

# Department of Biology

## 2025-2026

((Pathological analyses))

Stage (-3-)

LEC- ((3 ))

**General Urine Examination or Urinalysis part**

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# Methods and time of urine Collection



- 1- Random collection taken at any time of day
- 2- Early morning collection of the sample . Is most useful because it tends to be uniform concentrated
- 3- midstream urine specimen
- 4- Catheterization of the bladder through the urethra for urine collection is carried out only in special cases, i.e., in a comatose

\* All types of the specimen should be put in Sterile container (Cap or tube and needle )



# Types of Analysis

- **Macroscopic (physical) Examination**
- **Chemical Analysis (Urine Dipstick)**
- **Microscopic Examination**
- **Culture**

# Macroscopic Examination

## Odor:

- **Ammonia-like:** (Urea-splitting bacteria)
- **Foul:** Old specimen, pus or inflammation
- **Fruity:** Ketones

## Color:

- **Colorless** Diluted urine or diabetes
- **Yellow-Green** Bilirubin / Biliverdin
- **Red** Blood / Hemoglobin
- **Milky** Urinary tract infection (Pus)

# Macroscopic Examination

**- Appearance:**

**Clear , Turbid**

**Turbidity can be occur by :**

Bladder Stones

Glomerulonephritis

Urethritis

Uric Acid Crystals

# Chemical Analysis

## 1- Specific Gravity

## 2- Protein :

A- Heat and Acetic acid

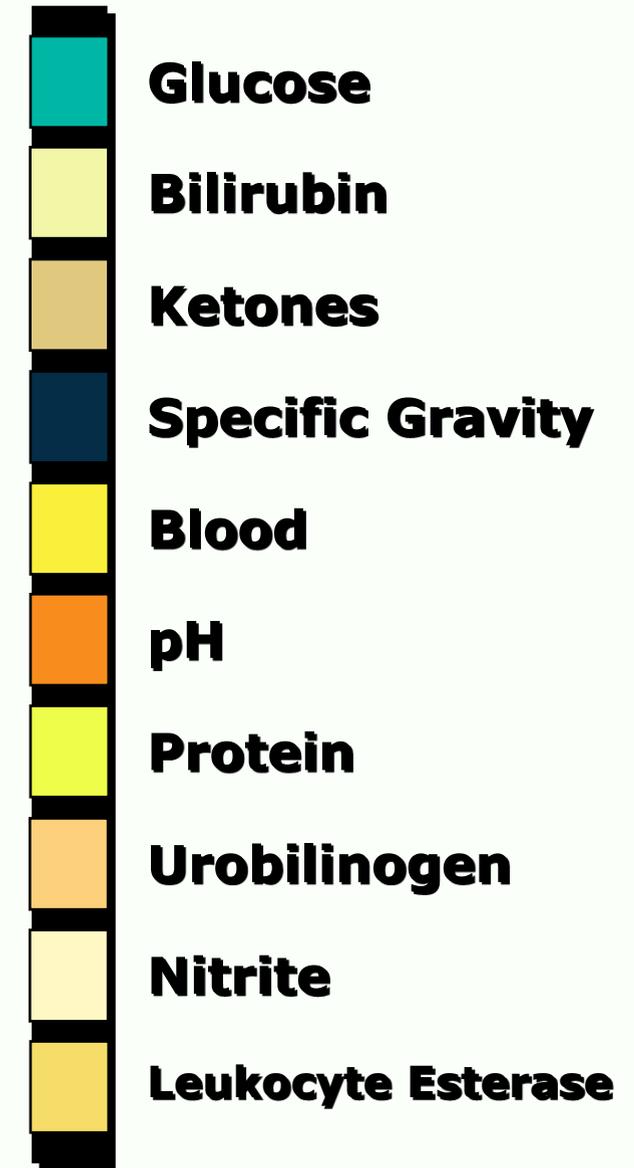
B- Sulphosalicylic acid test

C- Detecting the protein by strips.

### RESULTS:

-	No cloudiness
+	Definite cloudiness, but no granularity
++	Granular cloudiness in upper part, dense and transparency
+++	High dense and opaque cloudiness
++++	Dense precipitation and often it is solid

## Urine Dipstick



# One + Step®

Reagent Strips For Urinalysis  
 Bandelettes Reactives Pour L'analyse Urinaire  
 Reagenz Streifen Für Urinanalyse  
 Tiras Reactivas Para Analisis De Orina

CE 0120

IVD



2°C



30°C



Tests	Results / Resultats / Resultados / Ergebnisse
<b>Leukocytes/Leucocytes Leucocitos/Leukozyten</b>	neg. trace +70 ++125 +++500 WBC/ $\mu$ L
<b>Nitrite/Nitritos Nitrit</b>	neg. trace pos.
<b>Urobilinogen/Urobilinogéno Urobilinógeno</b>	0.1 +Normal+ 1(1.6) 2(3.3) 4(6.6) 8(13.2) mg/dl ( $\mu$ mol/L)
<b>Protein/Protéines Proteínas</b>	neg. trace +30(0.3) ++100(1.0) +++300(3.0) ++++1000(10) mg/dl (g/L)
<b>pH</b>	5 6 6.5 7 7.5 8 8.5
<b>Blood/Sang Sangre/Blut</b>	neg. Hemolysis trace +25 ++80 +++200 Non Hemolysis 0 ++60 RBC/ $\mu$ L
<b>S.G./Densité Densidad/Spec. Gew.</b>	1.000 1.005 1.010 1.015 1.020 1.025 1.030
<b>Ketones/Cétones Cetonas/Ketonkörper</b>	neg. $\pm$ 5(0.5) +15(1.5) ++40(3.9) +++80(8) ++++160(16) mg/dl (mmol/L)
<b>Bilirubin/Bilirubine Bilirubina</b>	neg. * ** ***
<b>Glucose/Glucosa</b>	neg. $\pm$ 100(5.5) +250(14) ++500(28) +++1000(56) ++++2000(111) mg/dl (mmol/L)



### 3- Glucose test :

#### A- (Benedict's test)

In this method the (Cu) ions redact to the (Cu<sub>2</sub>O) by the glucose if present.

#### B - Detecting the glucose by strips.

### 4- Bile pigment test

### 5- Urobilinogen test

### 6- Ketone bodies test

### 7- PH

**8- nitrite test:** A [positive test](#) for nitrites in the urine is called **nitrituria** , positive nitrite test indicates that the cause of the UTI is a [gram negative](#) organism, most commonly [Escherichia coli](#).

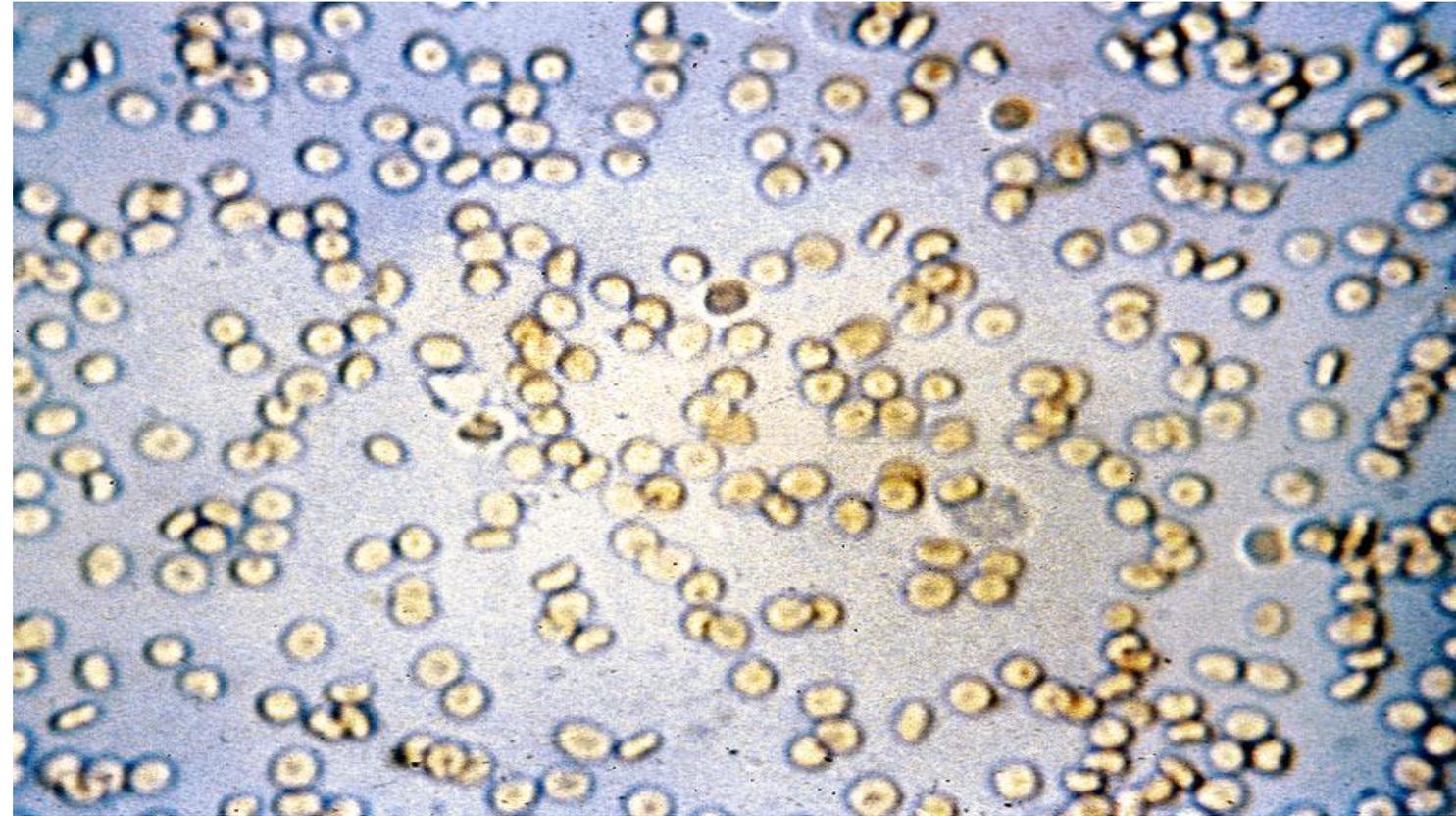


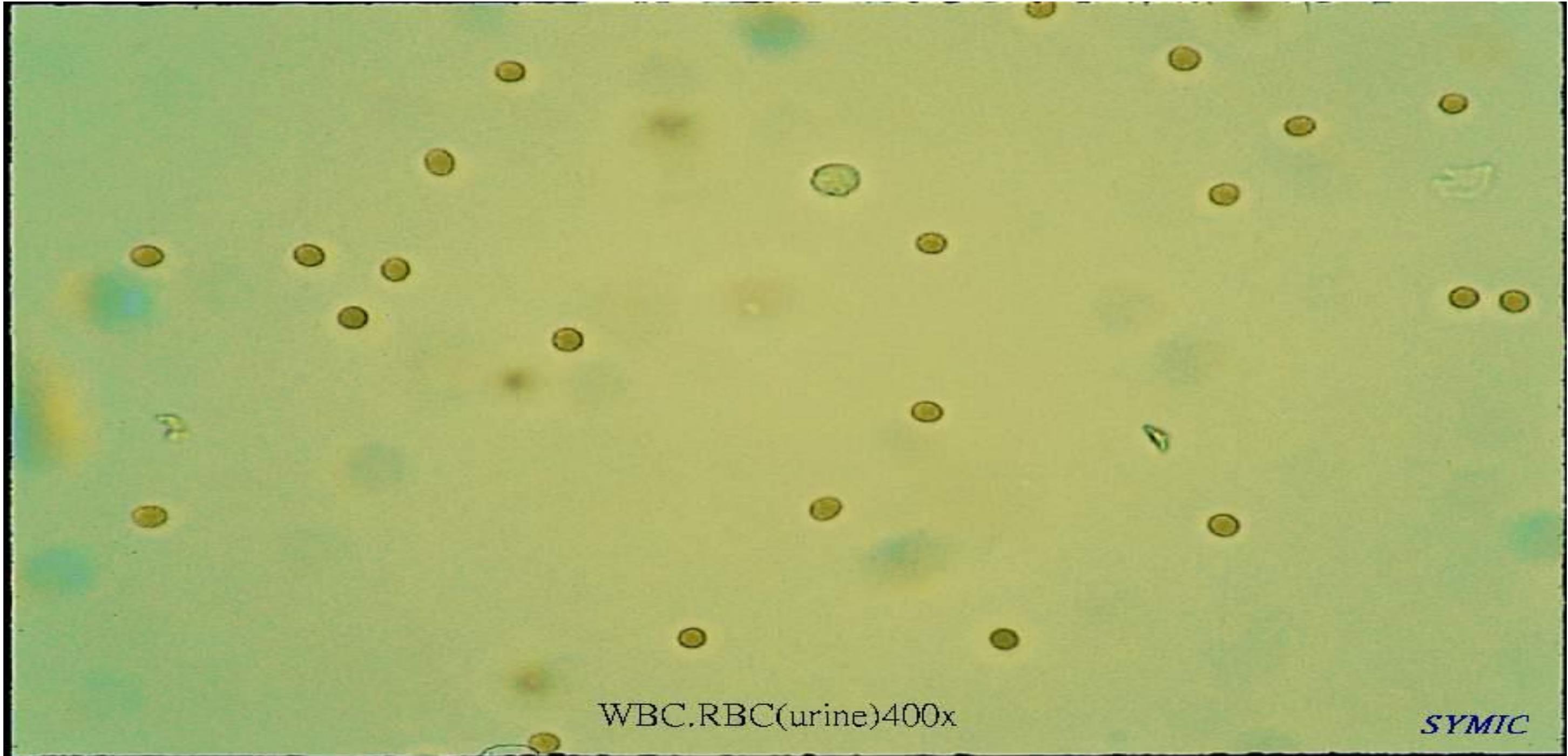
**9- Leukocyte esterase (LE) :** The leukocyte esterase (LE) test detects [esterase](#), an enzyme released by white blood cells because abnormalities associated with [infection](#). The combination of the LE test with the urinary [nitrite test](#) provides an excellent screen for establishing the presence of a urinary tract infection (UTI). A urine sample that tests positive for both nitrite and leukocyte esterase should be cultured for pathogenic [bacteria](#).

# Microscopic Examination

## Red Blood Cells

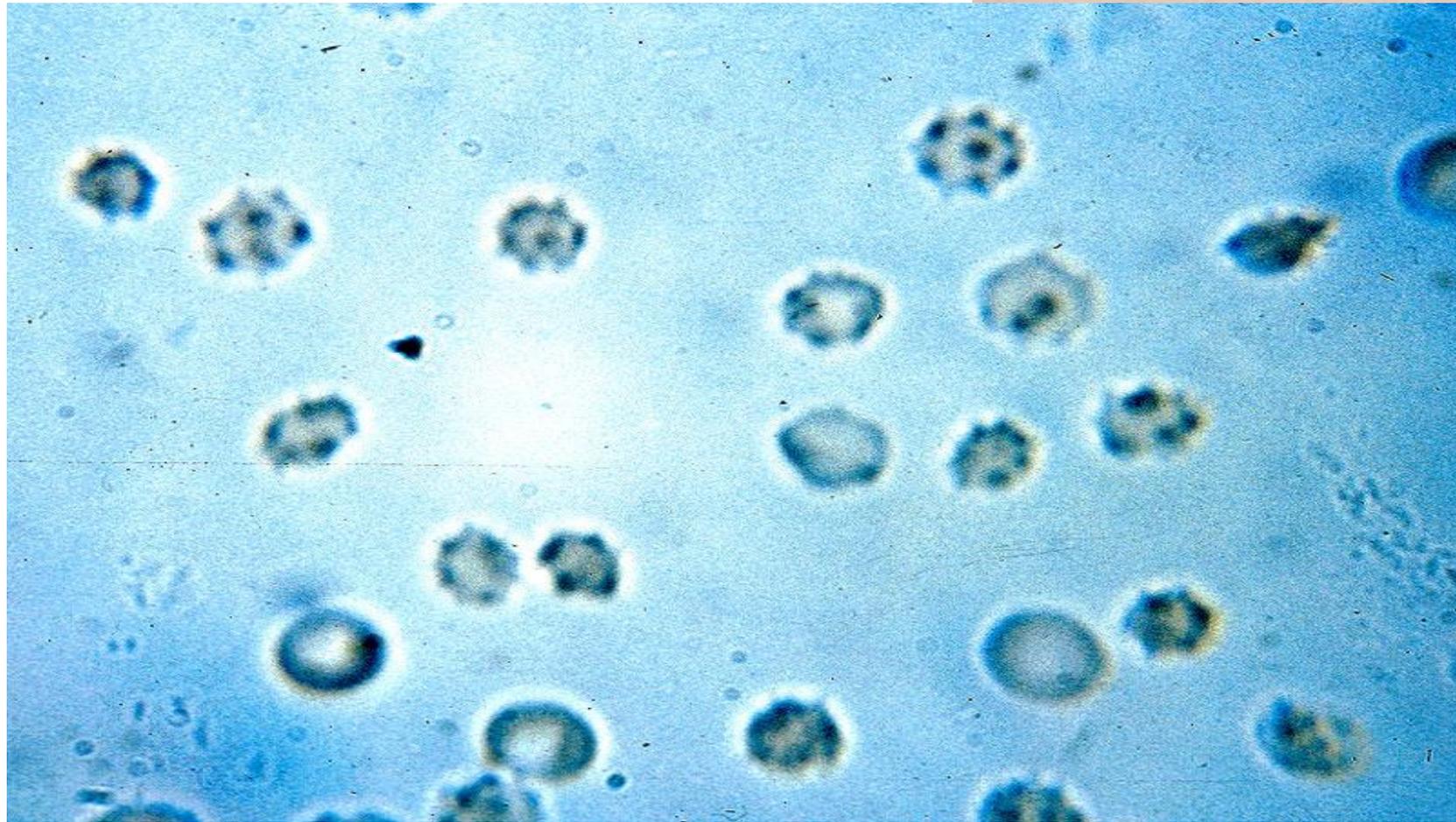
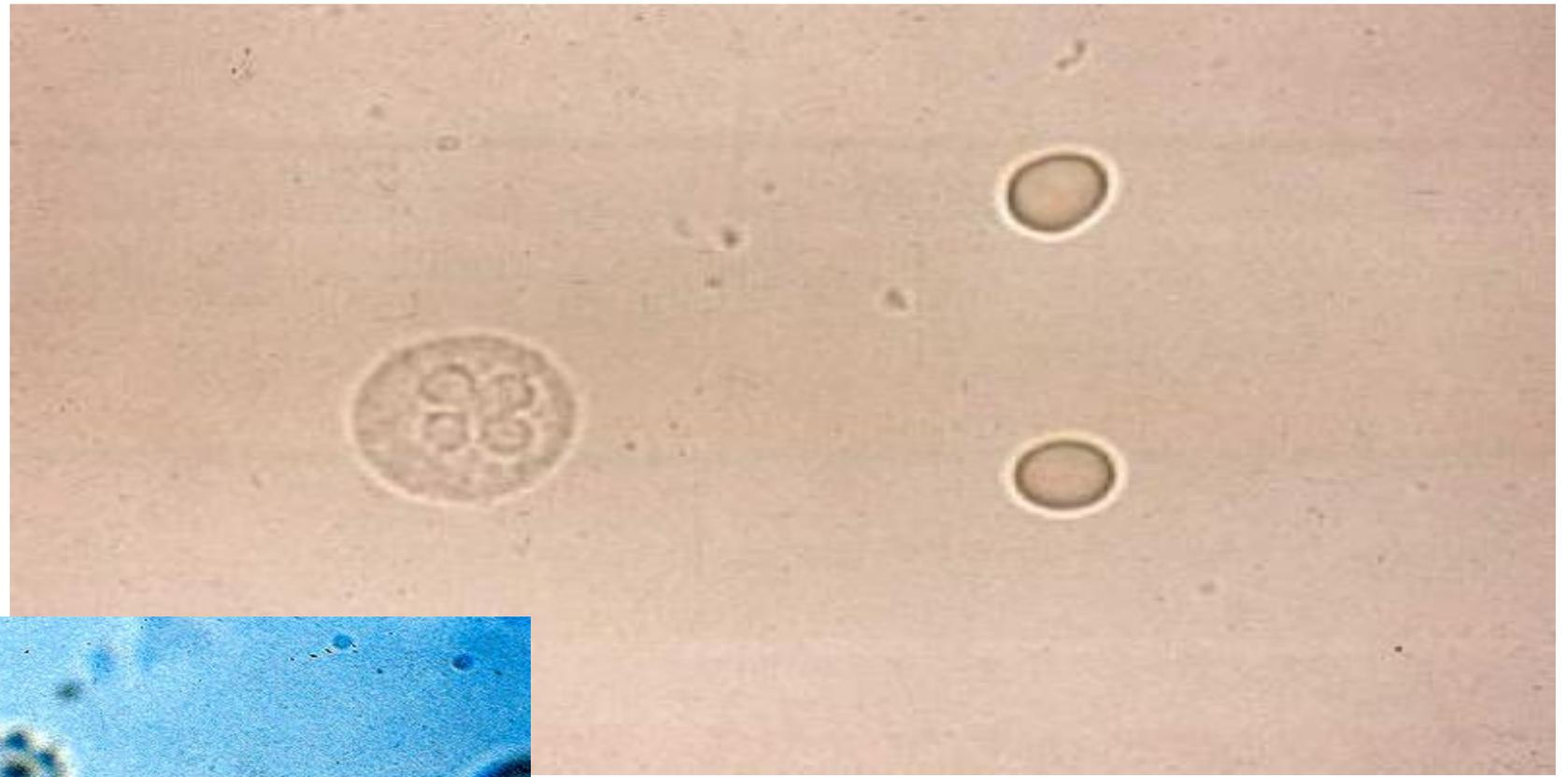
Hematuria is the presence of abnormal numbers of red cells in urine due to: glomerular damage, tumors , urinary tract stones, renal infarcts, upper and lower urinary tract infections and physical stress.

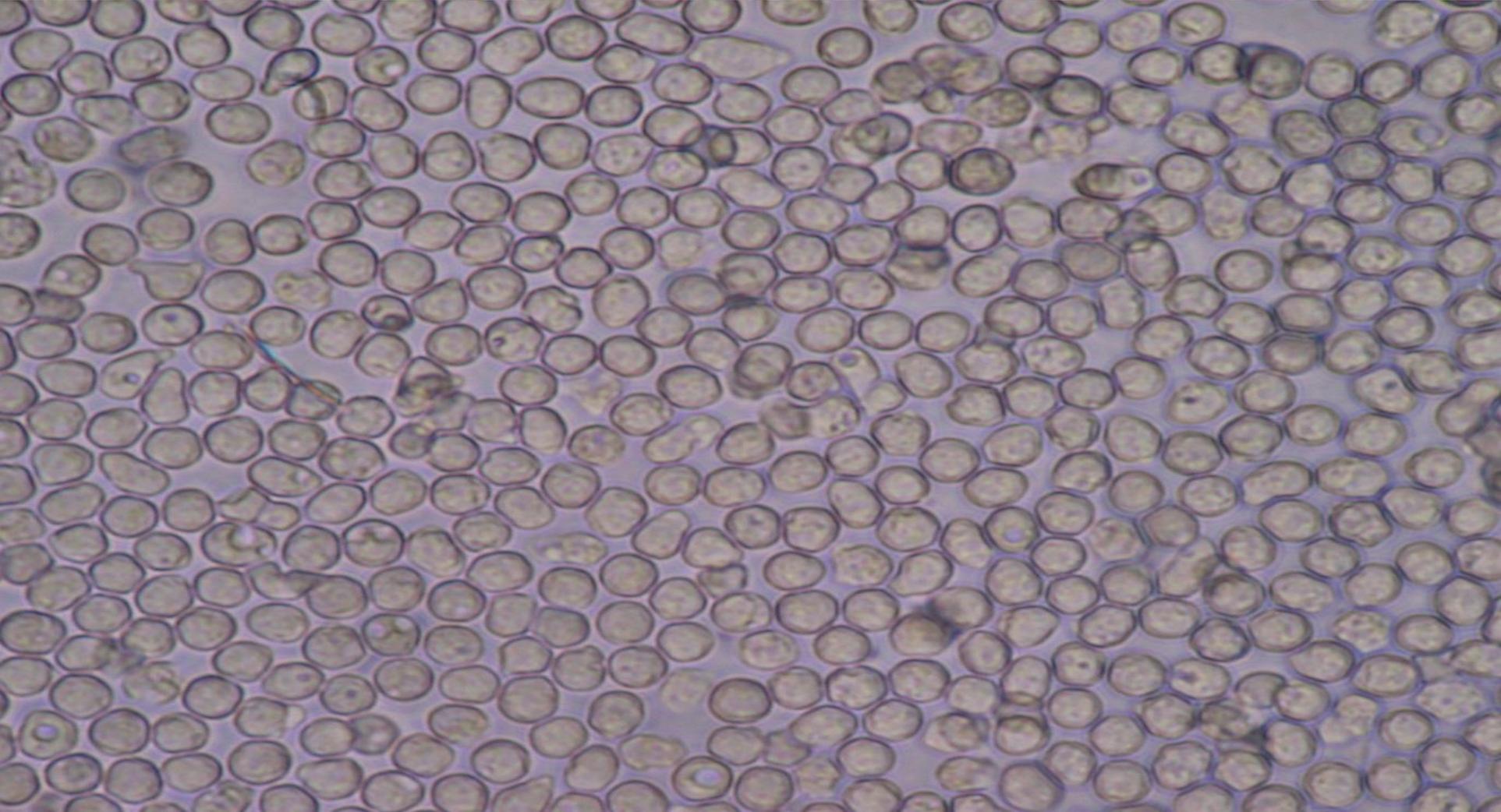
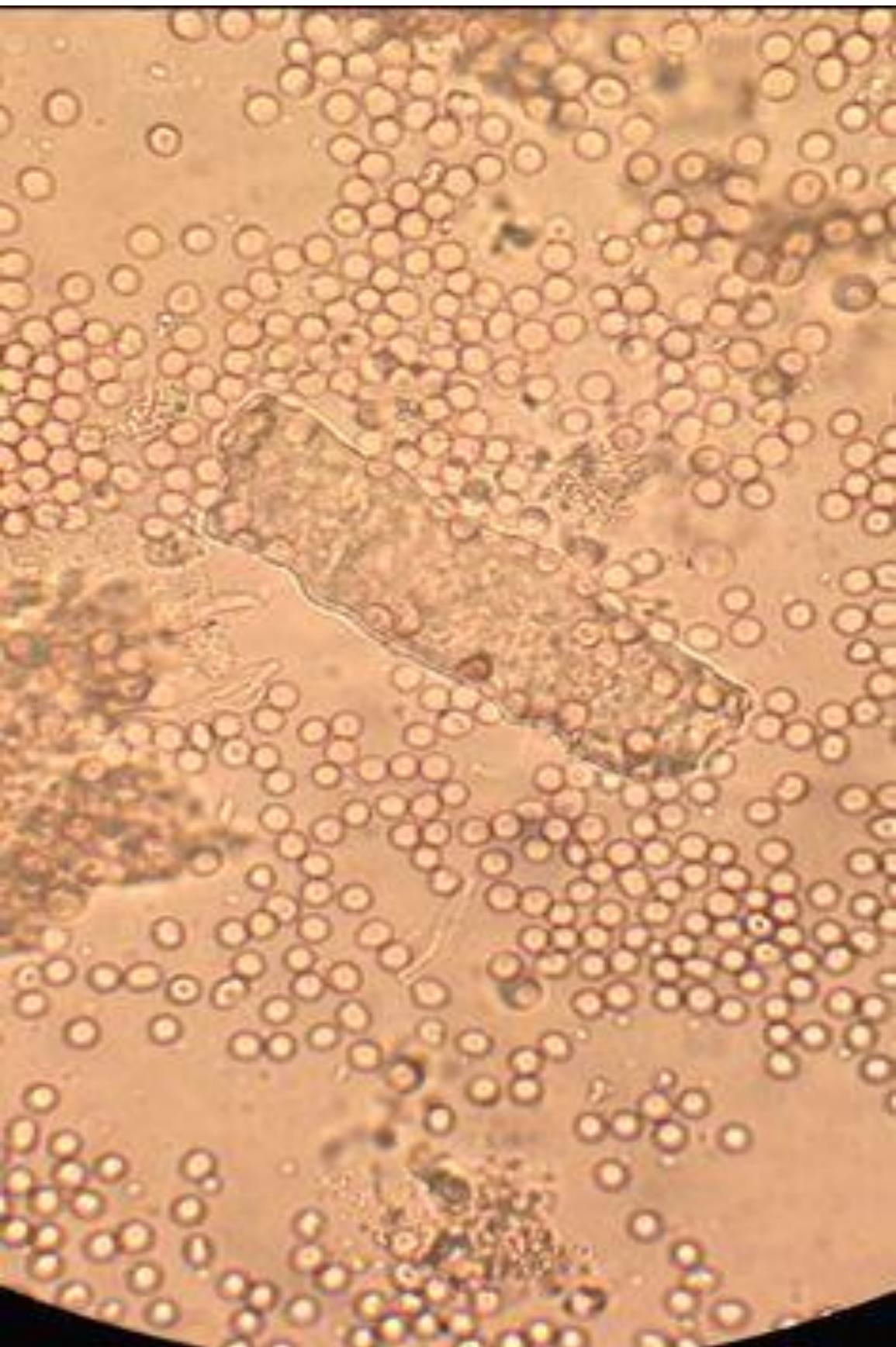
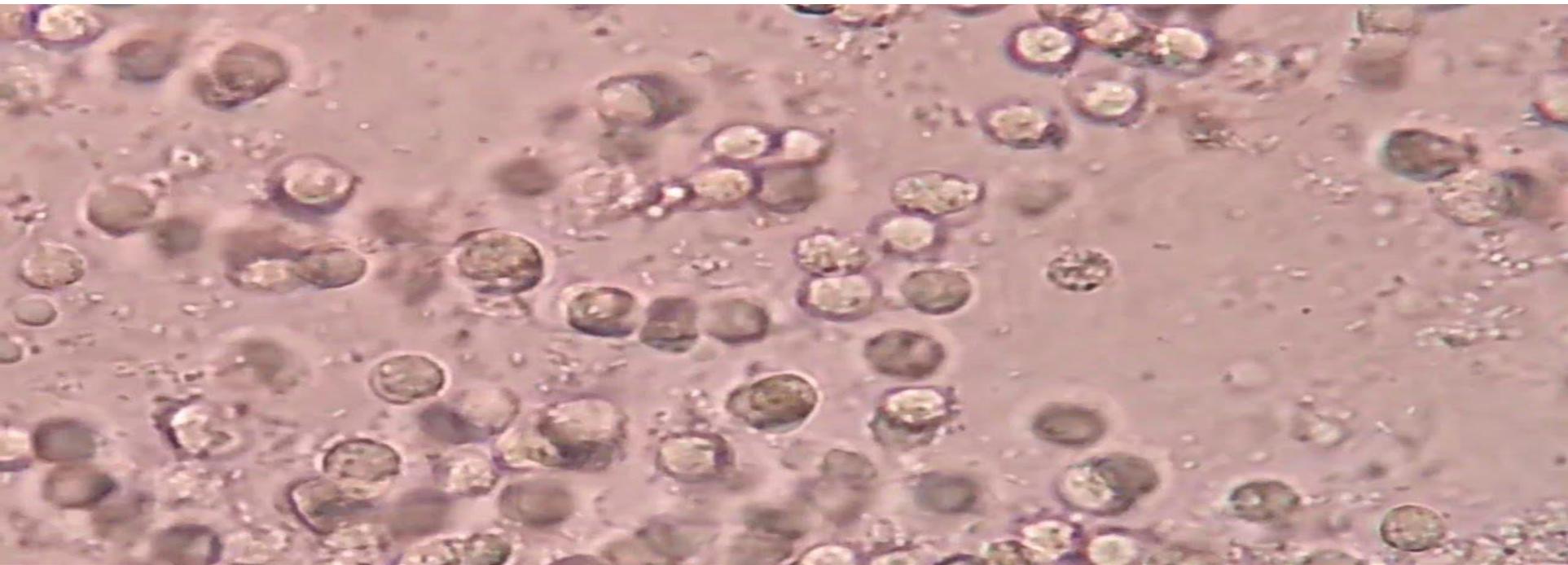




WBC.RBC(urine)400x

*SYMIC*

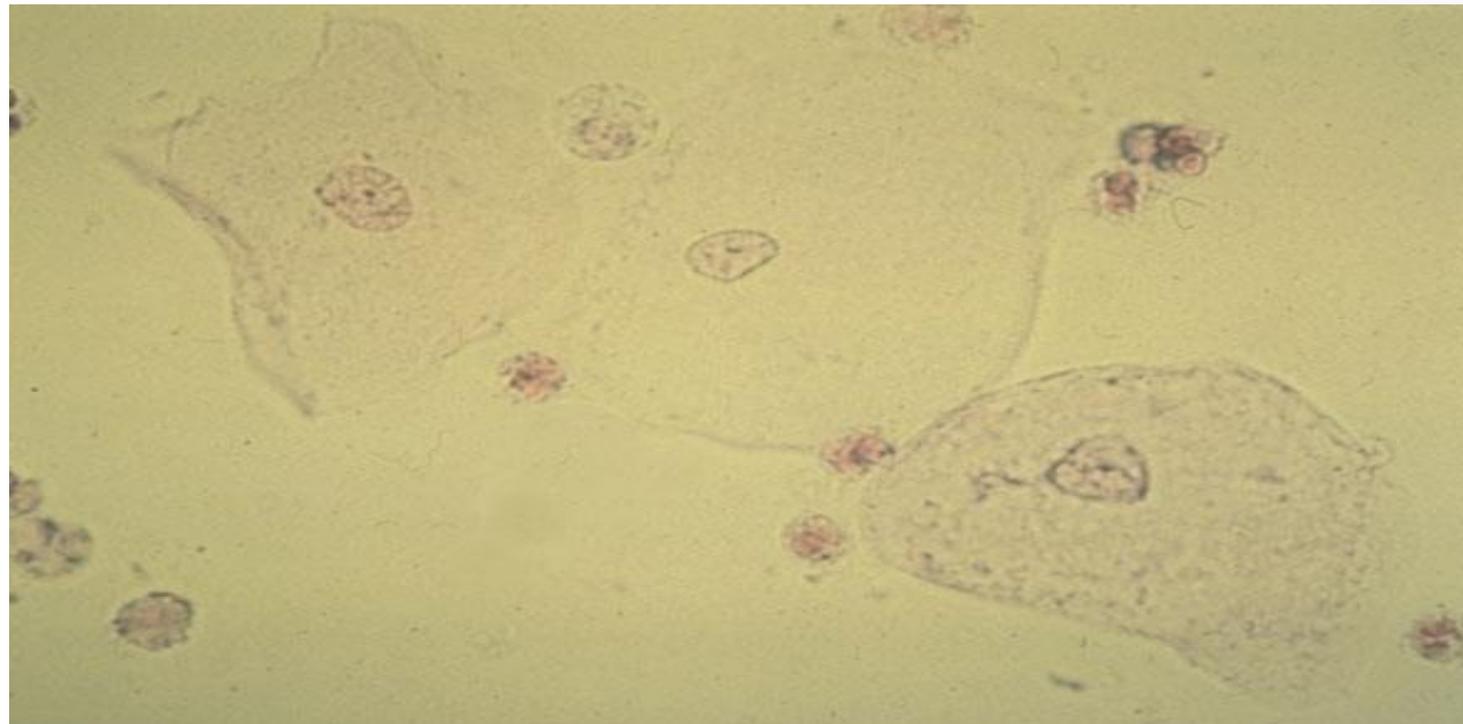
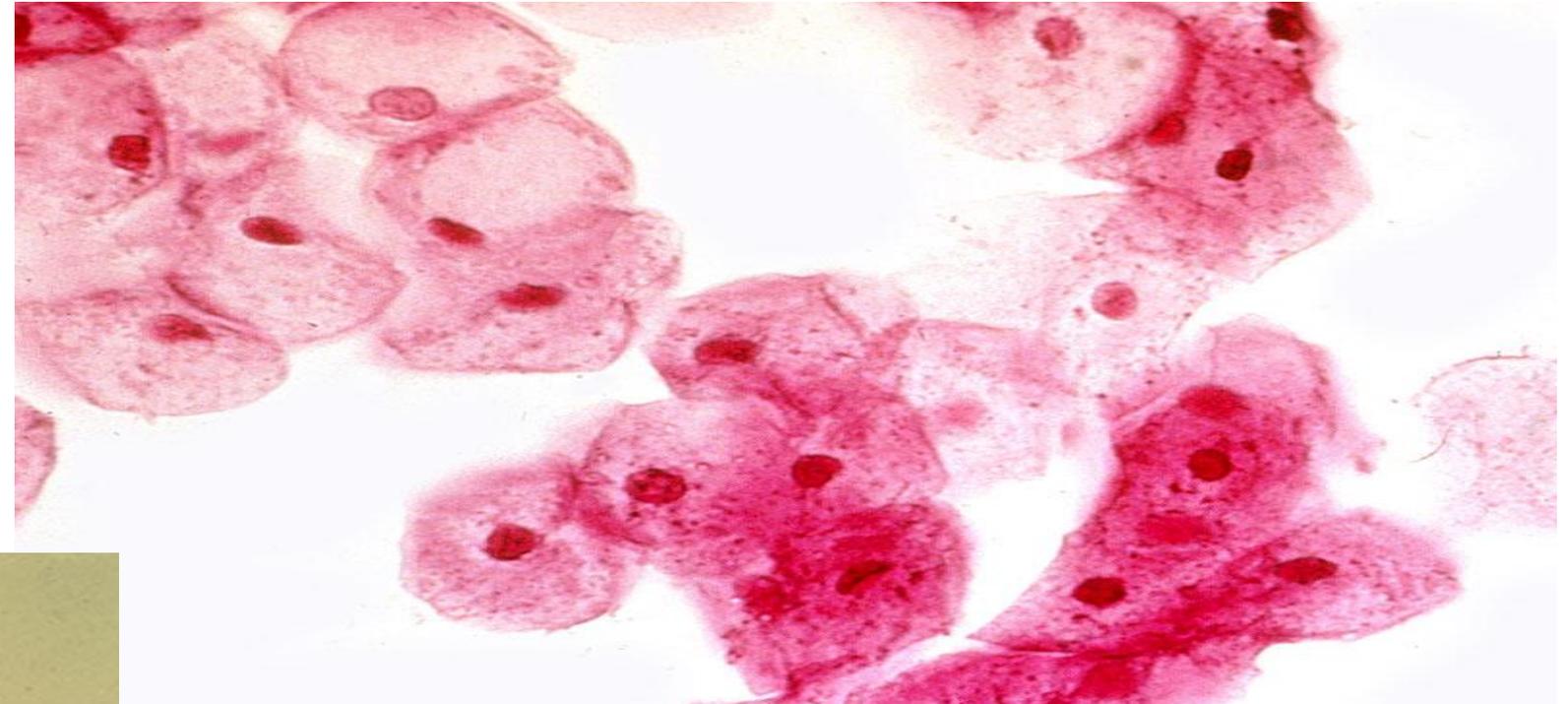




# Microscopic Examination

## Epithelial Cells

Renal tubular epithelial cells, usually larger than granulocytes, contain a large round or oval nucleus and normally slough into the urine in small numbers.



# Microscopic Examination

Bacteria



# Microscopic Examination

## Yeasts

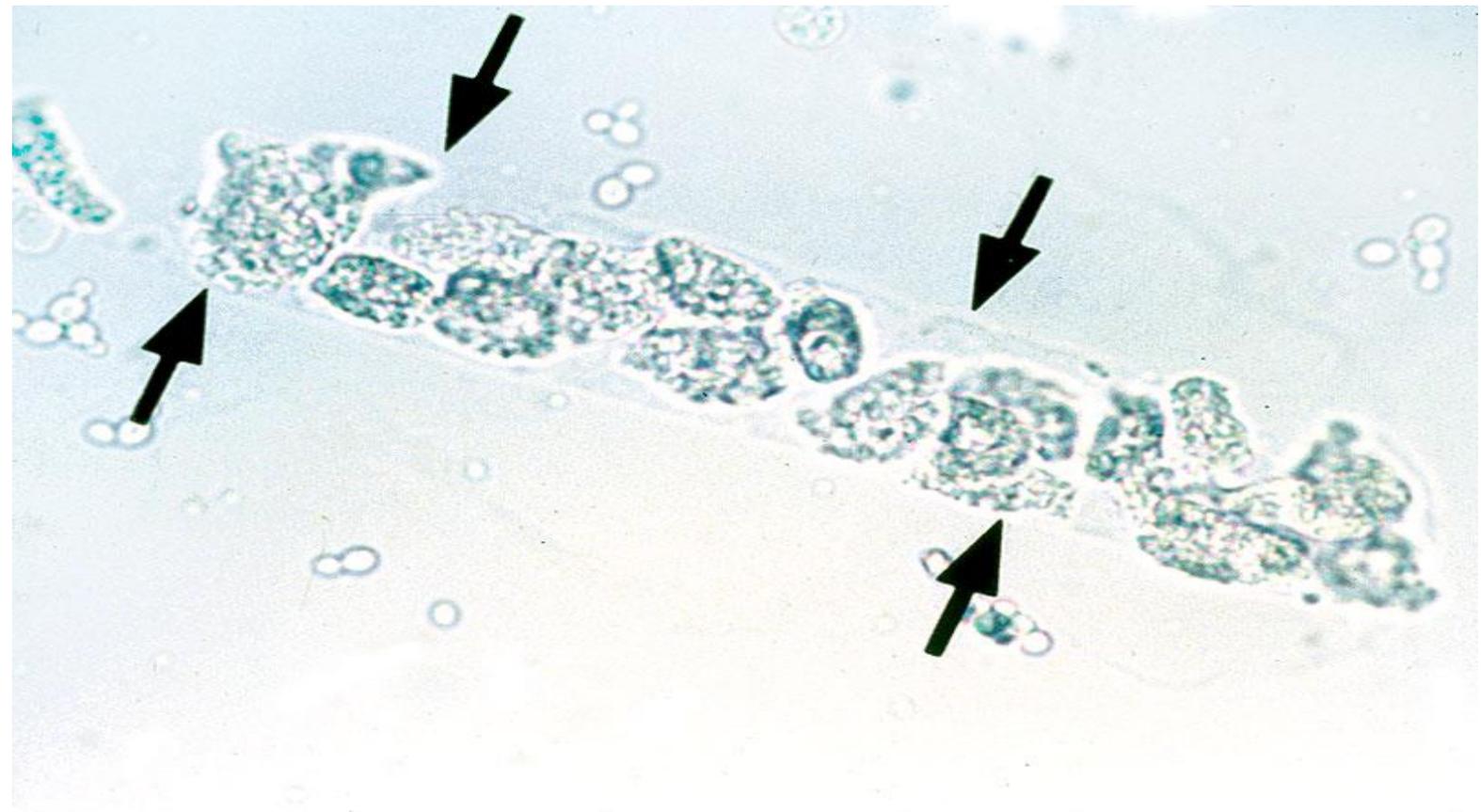


# Microscopic Examination

**Waxy Cast**

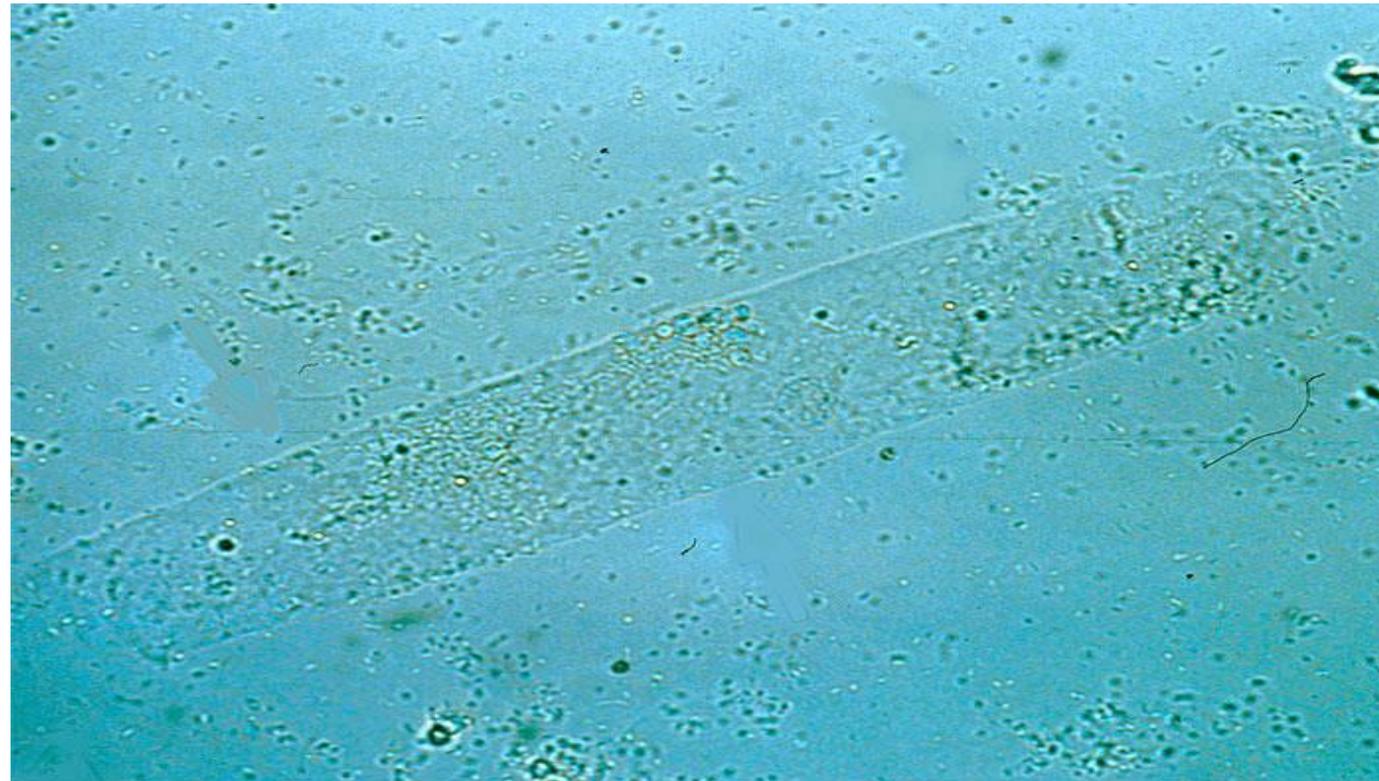


**WBCs Cast**



# Microscopic Examination

**Hyaline Cast**



**Granular Cast**



# Microscopic Examination

## Crystals

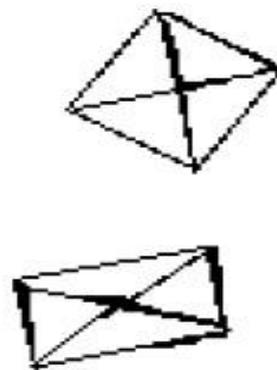
### Crystals

Common crystals can be seen is calcium oxalate , triple phosphate and amorphous phosphates etc .

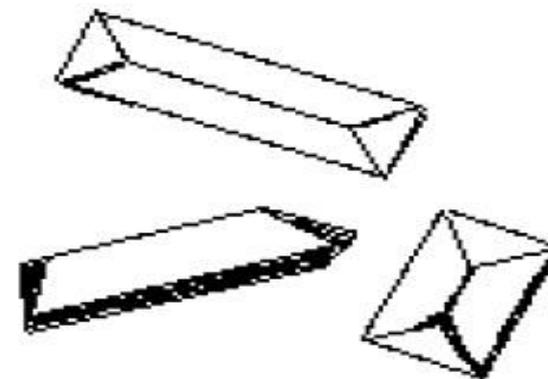
uncommon crystals include:

cystine crystals in urine of neonates with congenital cystinuria or severe liver disease

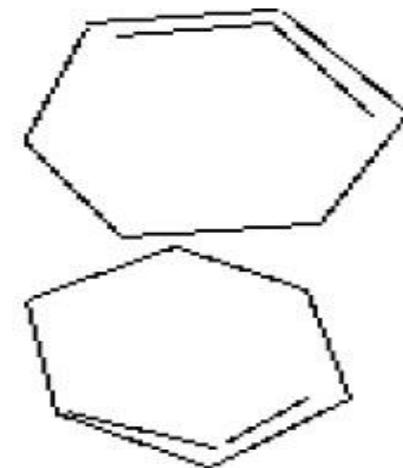
Tyrosine crystals with congenital tyrosinosis or marked liver impairment ,  
leucine crystals in patients with severe liver disease or with maple syrup urine disease.



Oxalate



Triple Phosphate



Cystine

SI

Amorphous Phosphate

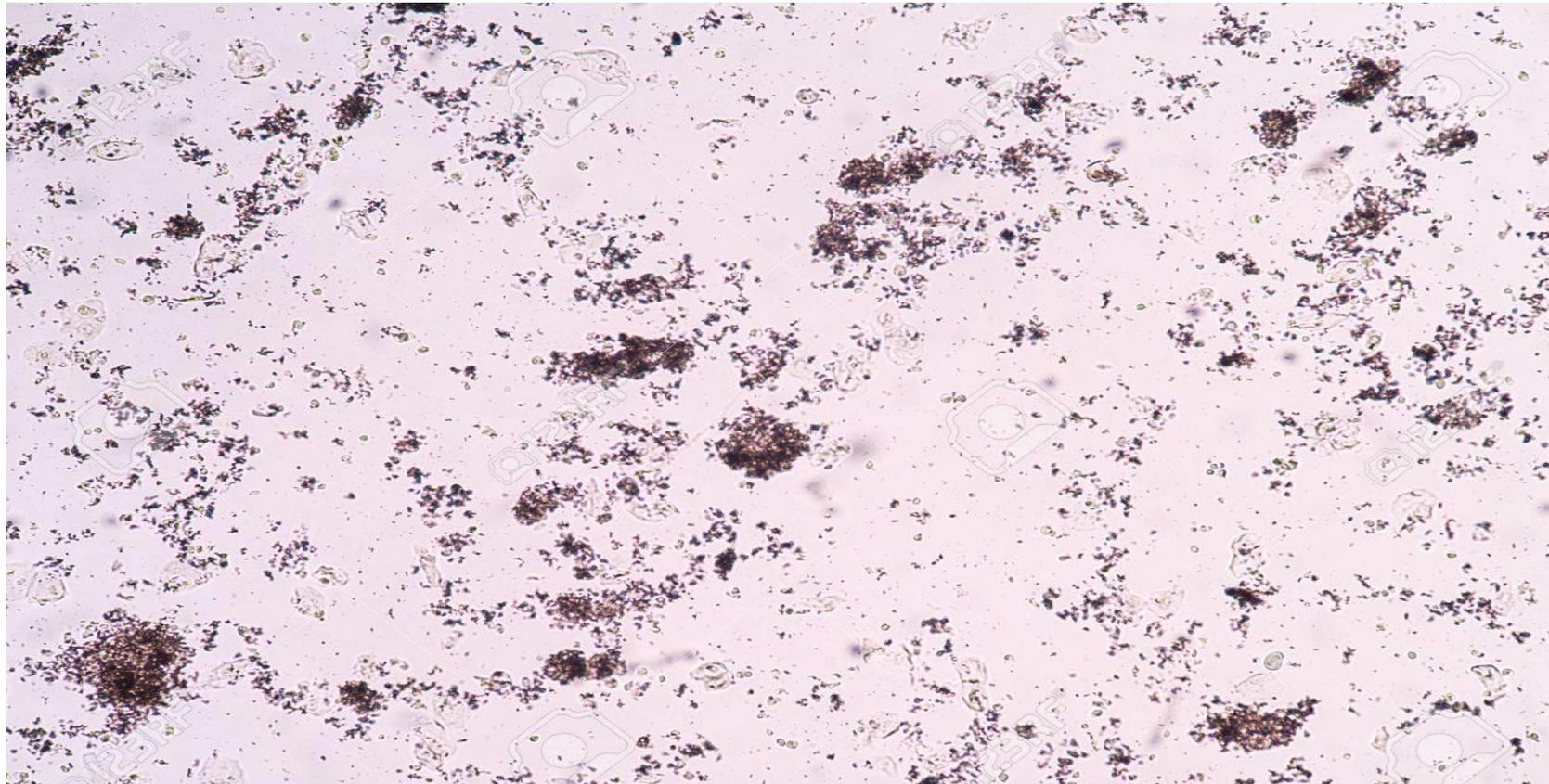


Scholar Idea

X40

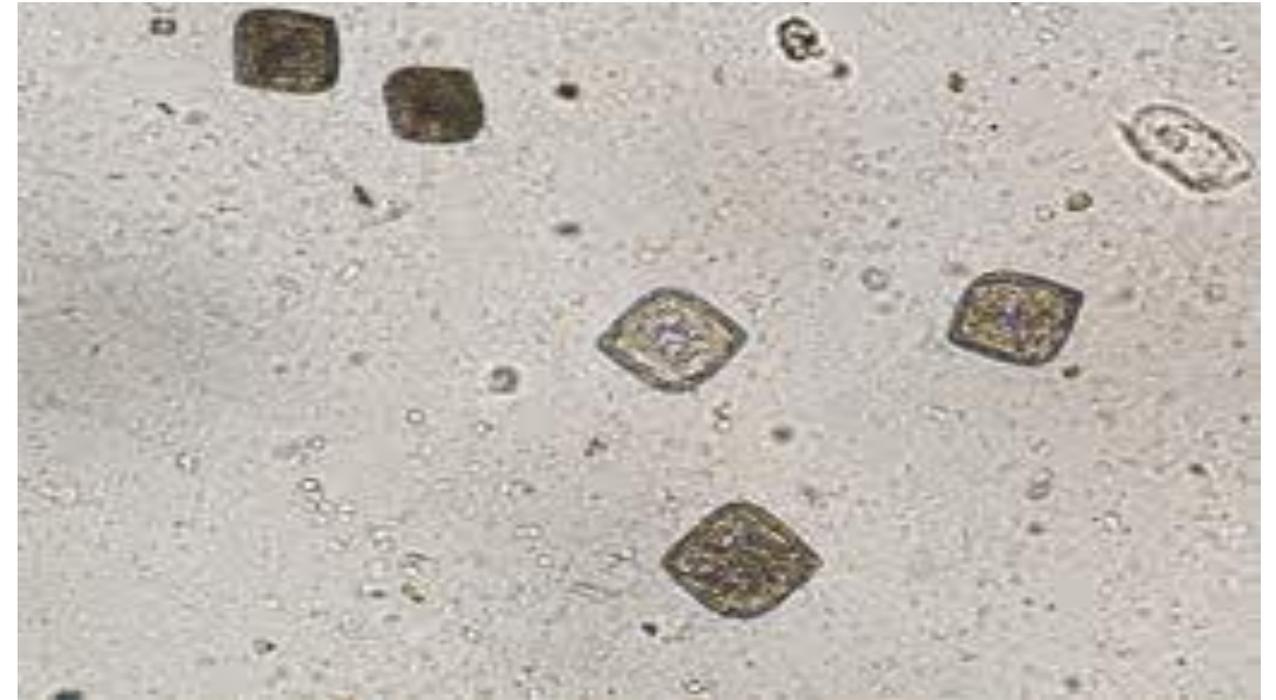
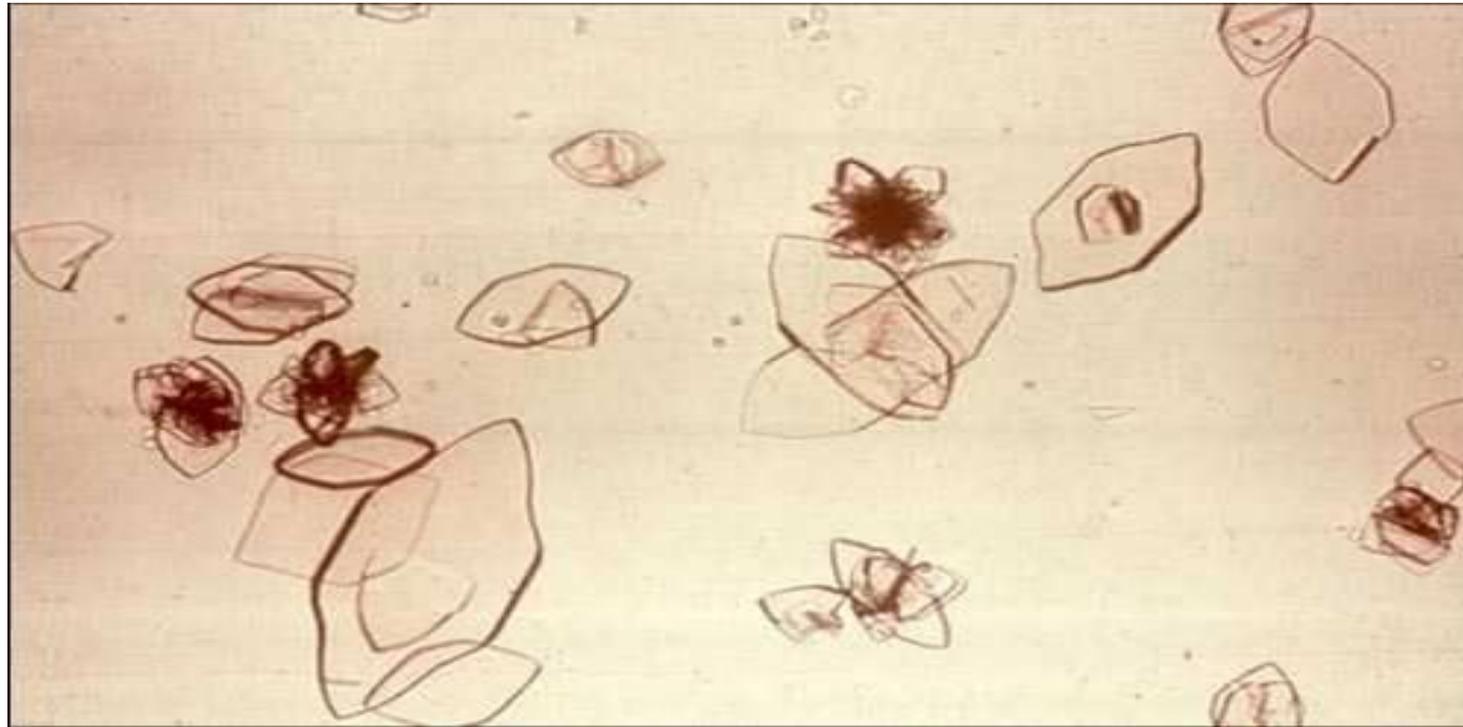


# Amorphous urate



# Microscopic Examination

## Uric acid

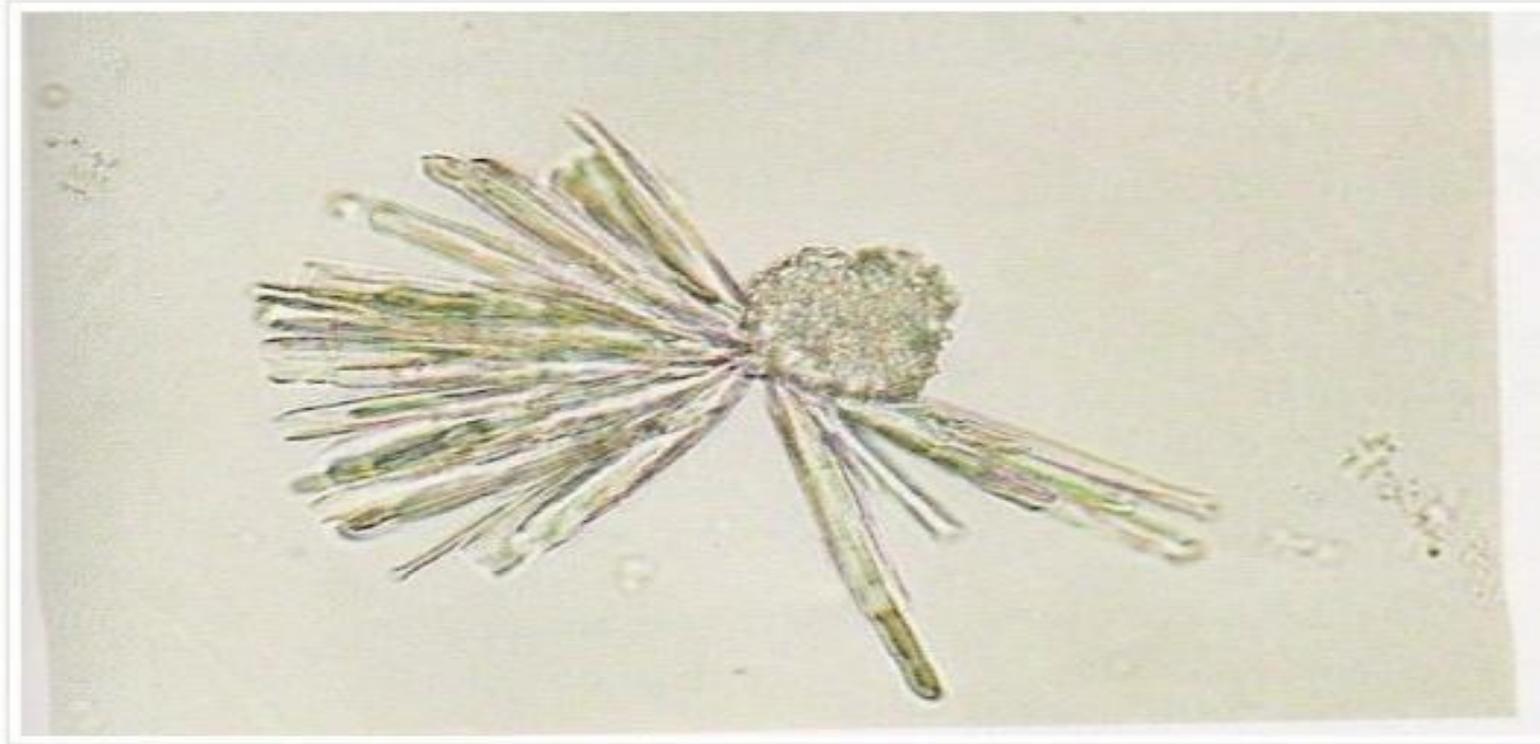


# Microscopic Examination

## Calcium Oxalate Crystals



## Calcium Phosphate Crystals

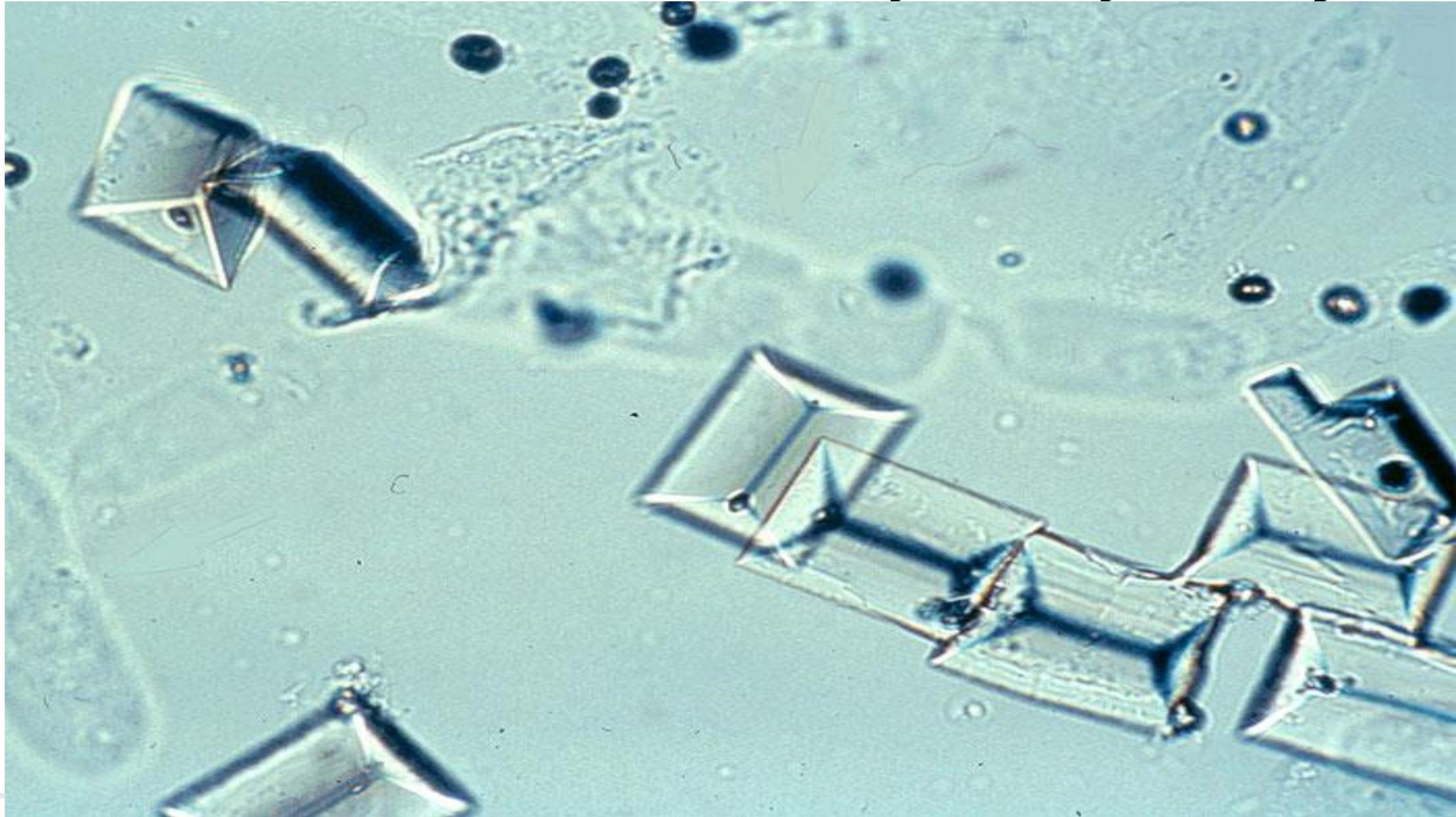


## Calcium Carbonate Crystals



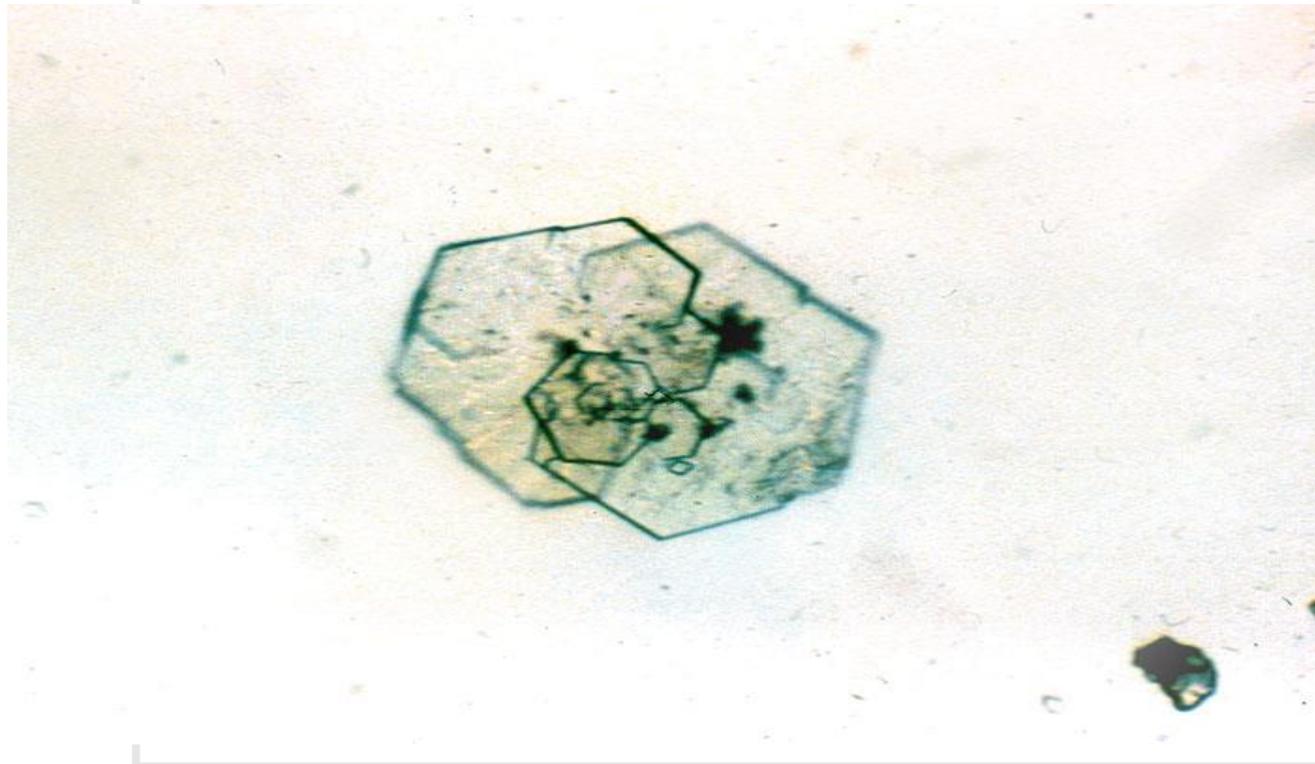
# Microscopic Examination

## Triple Phosphate Crystals



# Microscopic Examination

**Cystine Crystals**



**Leucine Crystals**



# Microscopic Examination

## Ammonium Biurate Crystals

sulfonamide

