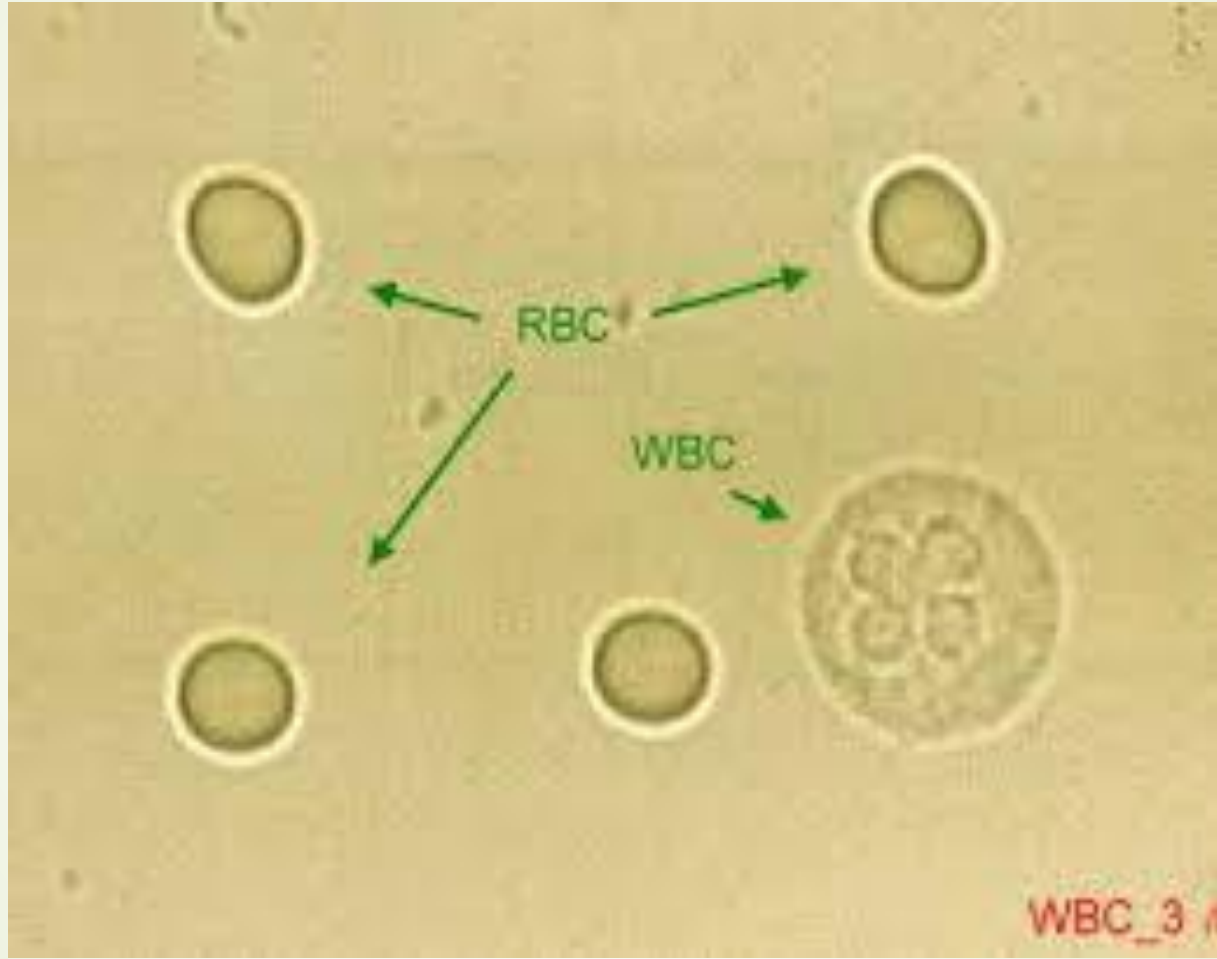


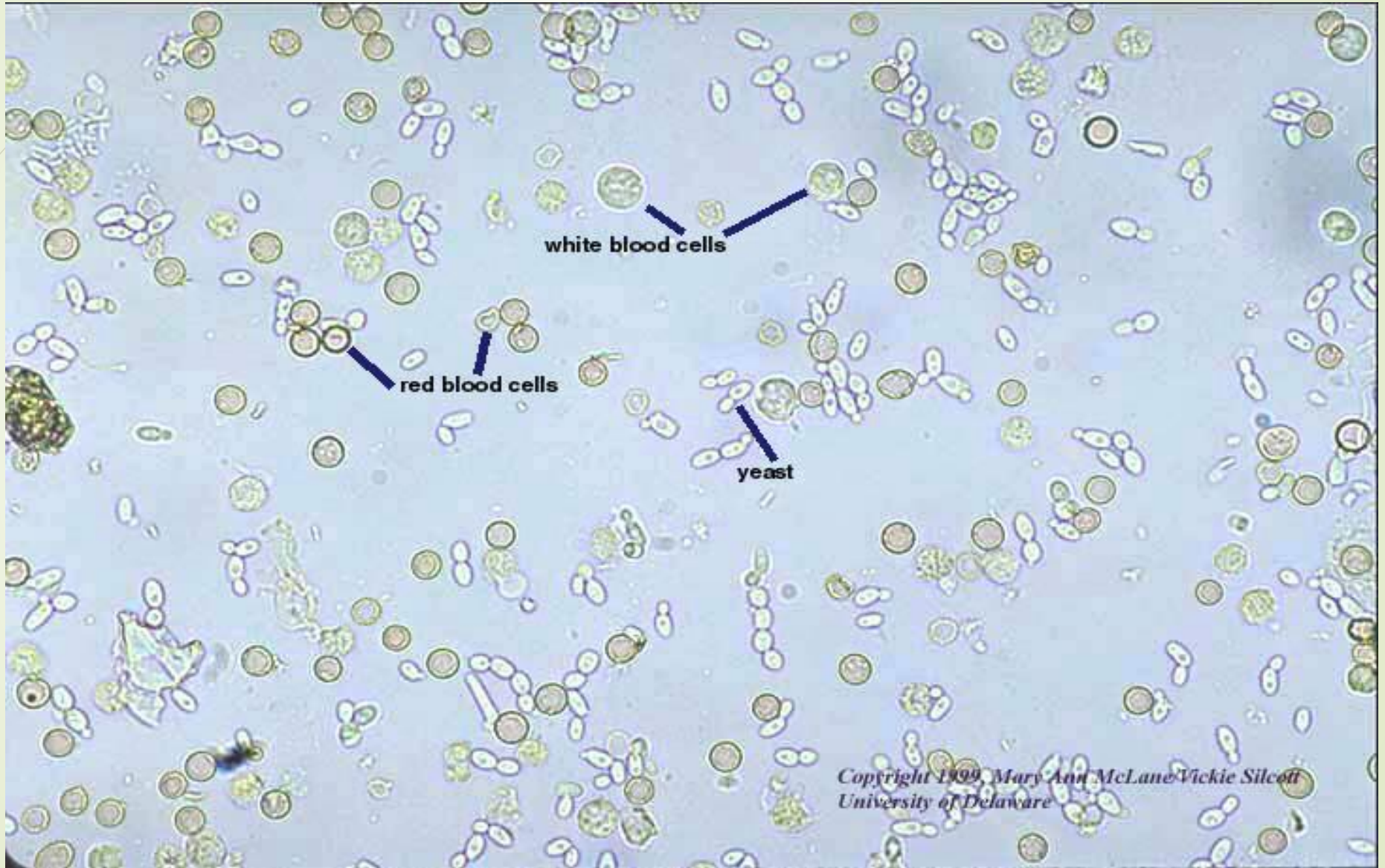
Source: Usatine RP, Smith MA, Mayeaux EJ, Chumley HS: *The Color Atlas of Family Medicine*, Second Edition: www.accessmedicine.com
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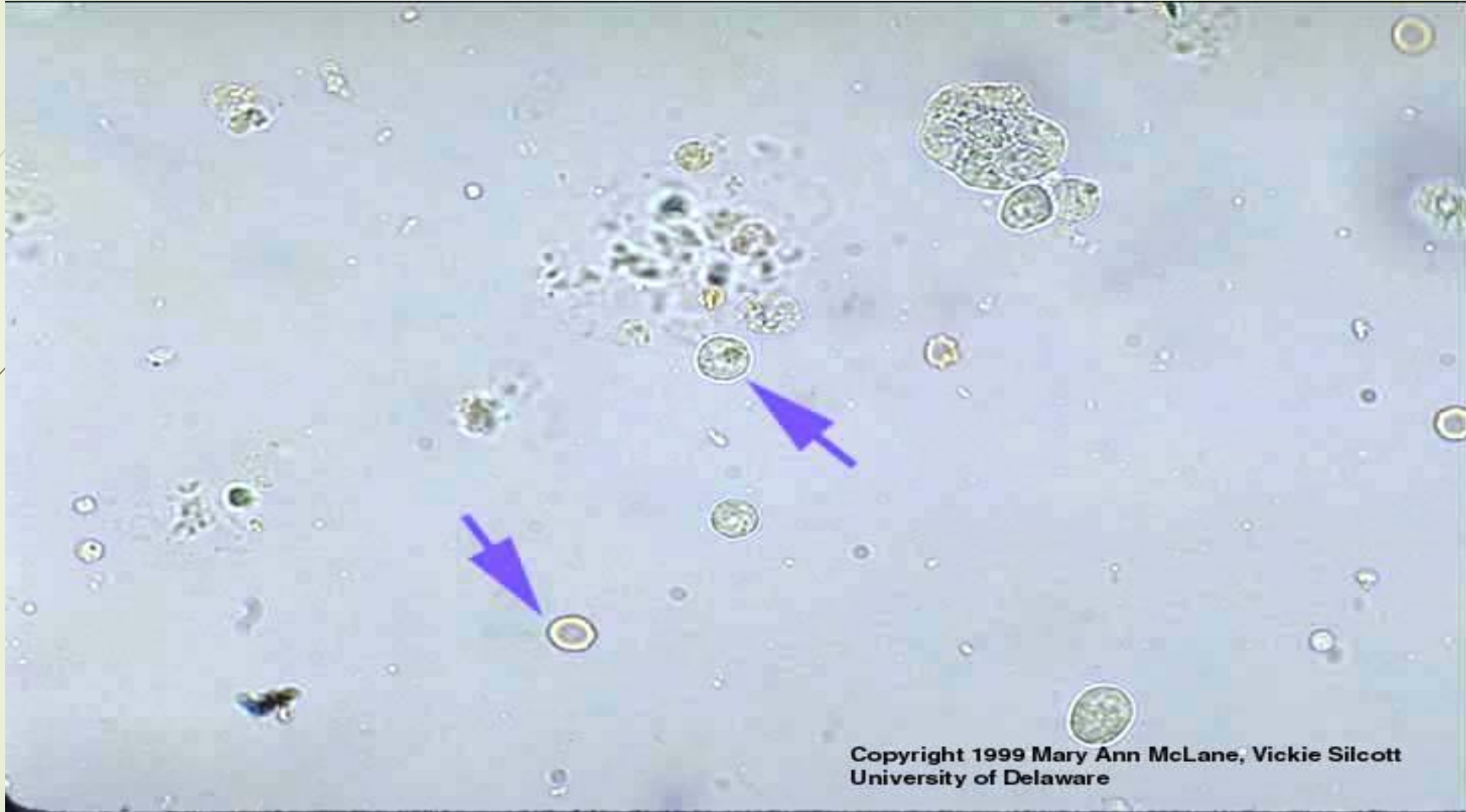


Isomorphic RBCs

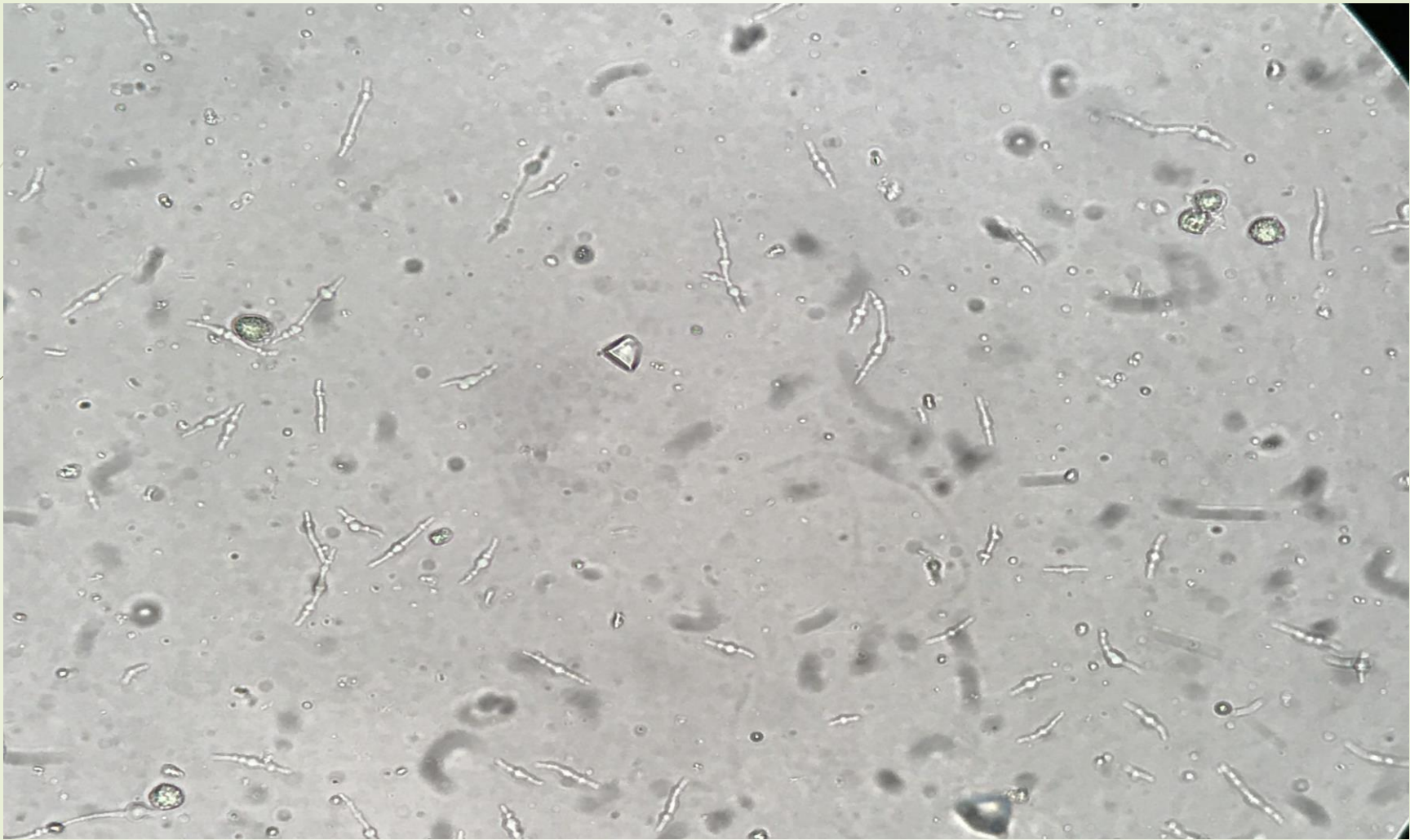




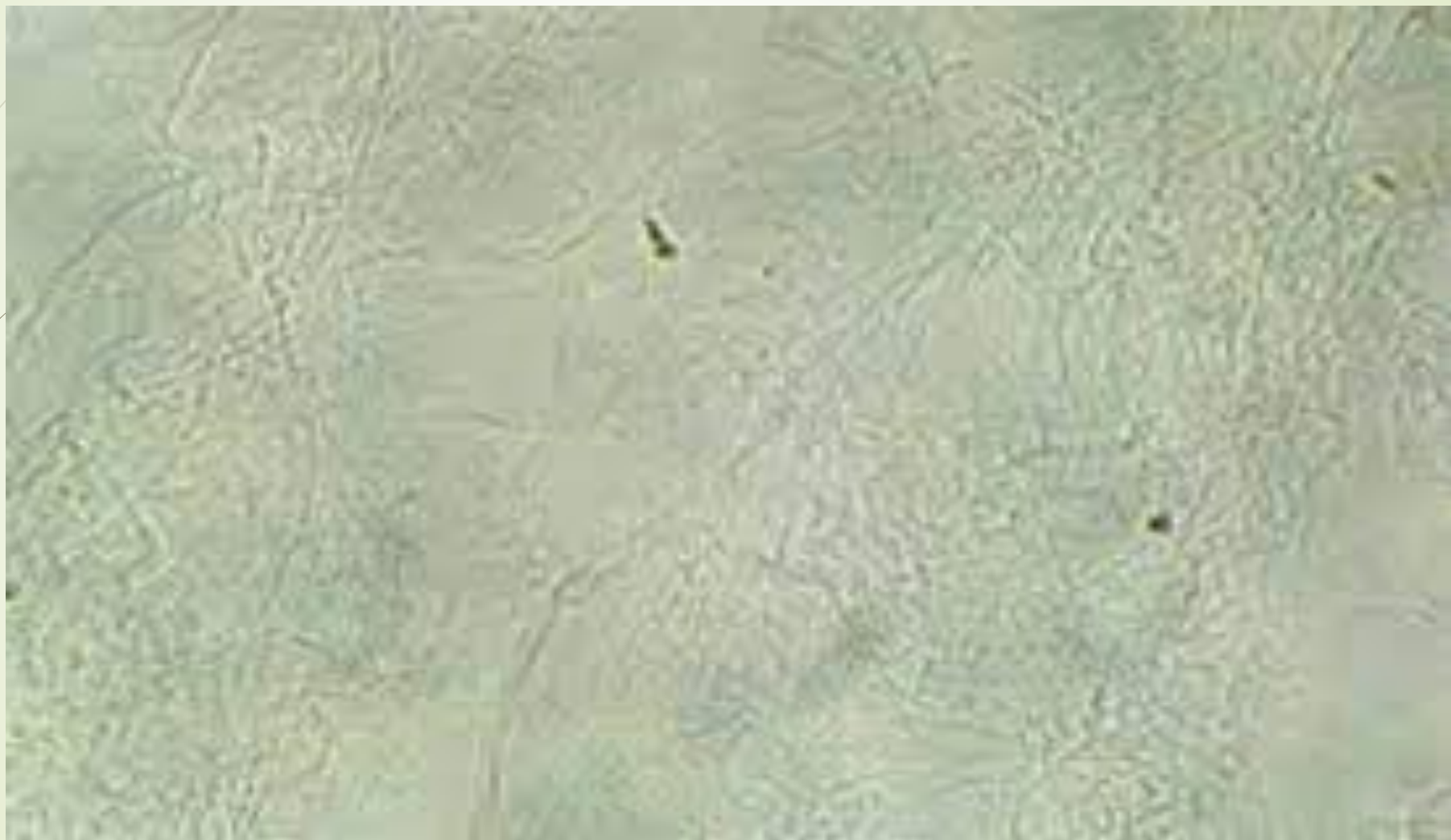
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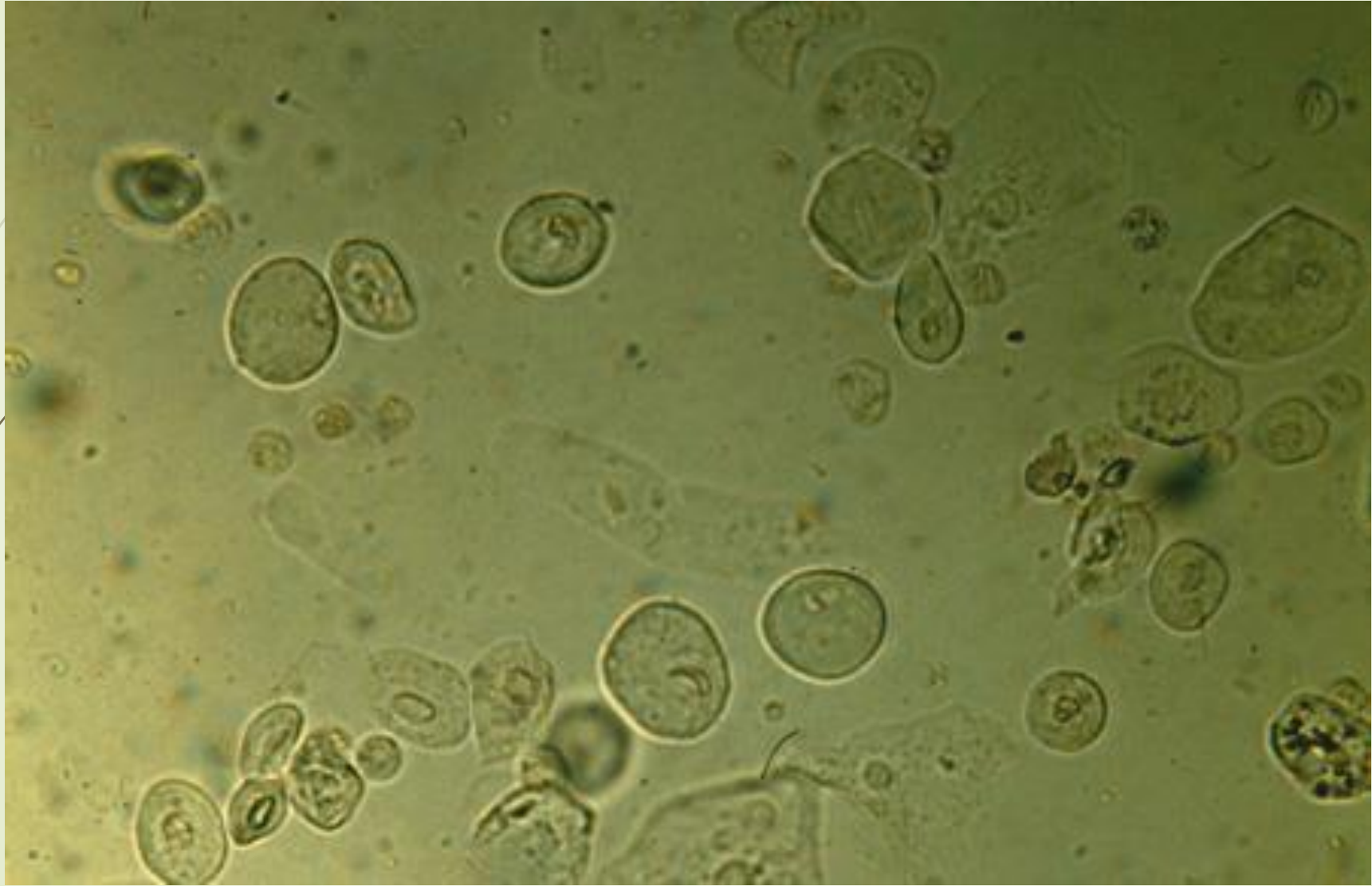


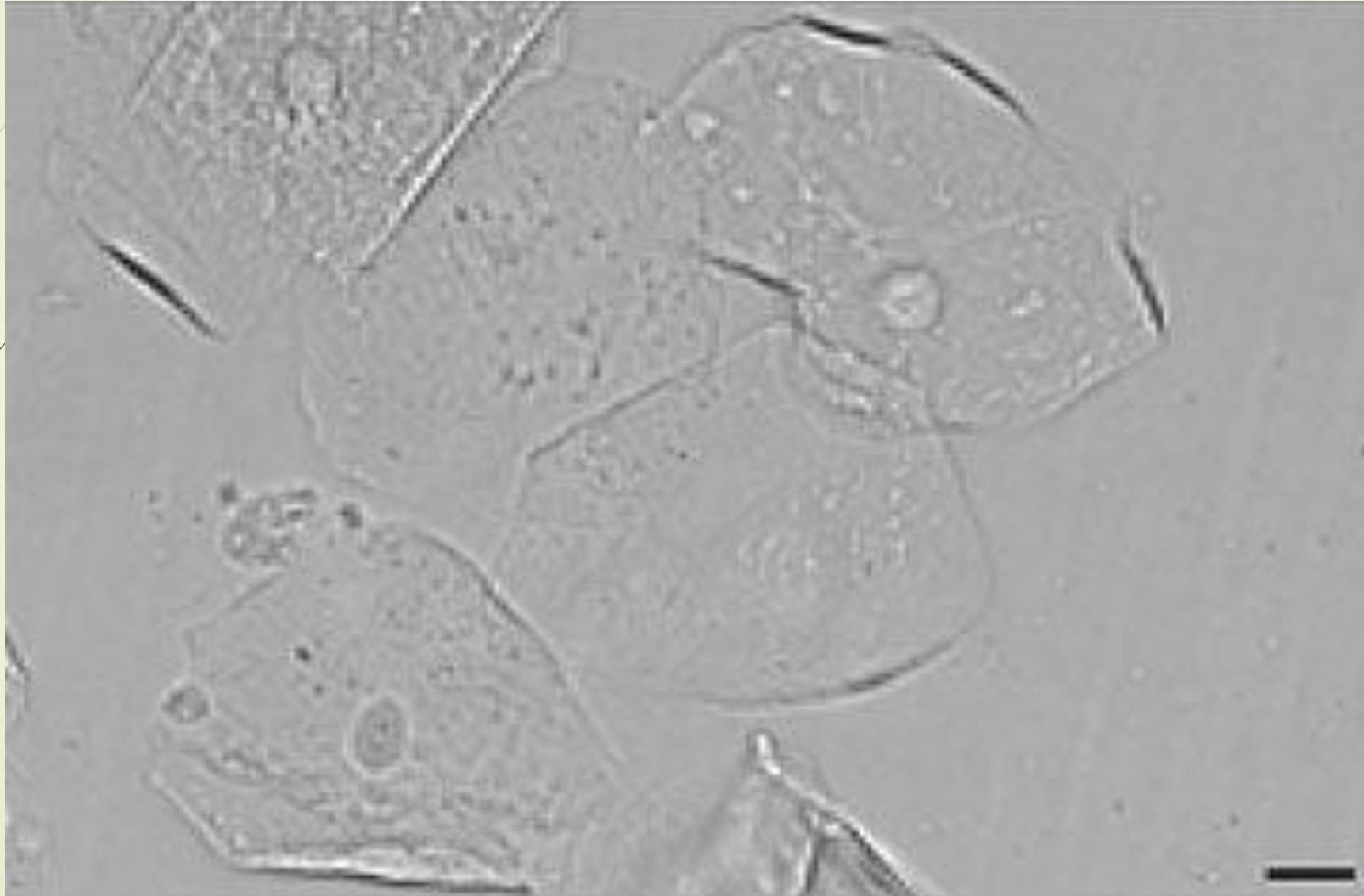
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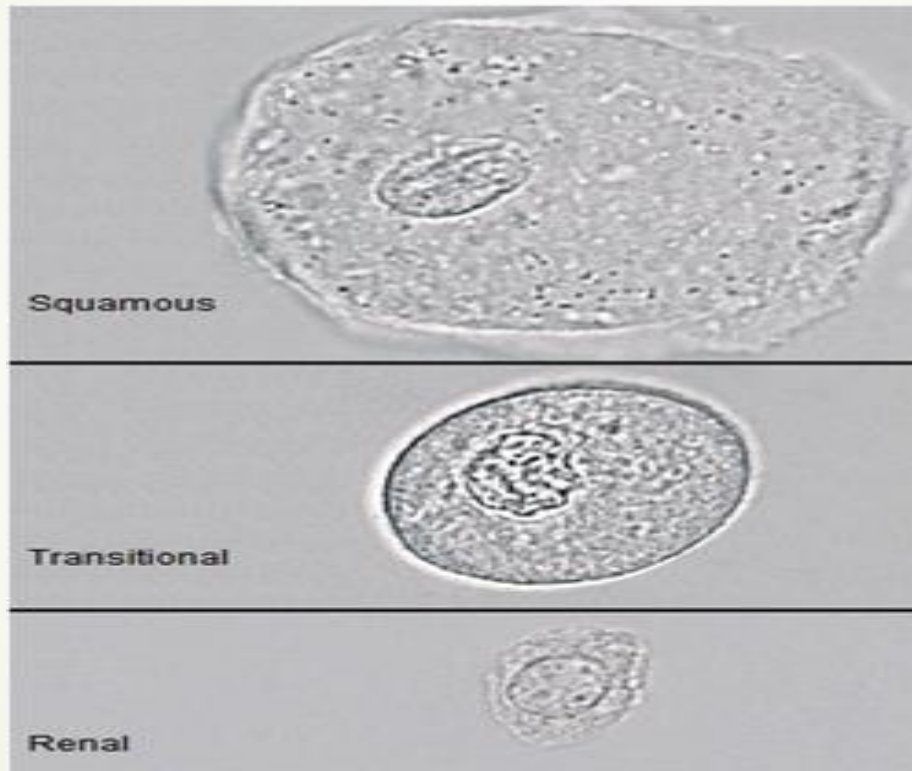




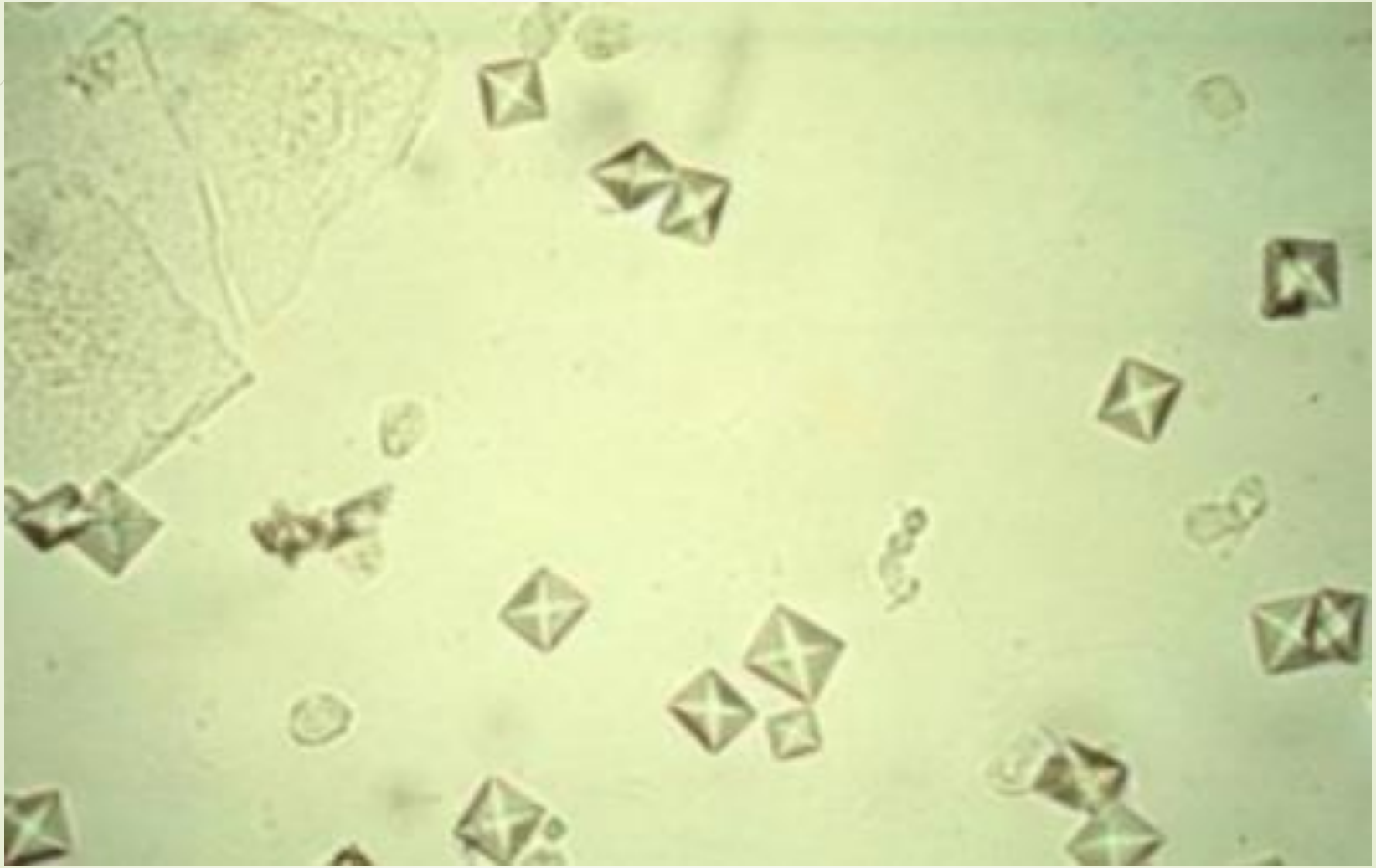




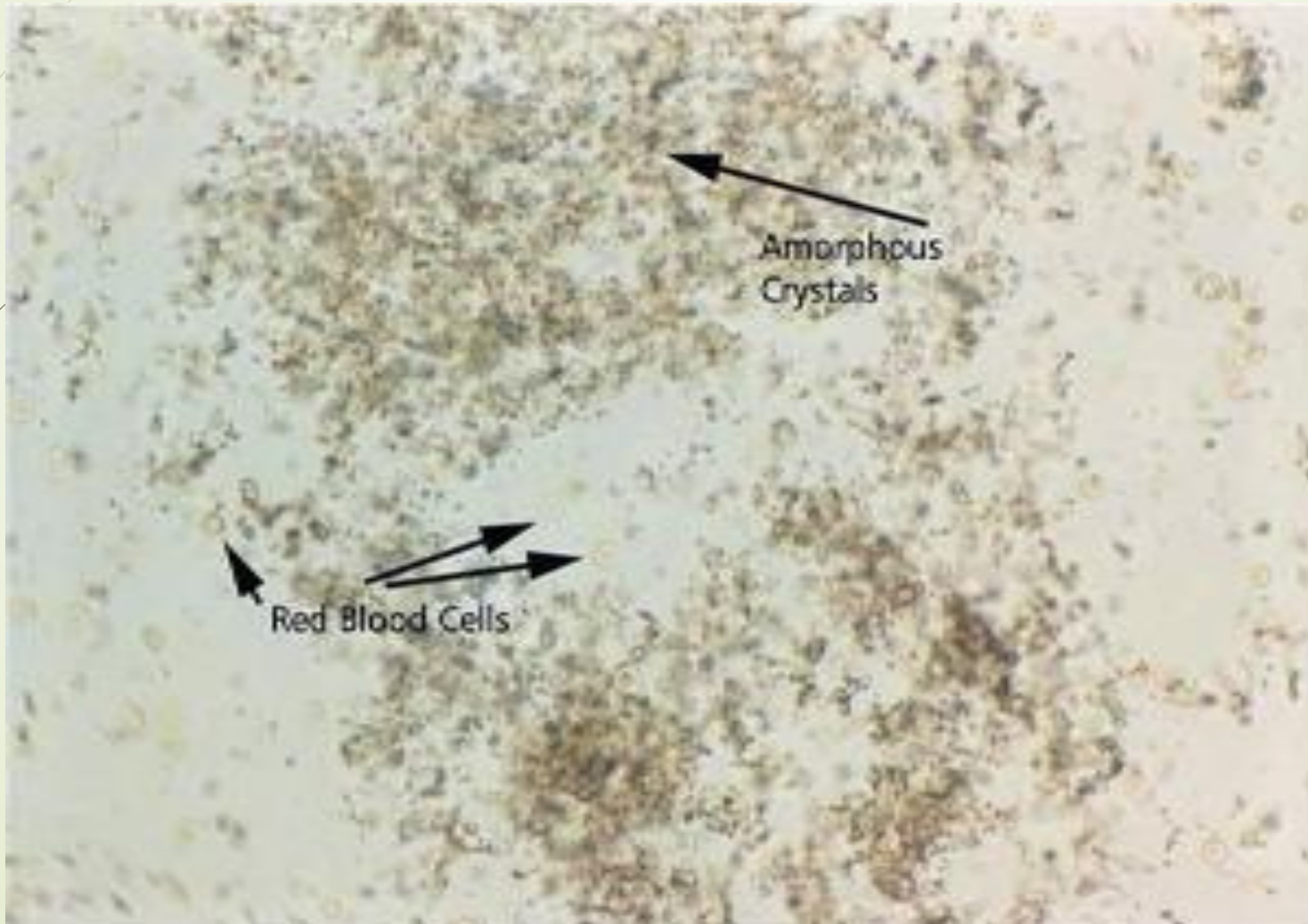








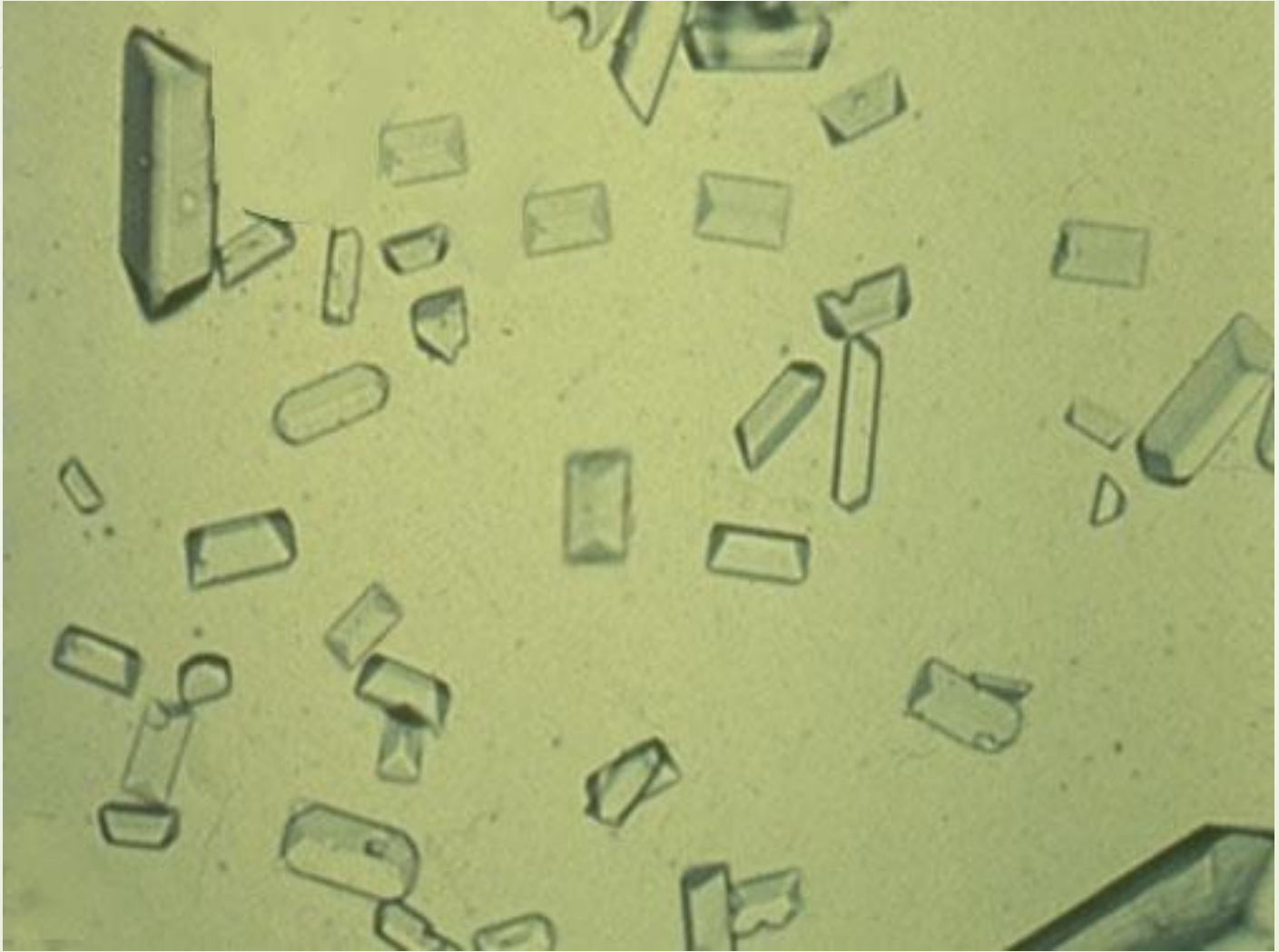


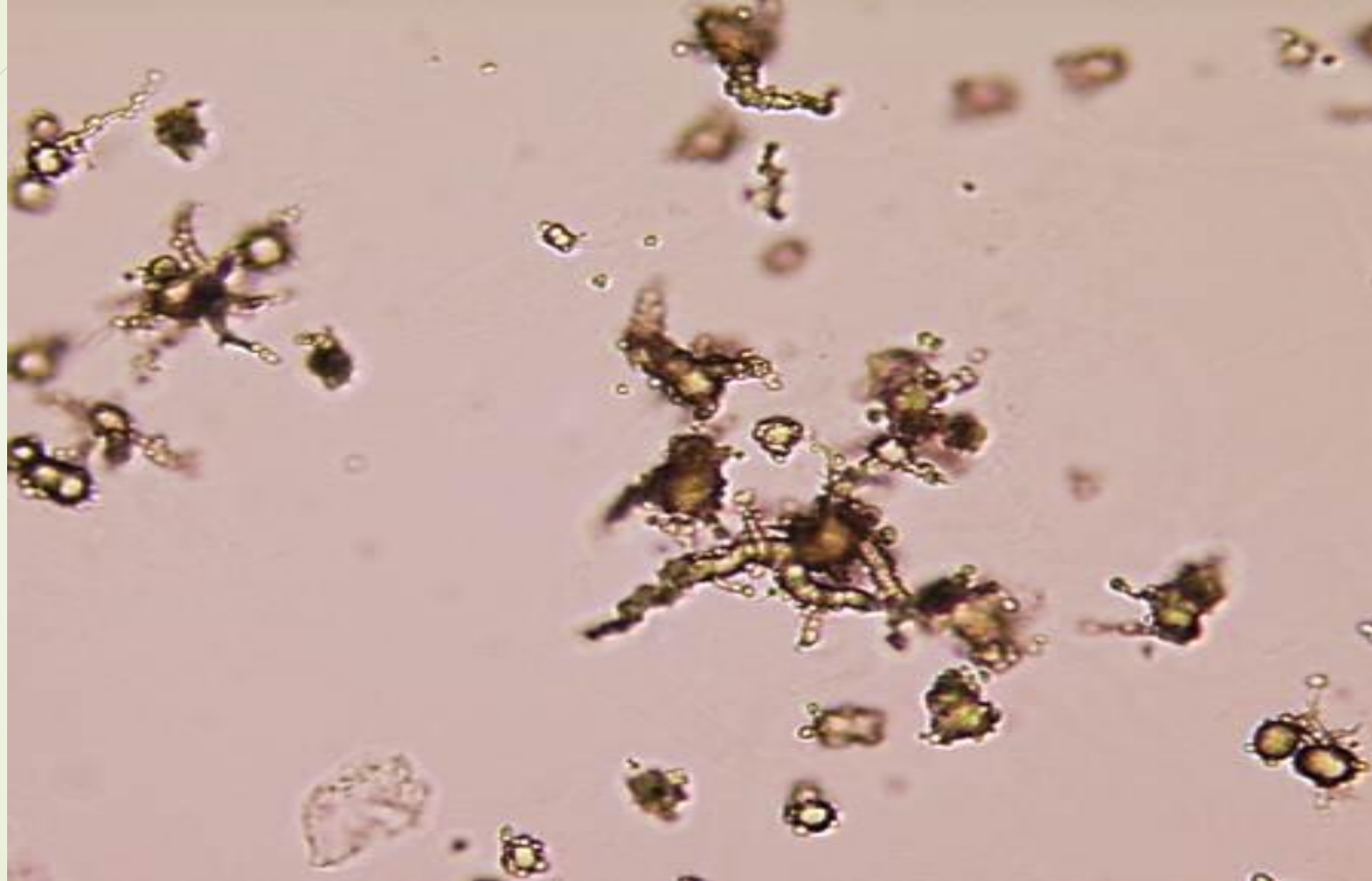






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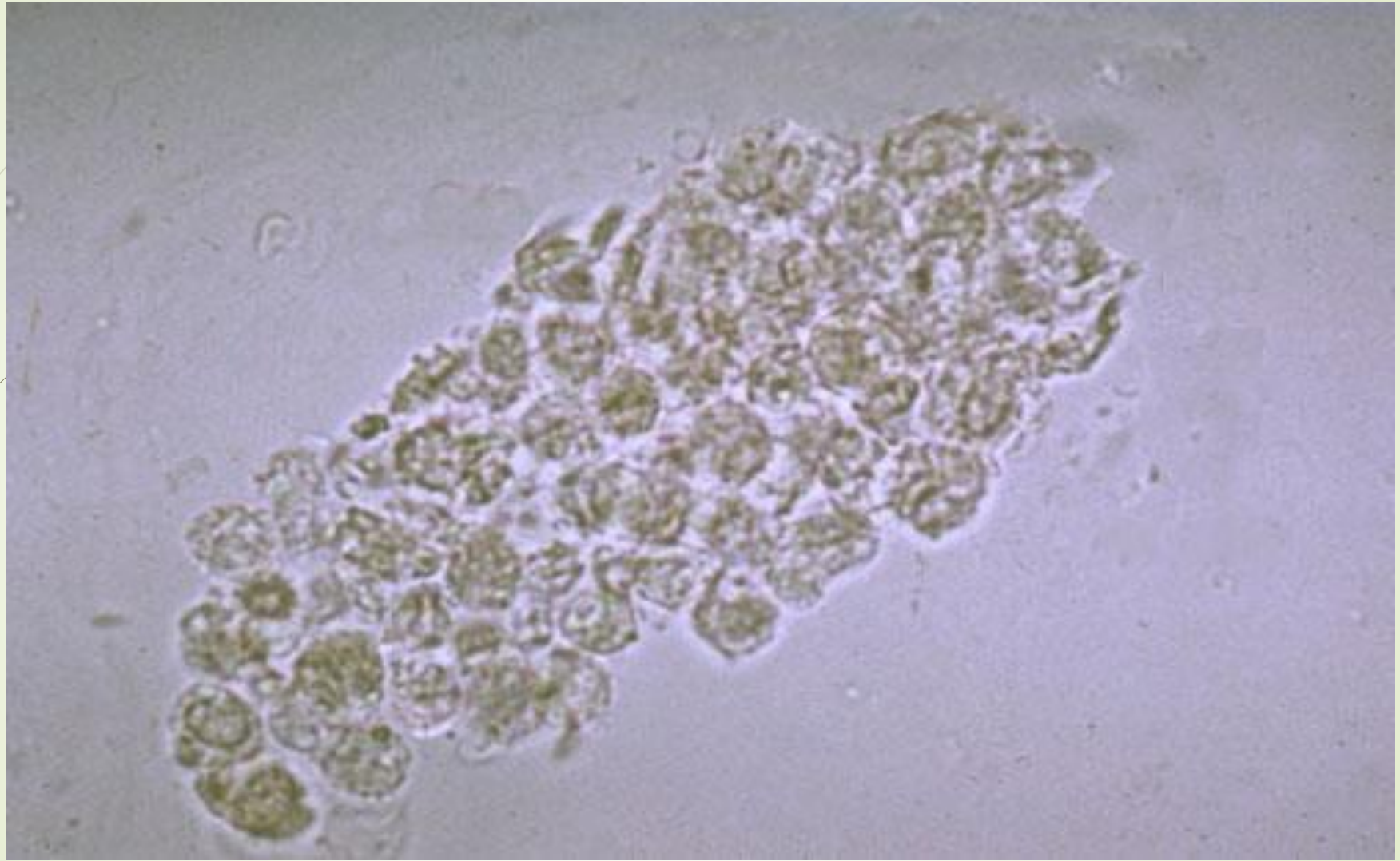


Hyaline Casts





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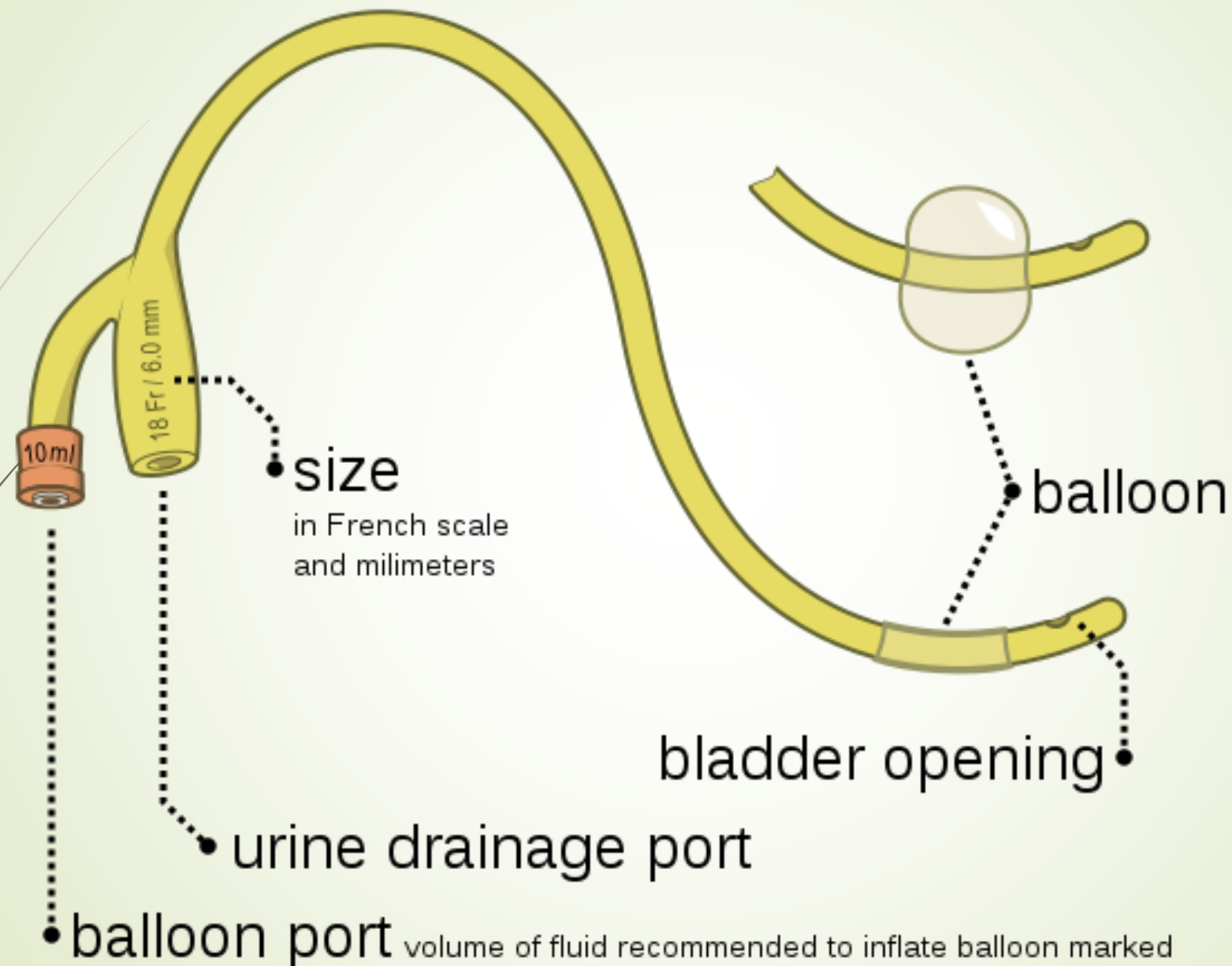


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1+ Bilirubin : Mild green line of separation btm layers



۲. تکمیل فرم درخواست یا دریافت نمونه ادراری

■ نام و شماره بیمار	■ نام پزشک درخواست‌کننده
■ سن و جنسیت	■ تاریخ درخواست آزمایش
■ پذیرش (سرپایی و بستری)	■ تاریخ و زمان جمع‌آوری نمونه
■ نام بخش	■ تاریخ و زمان تحویل نمونه
■ نوع نمونه (کاتتر یا ...)	■ علت مراجعه و تشخیص احتمالی بیماری

ذکر عوامل مداخله‌گر احتمالی (بیماری‌های زمینه‌ای، مصرف آنتی‌بیوتیک و ...)

جدول ۱-۲: طبقه‌بندی عفونت‌های ادراری با توجه به سندروم‌های بالینی

CATEGORY	CLINICAL	LABORATORY
Acute, uncomplicated UTI In women	Dysuria, urgency, frequency, suprapubic pain No urinary symptoms in last 4 wk before current episode No fever, flank pain	≥ 10 WBC/mm ³ $\geq 10^3$ CFU/ml uropathogens ¹ in CCMS urine ²
Acute, uncomplicated pyelonephritis	Fever, chills Flank pain on examination Other diagnosis excluded No history or clinical evidence of urologic abnormalities	≥ 10 WBC/mm ³ $\geq 10^4$ CFU/ml uropathogens in CCMS urine
Complicated UTI and UTI in men	Any combination of symptoms listed above One or more factors associated with complicated UTI	≥ 10 WBC/mm ³ $\geq 10^5$ CFU/ml uropathogens in CCMS urine
Asymptomatic bacteriuria	No urinary symptoms	$\pm \geq 10$ WBC/mm ³ $\geq 10^5$ CFU/ml in two CCMS cultures > 24 hrs apart

فصل دوم: عفونت‌های ادراری

۱. یوروپاتوژن: ارگانیزی است که به‌طور معمول باعث عفونت ادراری می‌شود.
 ۲. ادرار تمیز میانی (CCMS): Clean - Catch Midstream Urine.

جدول ۲-۲: راهنمای تفسیری کشت‌های ادراری

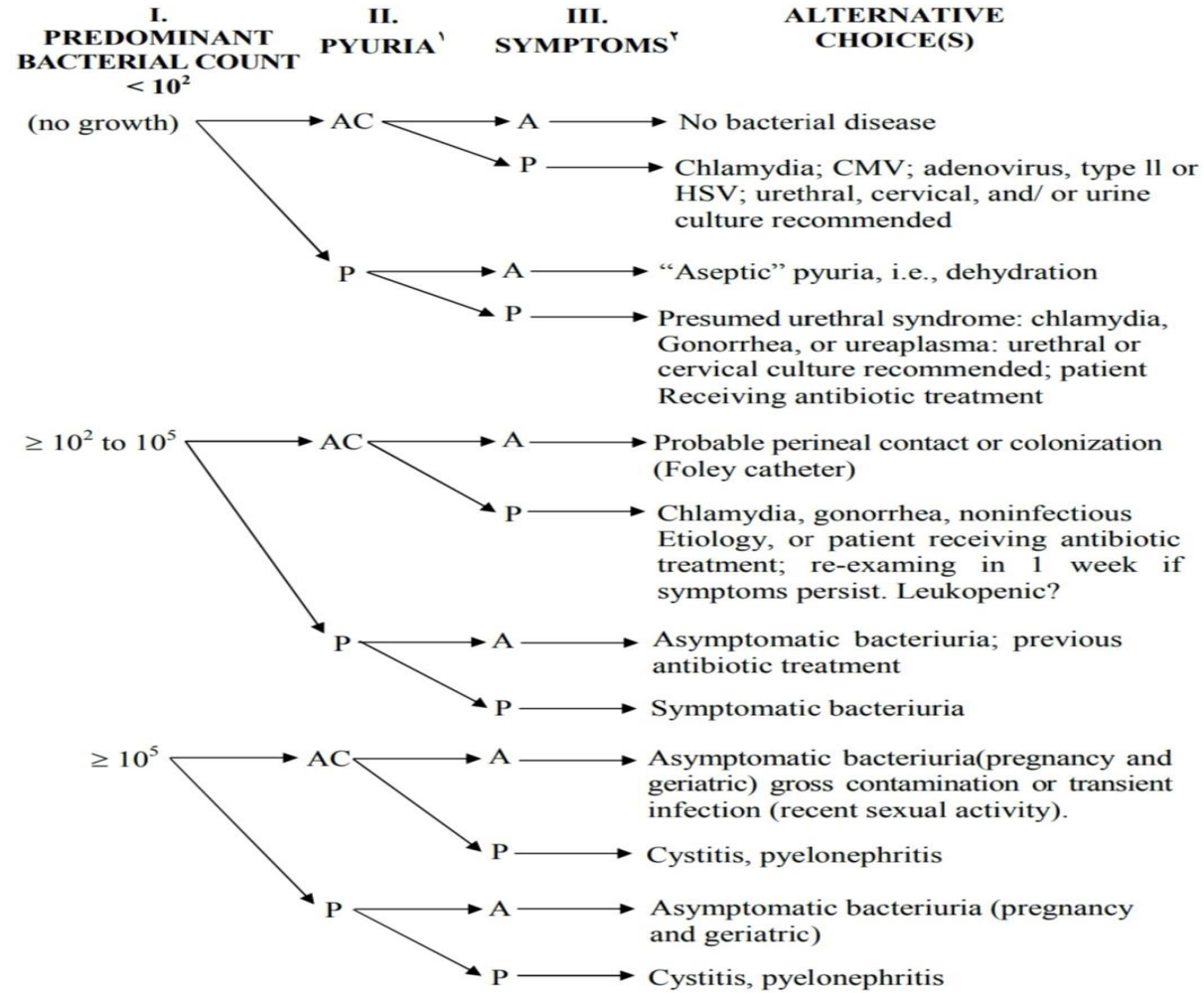
RESULT	SPECIFIC SPECIMEN TYPE/ ASSOCIATED CLINICAL CONDITION, IF KNOWN	WORKUP
$\geq 10^4$ CFU/ml of a single potential pathogen or for each of two potential pathogens	CCMS urine/ pyelonephritis, acute cystitis, asymptomatic bacteriuria, or catheterized urines	Complete ¹
$\geq 10^3$ CFU/ml of a single potential pathogen	CCMS urine/ symptomatic males or catheterized urines or acute urethral syndrome	Complete
\geq Three organism types with no predominating organism	CCMS urine or catheterized urine	None, Because of possible contamination, ask for another specimen
Either two or three organism types with predominant growth of one organism type and $< 10^4$ CFU/ml of the other organism type(s)	CCMS urine	Complete workup for the predominating ¹ organism (s); description of the other organism(s)
$\geq 10^2$ CFU/ml of any number of organism types (set up with a 0.001 and the 0.01-ml calibrated loop)	Suprapubic aspirated, any other surgically obtained urines (including ileal conduits, cystoscopy specimens)	Complete

۱. تشخیص ارگانیزم همراه با آزمایش حساسیت میکروبی Complete workup.
 ۲. Predominant growth = 10^4 to $\geq 10^5$ CFU/ml.

جدول ۳-۲: تفسیر نتایج کشت ادرار و انجام‌دادن عملیات تشخیصی

Colony count (CFU/ml) ¹	Symptoms, Clinical Disease, or Patient Population	Urine Source	No. of Organisms, Types Isolated	Laboratory Work-up Suggested ²
$< 10^2$ $\geq 10^2$	Pediatric	CV ³ /CA ³ Suprapubic	None ≤ 2 organisms by anaerobic culture	None ⁴ ID & AST
$\geq 10^2$	Symptomatic female, urethritis	CV	Pure culture	ID & AST
$\geq 10^3$	Symptomatic male, prostatitis	CA	≤ 2 organisms	ID & AST
$\geq 10^3$ $\geq 10^5$	Cystitis/pyelonephritis	CA Bladder wash-out CV	Pure culture Pure culture 2-3 organisms > 3 organisms	ID & AST ID & AST ID & AST Q & SID Q & M or Q & GS

جدول ۲-۴: تفسیر نتایج کشت ادرار براساس تعداد باکتری، پیوری و علائم بالینی



۱. لکوسیت استراز مثبت (+) برابر است با حداقل 5WBC/HPF. A=absent P=present

۲. سوزش ادرار و تکرر.

در صورتی که بیمار تحت درمان با آنتی‌بیوتیک است، رنگ‌آمیزی گرم، شمارش WBC و نتیجه کشت ممکن است قابل قبول نباشد.

تعداد ارگانیسم و شمارش WBC در ادرار سانتیفریوژ شده (سدیمان ادراری) ارزش مقایسه‌ای ندارد. پلیت‌ها برای بررسی و مشورت باید تا ۷۲ ساعت نگهداری شوند.

جدول ۲-۵: Urine Cultures-Definitive Identification and Susceptibility Criteria

Organism Group	Description (Presumptive/ Definitive Identification)	Set Up Susceptibility?
<i>Staphylococcus</i>	<ul style="list-style-type: none"> • <i>Staphylococcus</i> 	<ul style="list-style-type: none"> • yes
	<ul style="list-style-type: none"> • <i>Staphylococcus</i> Coagulase-negative 	<ul style="list-style-type: none"> • yes
	<ul style="list-style-type: none"> • <i>Staphylococcus</i> saprophyticus 	<ul style="list-style-type: none"> • no
<i>Streptococcus</i>	<ul style="list-style-type: none"> • <i>Beta streptococcus</i> 	<ul style="list-style-type: none"> • no
	<ul style="list-style-type: none"> • <i>Enterococcus</i> 	<ul style="list-style-type: none"> • s/p [facility-specific]
	<ul style="list-style-type: none"> • <i>Streptococcus viridans</i> 	<ul style="list-style-type: none"> • no
Gram-positive rods	<ul style="list-style-type: none"> • <i>C. urealyticum</i> 	<ul style="list-style-type: none"> • no
	<ul style="list-style-type: none"> • Diphtheroids 	<ul style="list-style-type: none"> • no
	<ul style="list-style-type: none"> • <i>Lactobacillus</i> 	<ul style="list-style-type: none"> • no
Gram-negative rods	<ul style="list-style-type: none"> • Presumptive identification 	<ul style="list-style-type: none"> • yes
	<ul style="list-style-type: none"> • Definitive identification 	<ul style="list-style-type: none"> • yes
Yeast	[facility-specific] presumptive vs. definitive	<ul style="list-style-type: none"> • no



Negative culture

- Urine culture negative
- No growth of uropathogens
- No growth of uropathogens at $\geq 1000/ \text{ml}$



Positive culture

- ▶ 10000 CFU/ ml normal urogenital or skin microbiota
- ▶ Multiple bacterial morphotype present, possible contamination; suggest appropriate recollection with timely delivery to the laboratory, if clinically indicated
- ▶ Colony count unreliable due to antimicrobial inhibition