



PATHOLOGY OF PYELONEPHRITIS, NEPHROLITHIASIS AND CYSTITIS

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OBJECTIVES

Recognize the predisposing factors for infections of the kidney and urinary tract.

Describe the different types of infections in the kidney and urinary tract.

Recognize the clinicopathological features of acute and chronic pyelonephritis.

Describe the causes of urinary tract obstruction.

Recognize drug induced nephritis

INFECTIONS OF URINARY TRACT

Upper Urinary tract

Pyelonephritis-

Acute

Chronic

Lower Urinary tract

ureteritis

cystitis

urethritis

DEFINITION

Pyelonephritis: one of the most common diseases of the kidney and is defined as inflammation affecting the tubules, interstitium, and renal pelvis.

ROUTE OF INFECTION

Ascending infection

- More than 85% of cases of urinary tract infection are caused by the gram-negative bacilli that are normal inhabitants of the intestinal tract.**

- This is the most common route of infection

Hematogenous infection

PREDISPOSING CONDITIONS- ACUTE PYELONEPHRITIS

Urinary tract obstruction, either congenital or acquired

Instrumentation of the urinary tract

Vesicoureteral reflux

Pregnancy..

Gender and age..

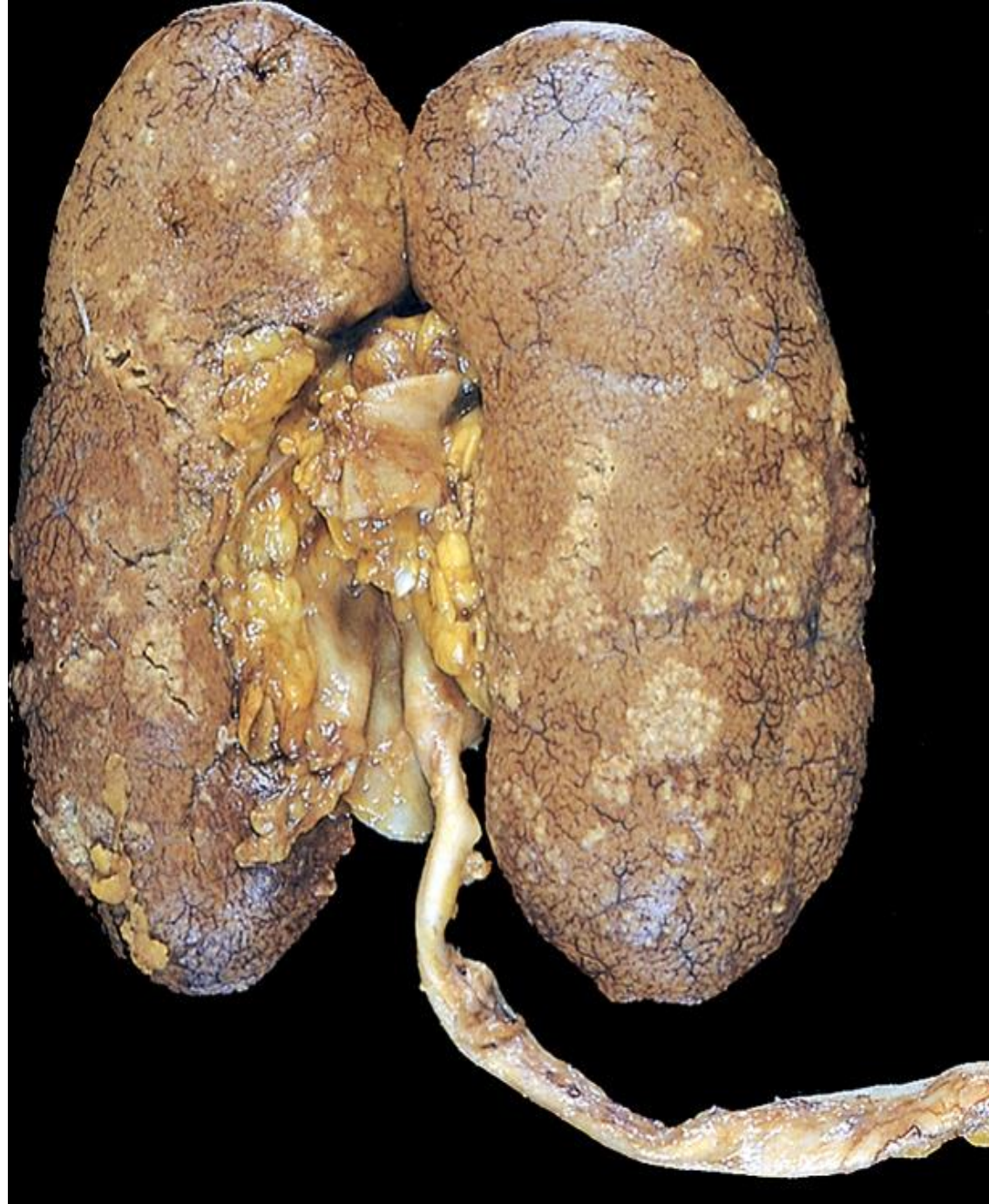
Preexisting renal lesions, causing intrarenal scarring and obstruction

Diabetes mellitus

Immunosuppression and immunodeficiency

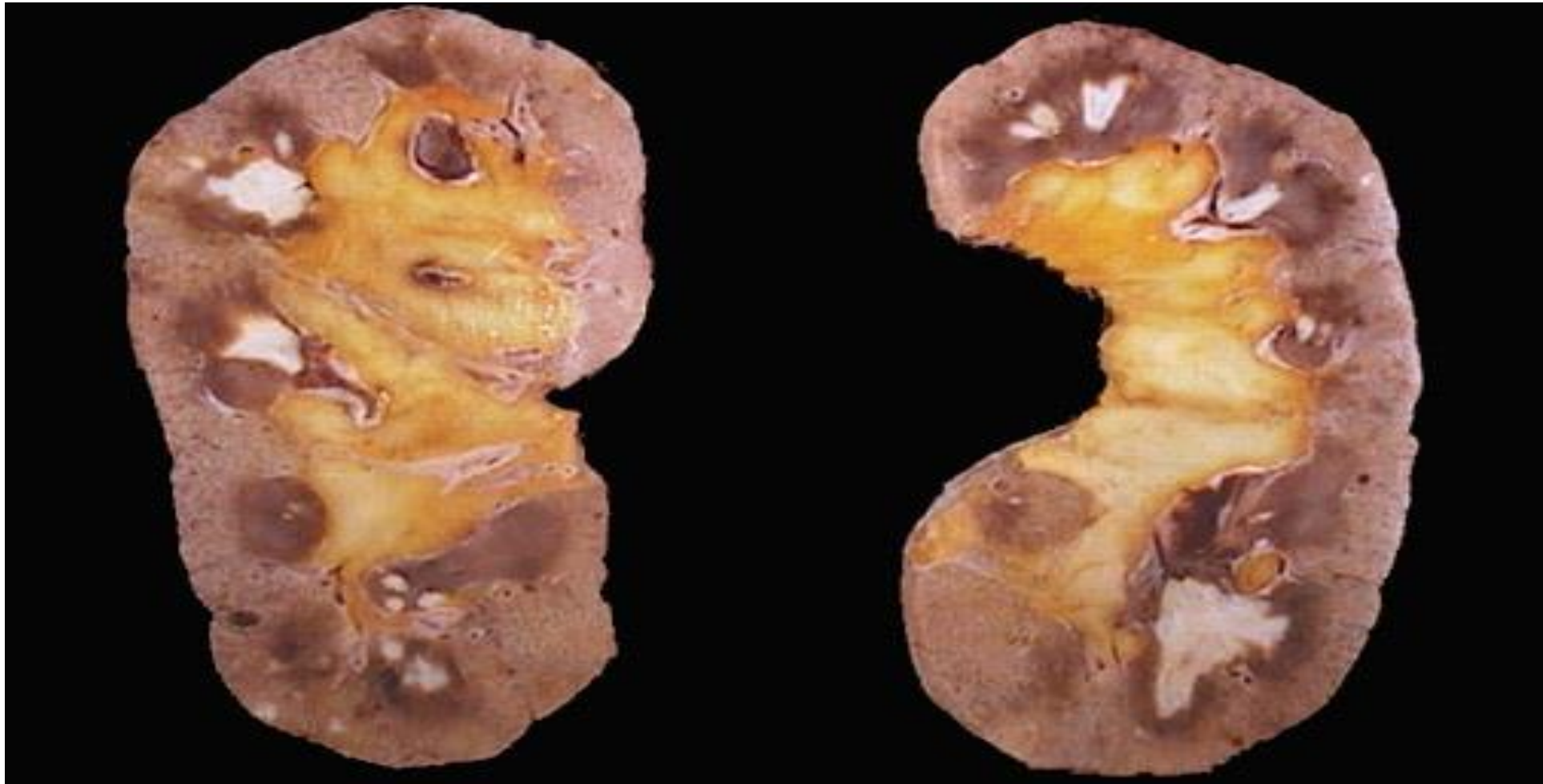
COMPLICATIONS -ACUTE PYELONEPHRITIS

- 1 Papillary necrosis**
- 2 Pyonephrosis**
- 3 Perinephric abscess**



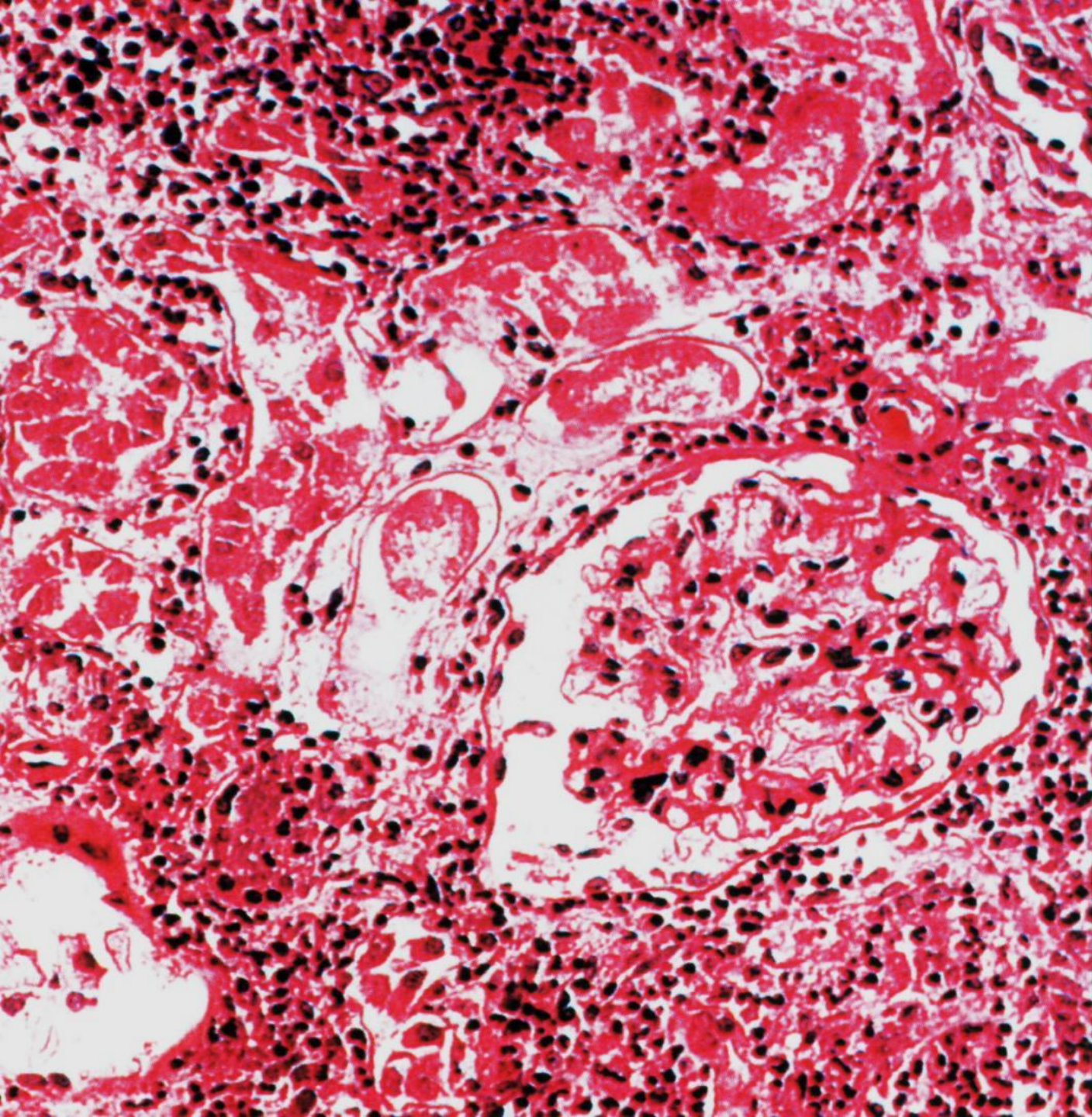
Acute pyelonephritis.
Cortical surface
shows grayish white
areas of
inflammation and
abscess formation

THE PALE WHITE AREAS INVOLVING SOME OR ALL OF MANY RENAL PAPILLAE ARE AREAS OF PAPILLARY NECROSIS

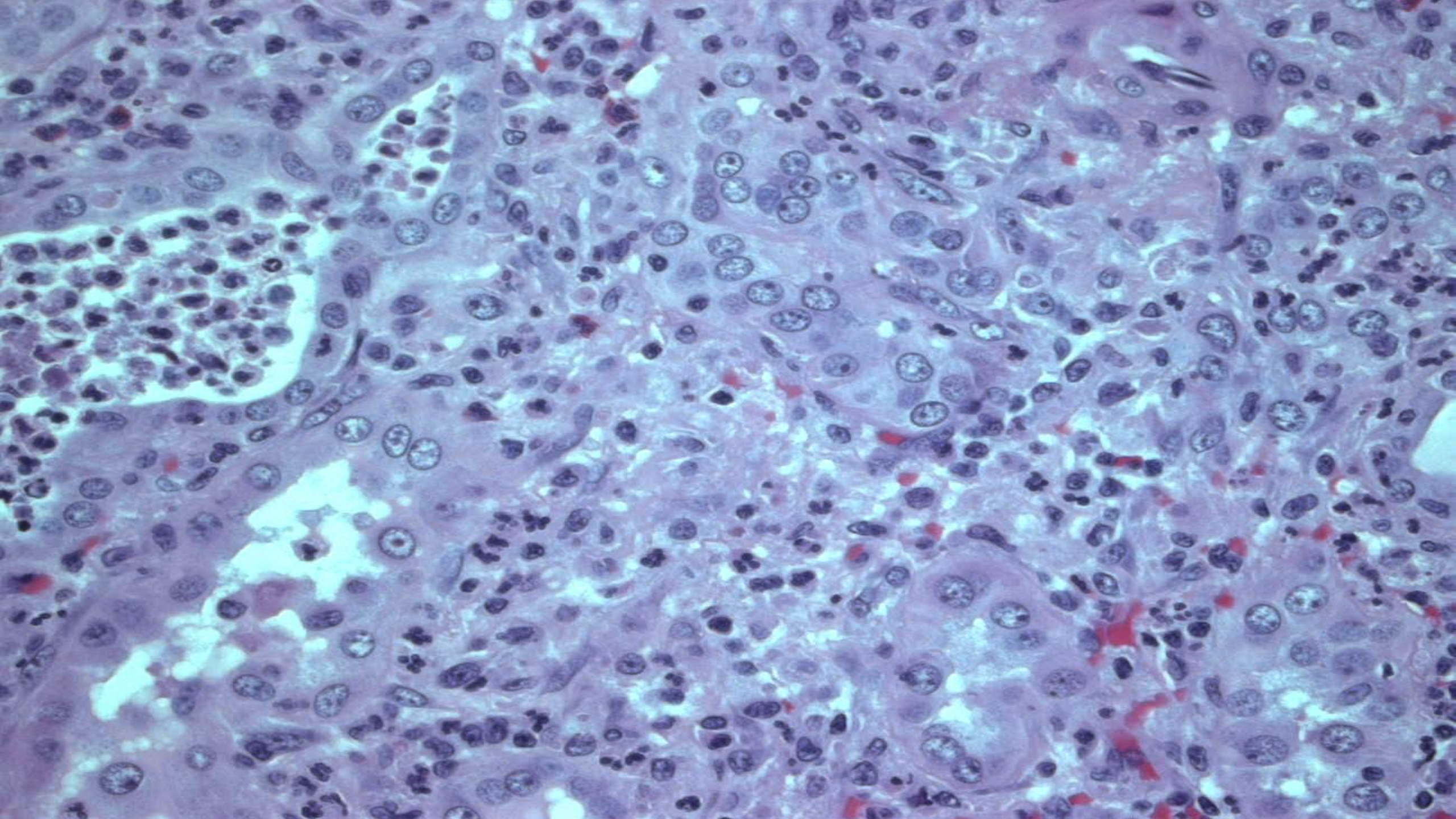


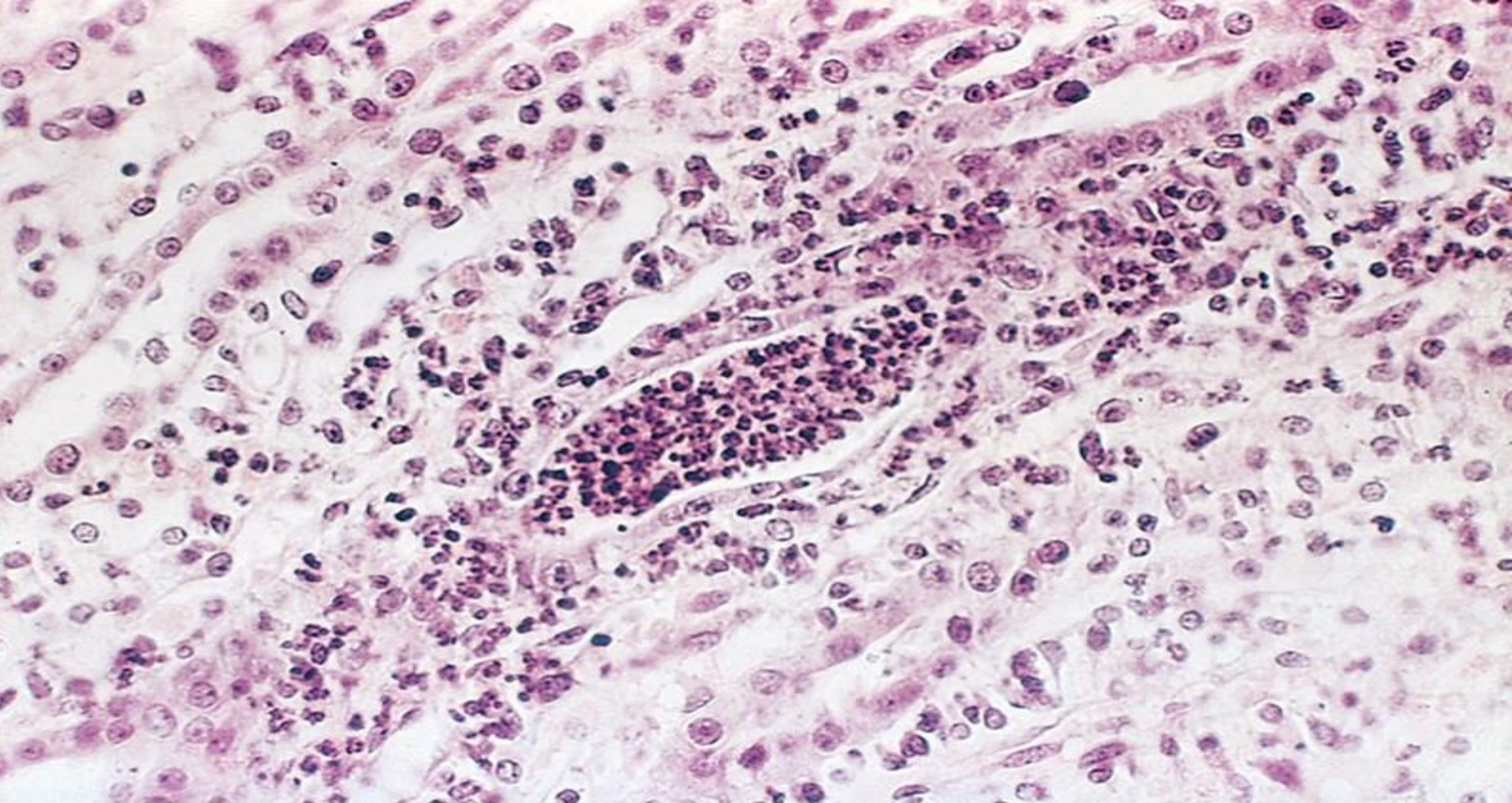


**ACUTE ON
CHRONIC
PYELONEPHRITIS
WITH NUMEROUS
SEPTIC FOCI
PRESENT IN AN
ALREADY SCARRED
KIDNEY.**



**ACUTE
PYELONEPHRITIS.
THERE IS A
DIFFUSE
INTERSTITIAL
INFILTRATE WITH
POLYMORPHONUCLE-
AR LEUKOCYTES.**





CHRONIC PYELONEPHRITIS AND REFLUX NEPHROPATHY

Chronic pyelonephritis is a disorder in which chronic tubulointerstitial inflammation and scarring involve the calyces and pelvis

- 1- Reflux nephropathy**
- 2- Obstructive**

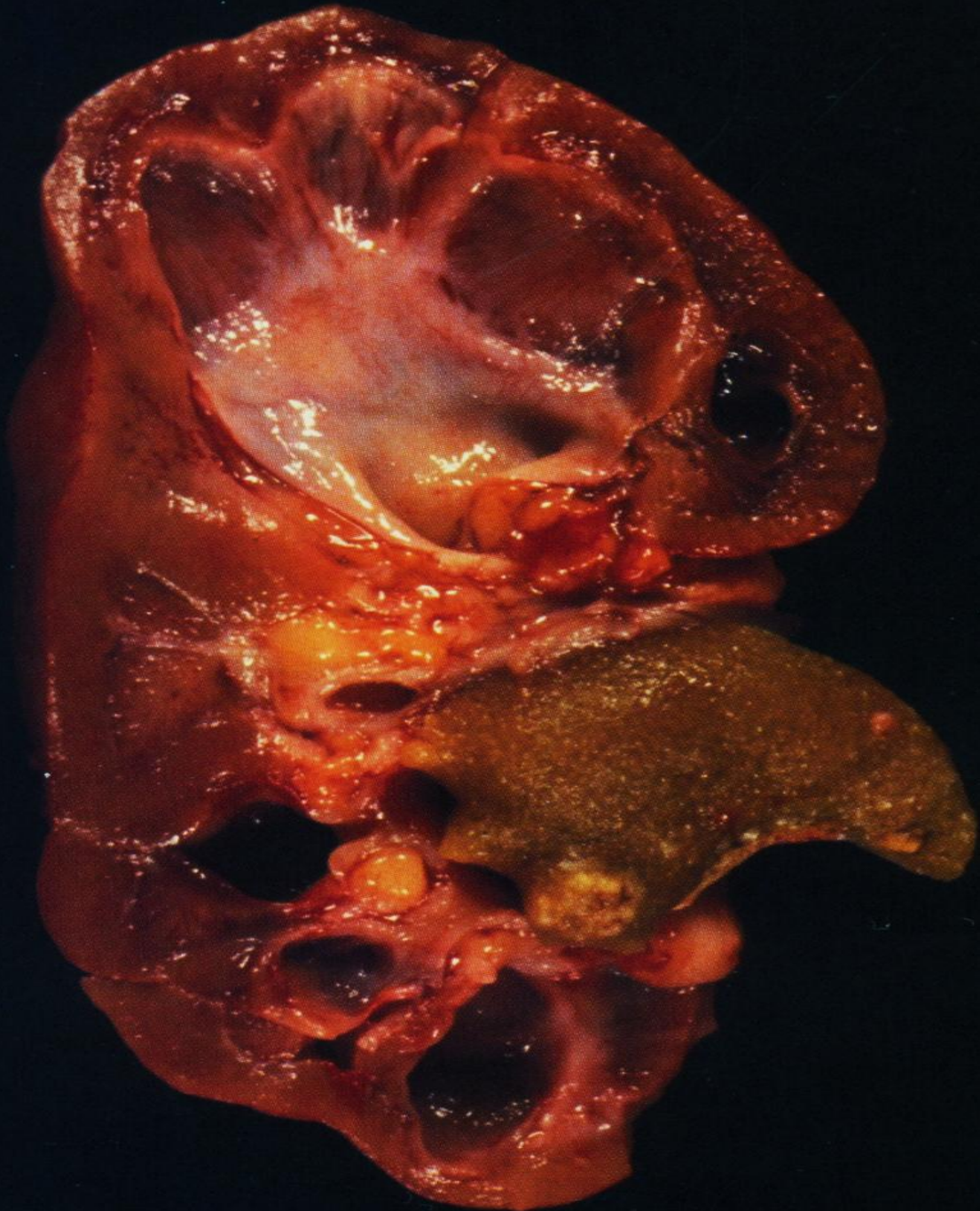
CHRONIC PYELONEPHRITIS-GROSS

The kidneys usually are irregularly scarred; if bilateral, the involvement is asymmetric.

The hallmarks of chronic pyelonephritis are **coarse, discrete, corticomedullary scars** overlying dilated, blunted, or deformed calyces, and **flattening of the papillae** .



**RENAL TUBERCULOSIS
SECONDARY TO
HEMATOGENOUS SPREAD
OF TUBERCLE BACILLI.**



**STAGHORN CALCULUS IN
PELVIURETERIC
JUNCTION.**



A. BILATERAL HYDRONEPHROSIS WITH ACUTE ON CHRONIC PYELONEPHRITIS IN A CHILD DUE TO URINARY TRACT OBSTRUCTION.



B. Hydronephrosis with thinned renal parenchyma in an adult kidney.



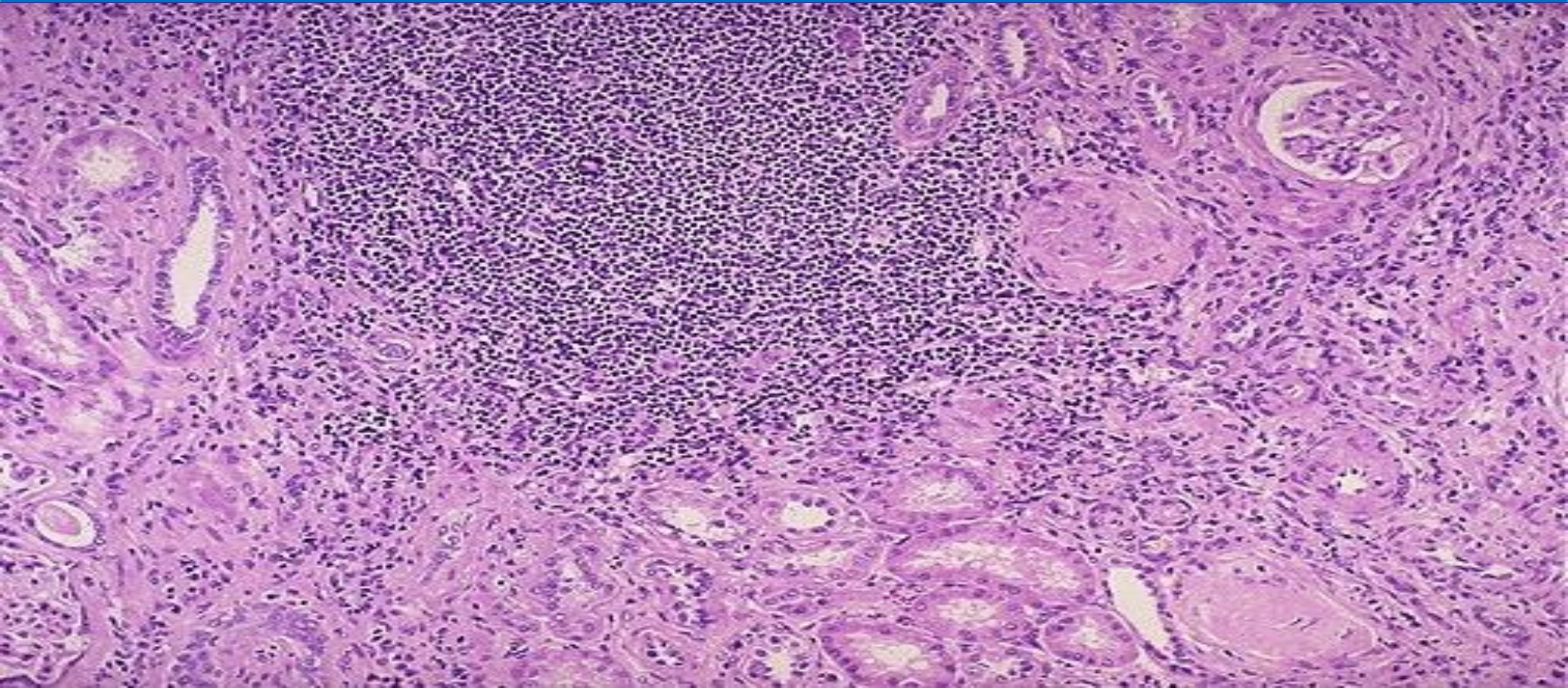
**A. UNSHAPED SCAR OF HEALED
PYELONEPHRITIS**

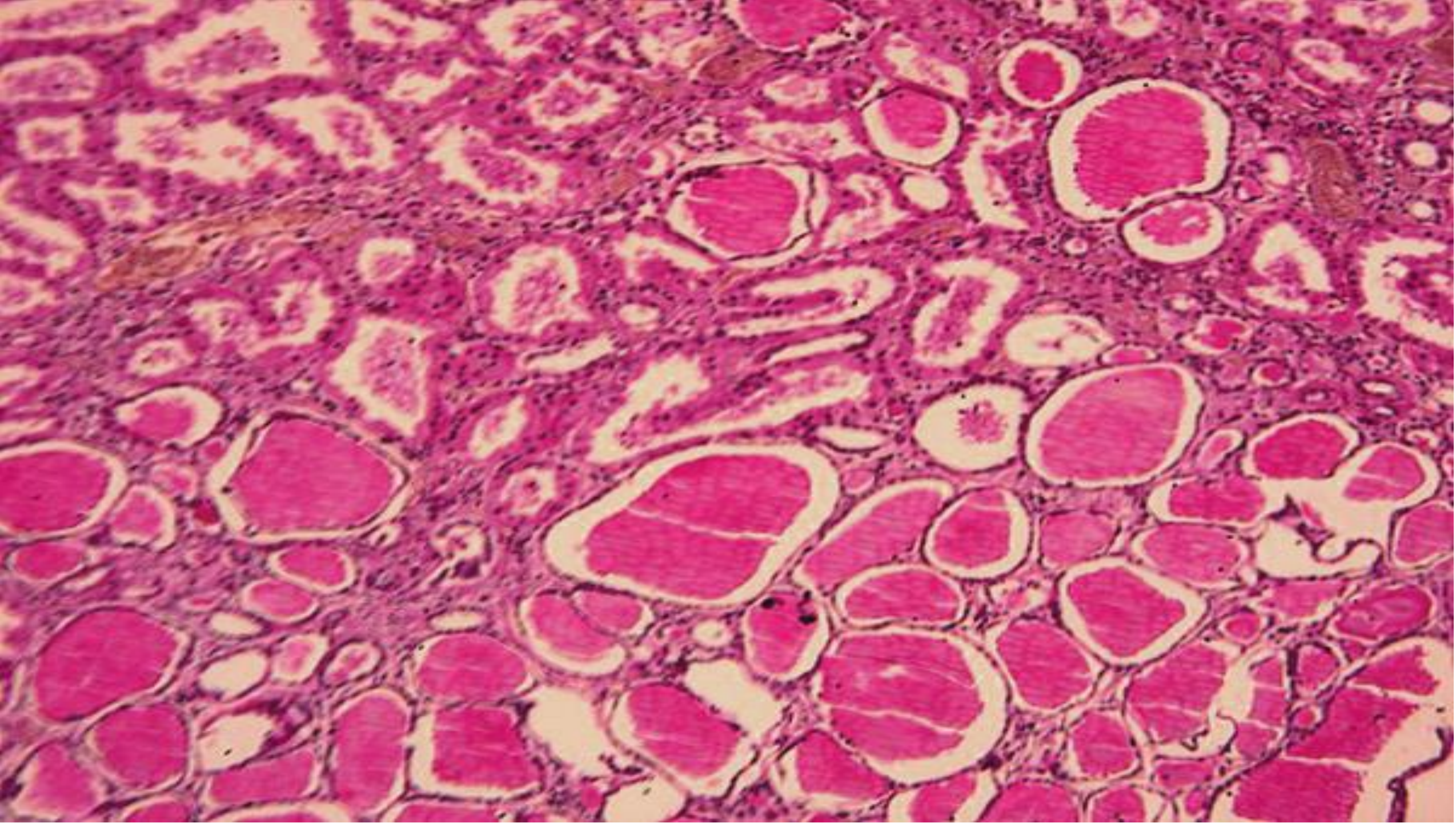


B. Healed pyelonephritis associated with vesicoureteral reflux has produced scarring of both poles of the kidney with calyceal distortion due to infection of the peripheral compound papillae.



Chronic pyelonephritis: collection of chronic inflammatory cells here is in a patient with a history of multiple recurrent urinary tract infections.





UROLITHIASIS

Types of stones in urinary tract

CALCIUM OXALATE and PHOSPHATE (70%)

Magnesium ammonium phosphate (15-20%)

(Struvite stone)

URIC ACID & URATE (5-10%)

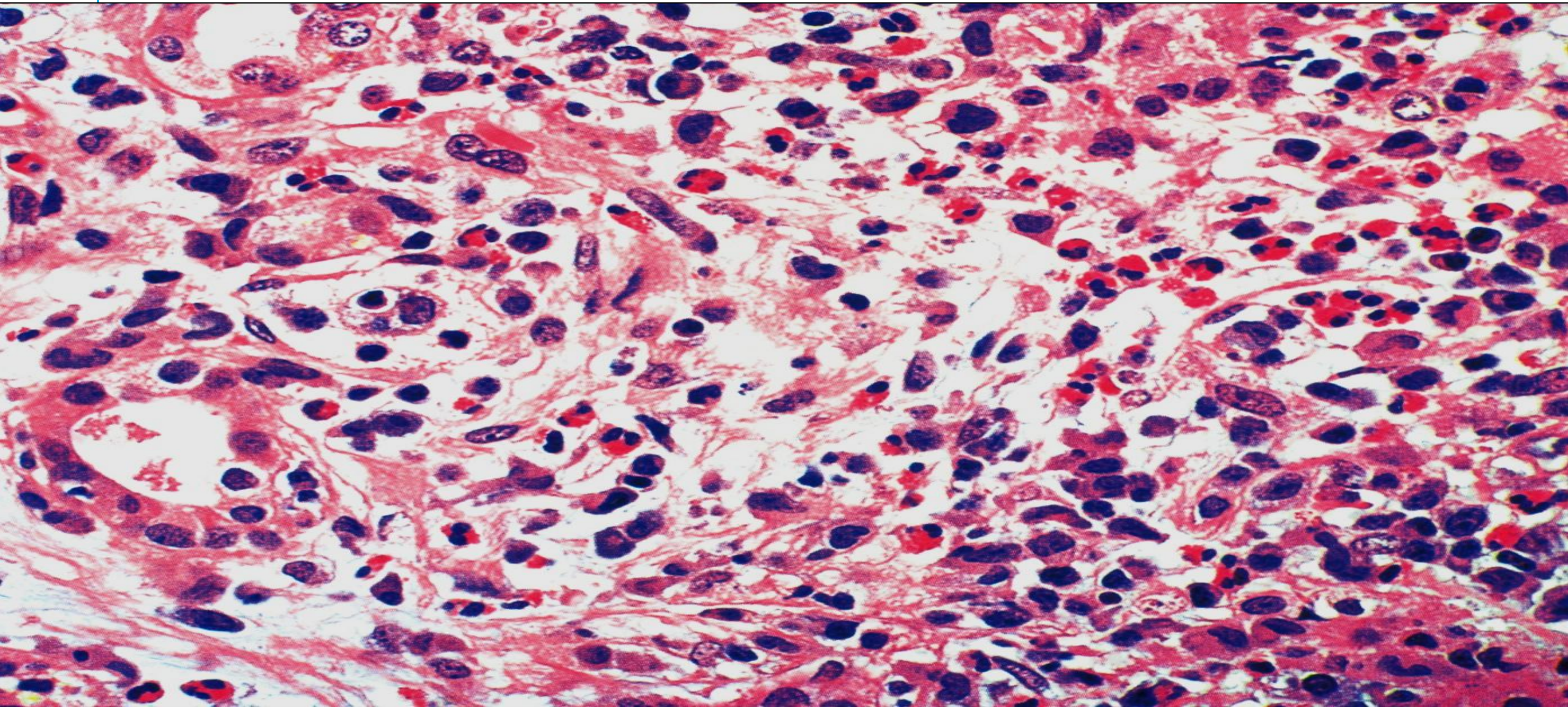
CYSTINE (1-2%)

TUBULOINTERSTITIAL NEPHRITIS

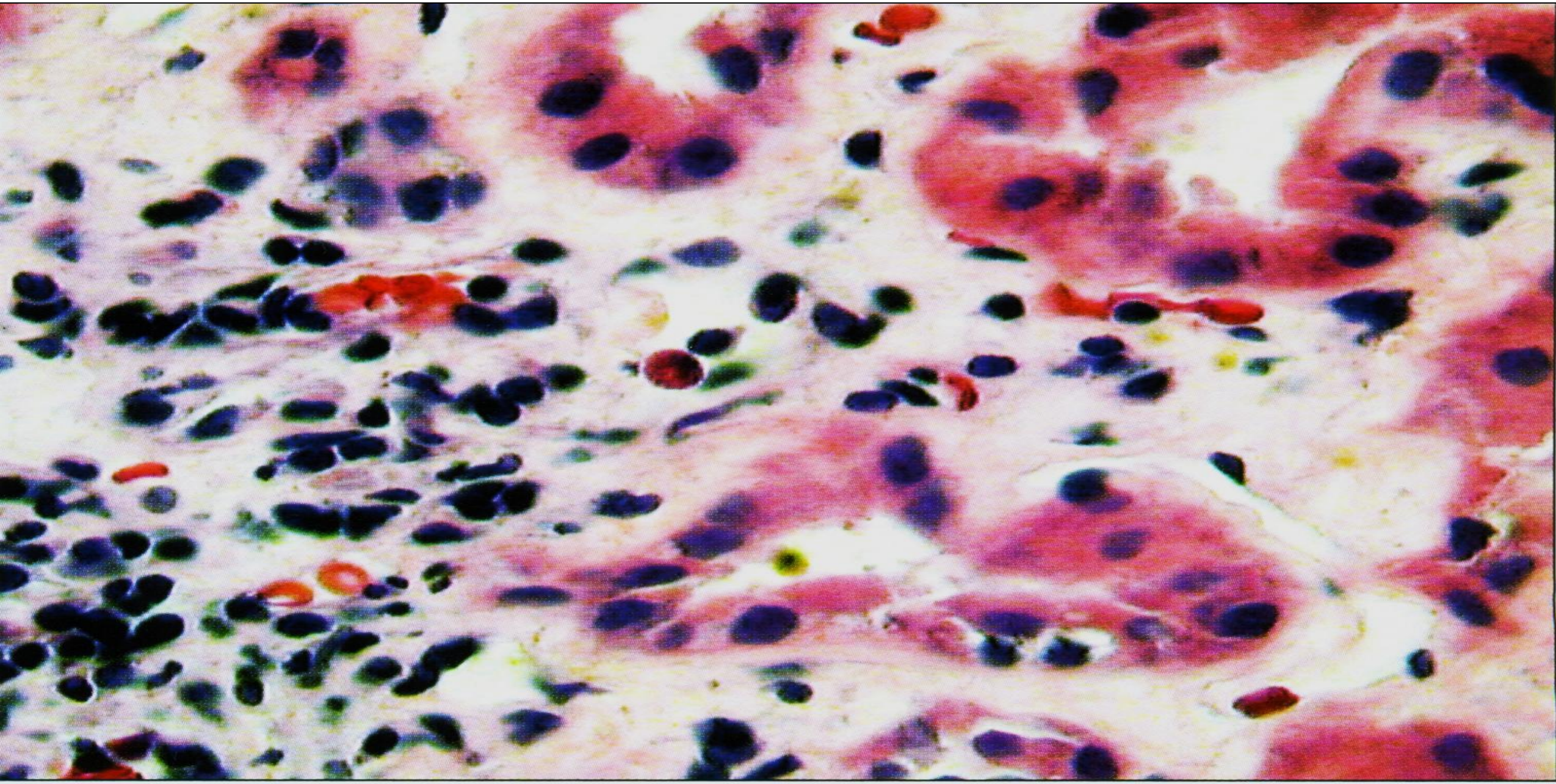
Tubulointerstitial Nephritis

This group of renal diseases involves inflammatory injuries of the tubules and interstitium that are often insidious in onset and are principally manifest by azotemia

THE MONONUCLEAR INFILTRATE IS ACCOMPANYING BY ABUNDANT EOSINOPHILS AND MAY HAVE A GRANULOMATOUS APPEARANCE.



HIGHER POWER OF TUBULITIS DEMONSTRATING INTERSTITIAL EDEMA AND
INVASION OF THE TUBULAR EPITHELIUM BY LYMPHOCYTES.



DEFINITION-UTI

UTI: the finding of microorganisms in bladder urine with or without clinical symptoms and with or without renal disease

Significant bacteriuria: the number of bacteria in the voided urine exceeds the number that can be expected from contamination (i.e. $\geq 10^5$ cfu/ml)

Clinical features of UTI

Cystitis

- Frequency
- Urgency
- Dysuria – painful voiding
- Suprapubic Pain
- Cloudy or foul-smelling urine



SYMPTOMS UROLITHIASIS

- Pain in the lower back part or in the lower abdomen, which might move to the groin. Pain may last from hours to minutes.
- Nausea, vomiting
- Blood in urine
- Burning during urination, foul smell in urine, chills, weakness and fevers for urinary tract infection.



ACUTE AND CHRONIC CYSTITIS: ETIOLOGY

Women are more likely to develop cystitis

Tuberculous cystitis is always a sequel to renal TB

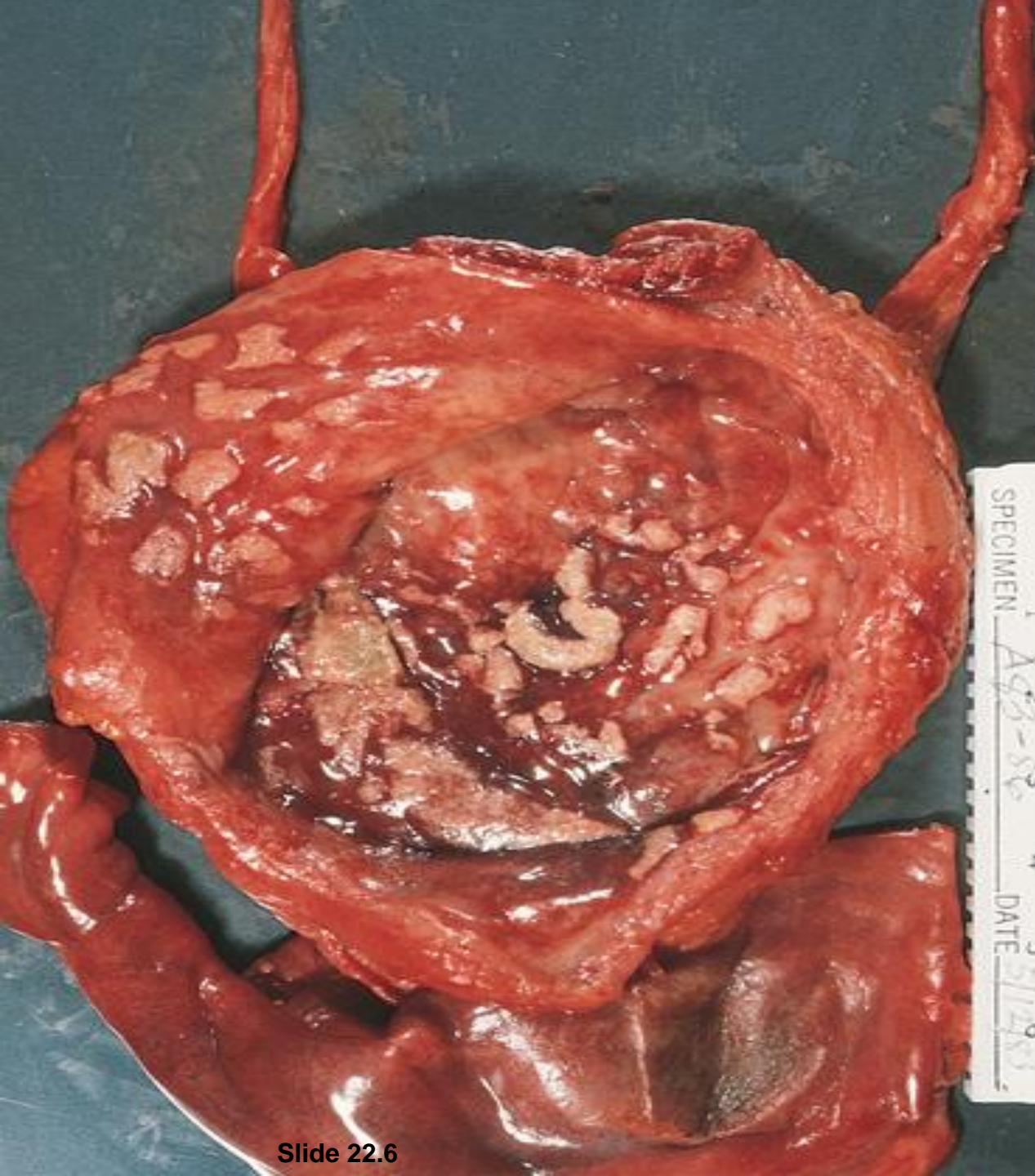
Candida albicans

Schistosomiasis (*Schistosoma haematobium*),

Chlamydia, and *Mycoplasma* may also cause cystitis.

Predisposing factors include bladder calculi, urinary obstruction, diabetes mellitus, instrumentation, and immune deficiency.

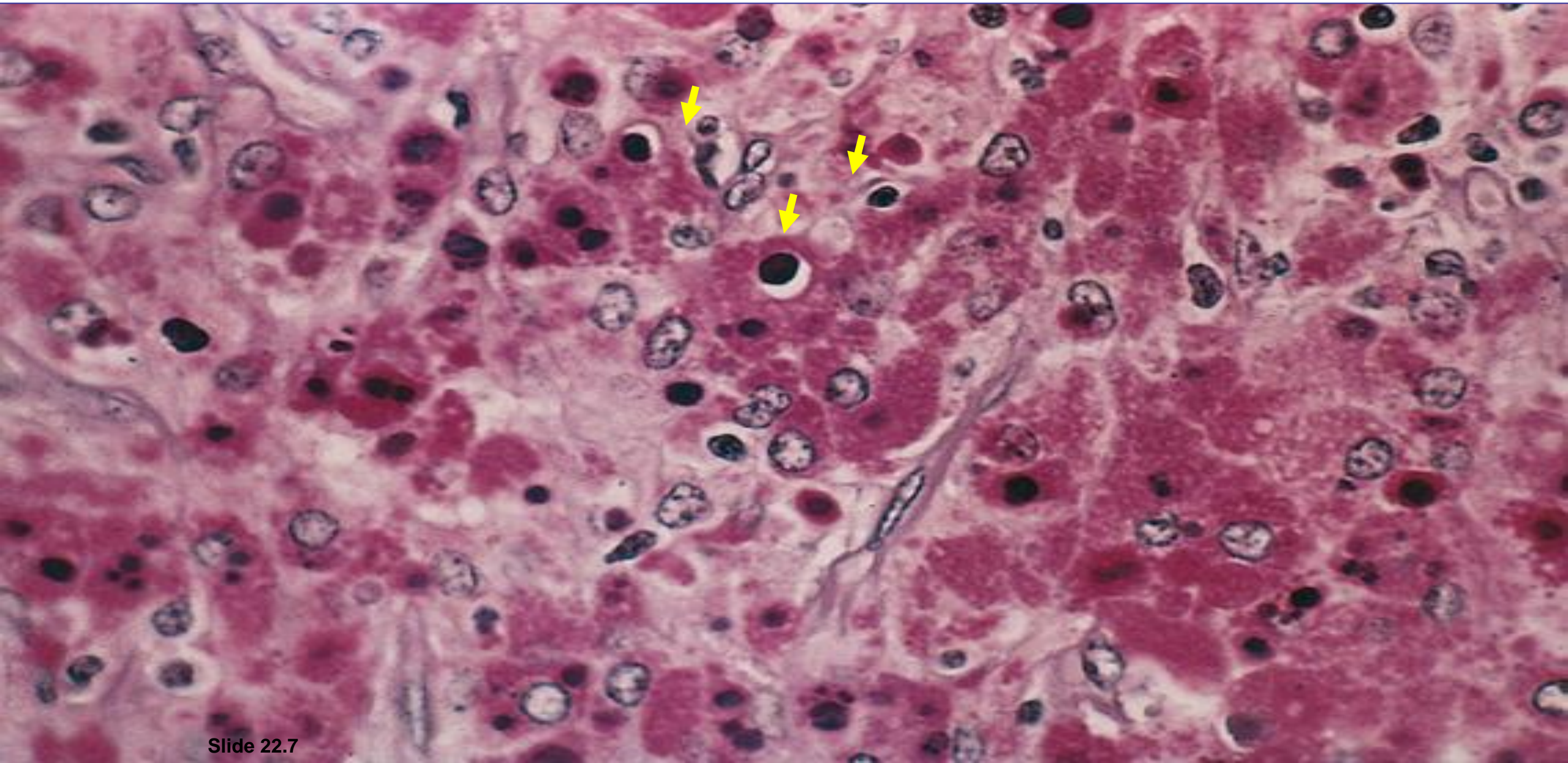
Finally, irradiation of the bladder region gives rise to *radiation cystitis*.

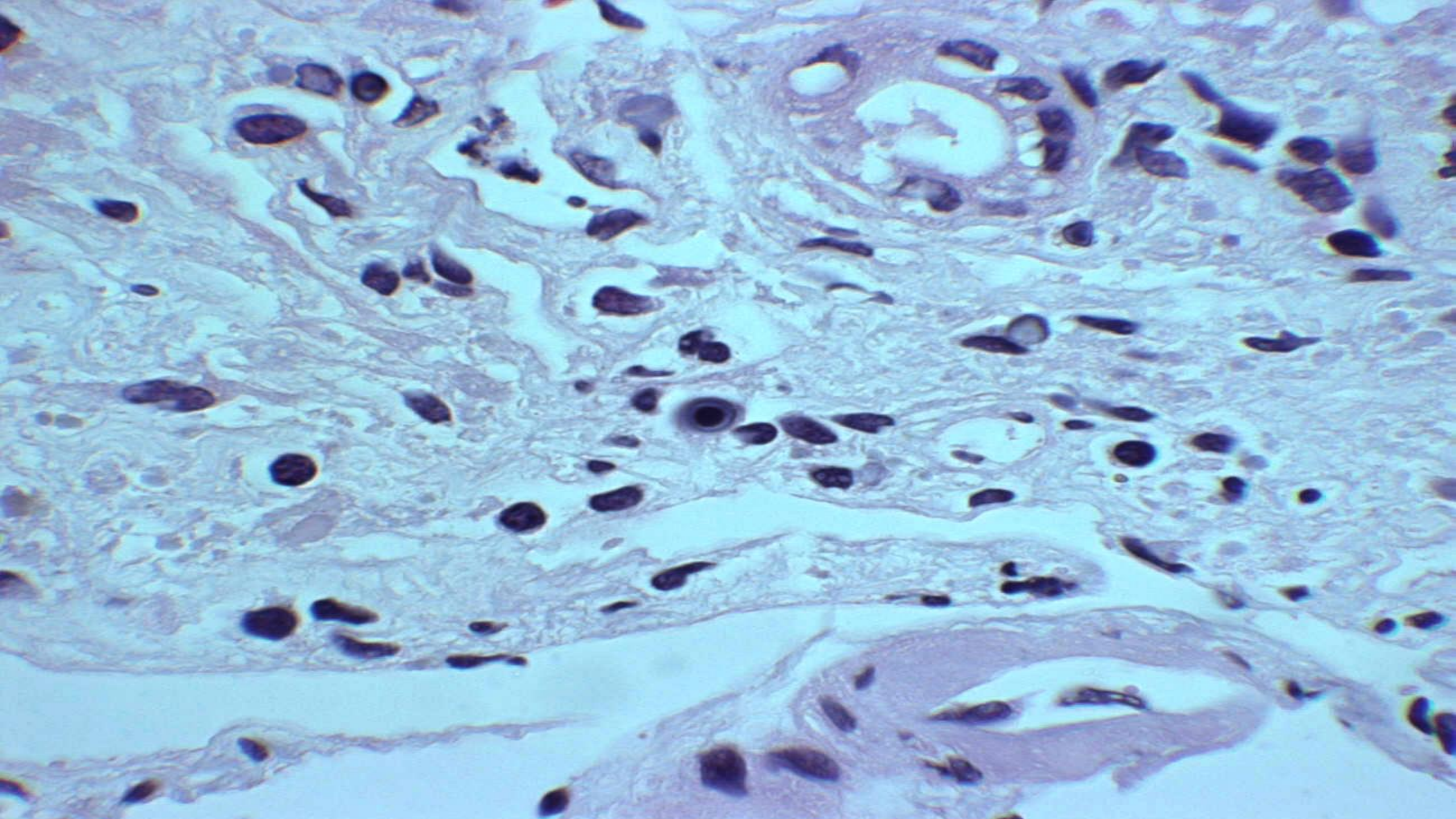


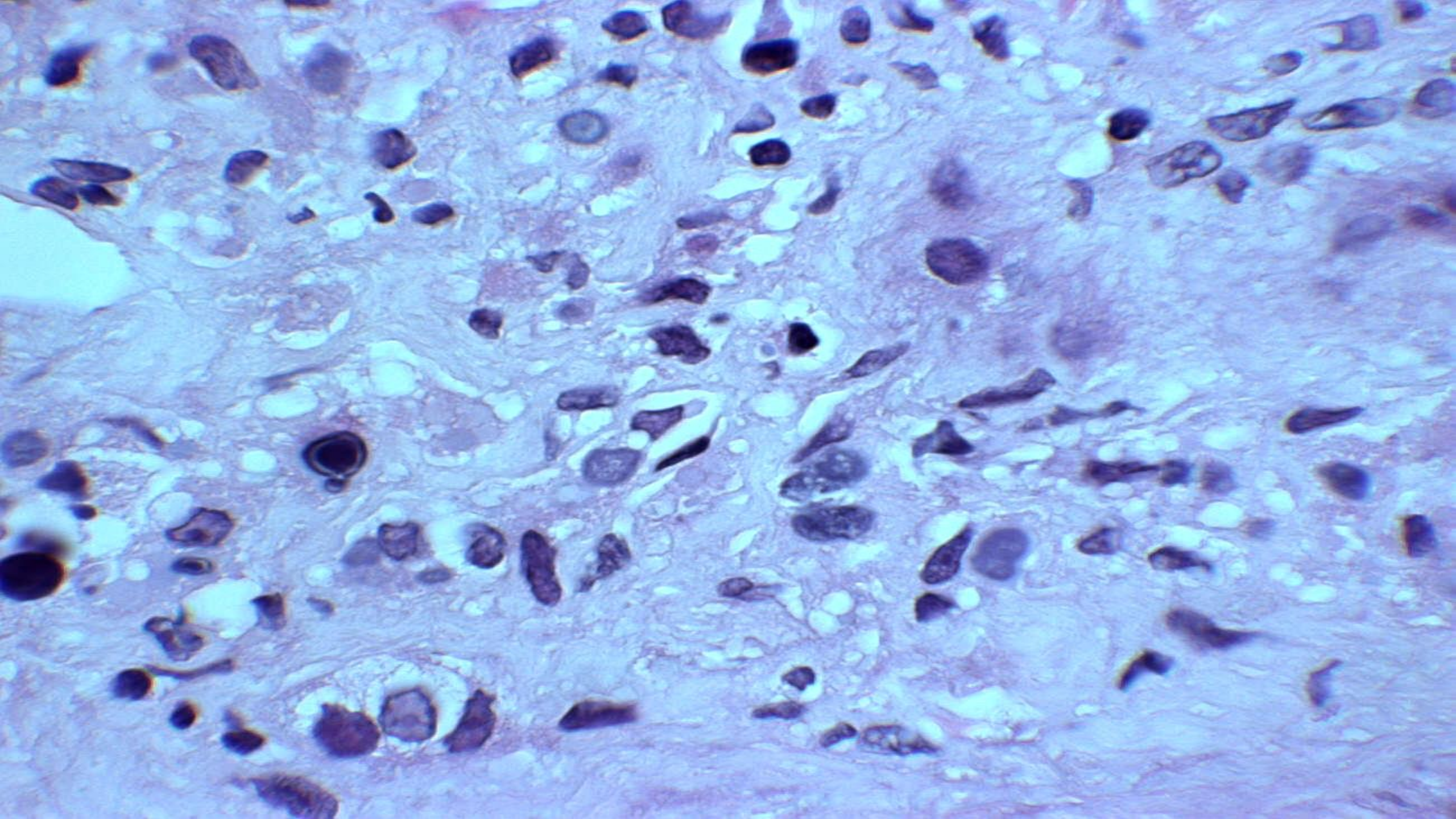
**Cystitis with
malakoplakia**

**Peculiar inflammatory
reaction
characterized by
soft, yellow,
plaques 3-4 cm in
diameter
and histologically
by foamy
macrophages**

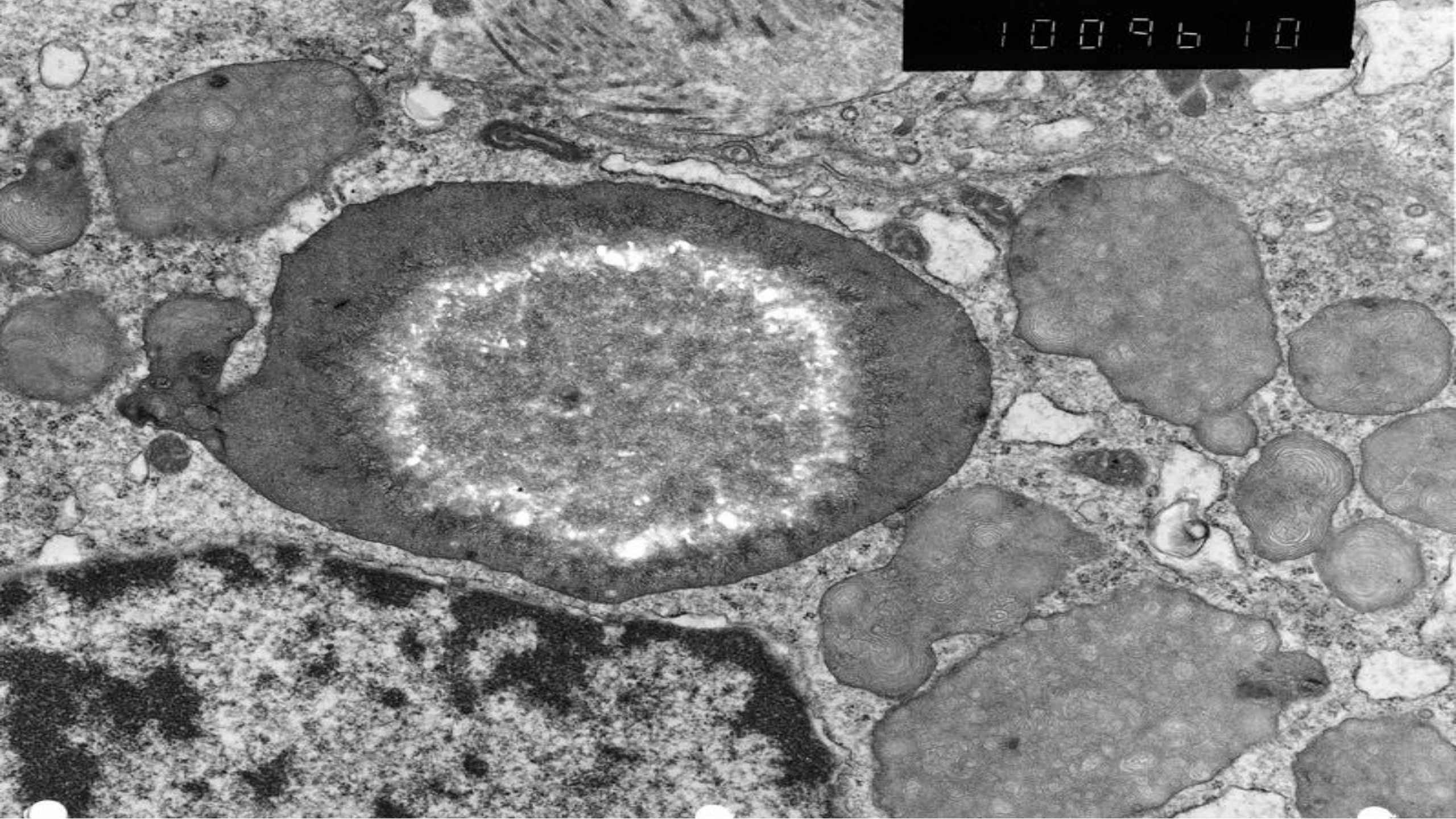
Cystitis with malakoplakia: Michaelis Gutman bodies

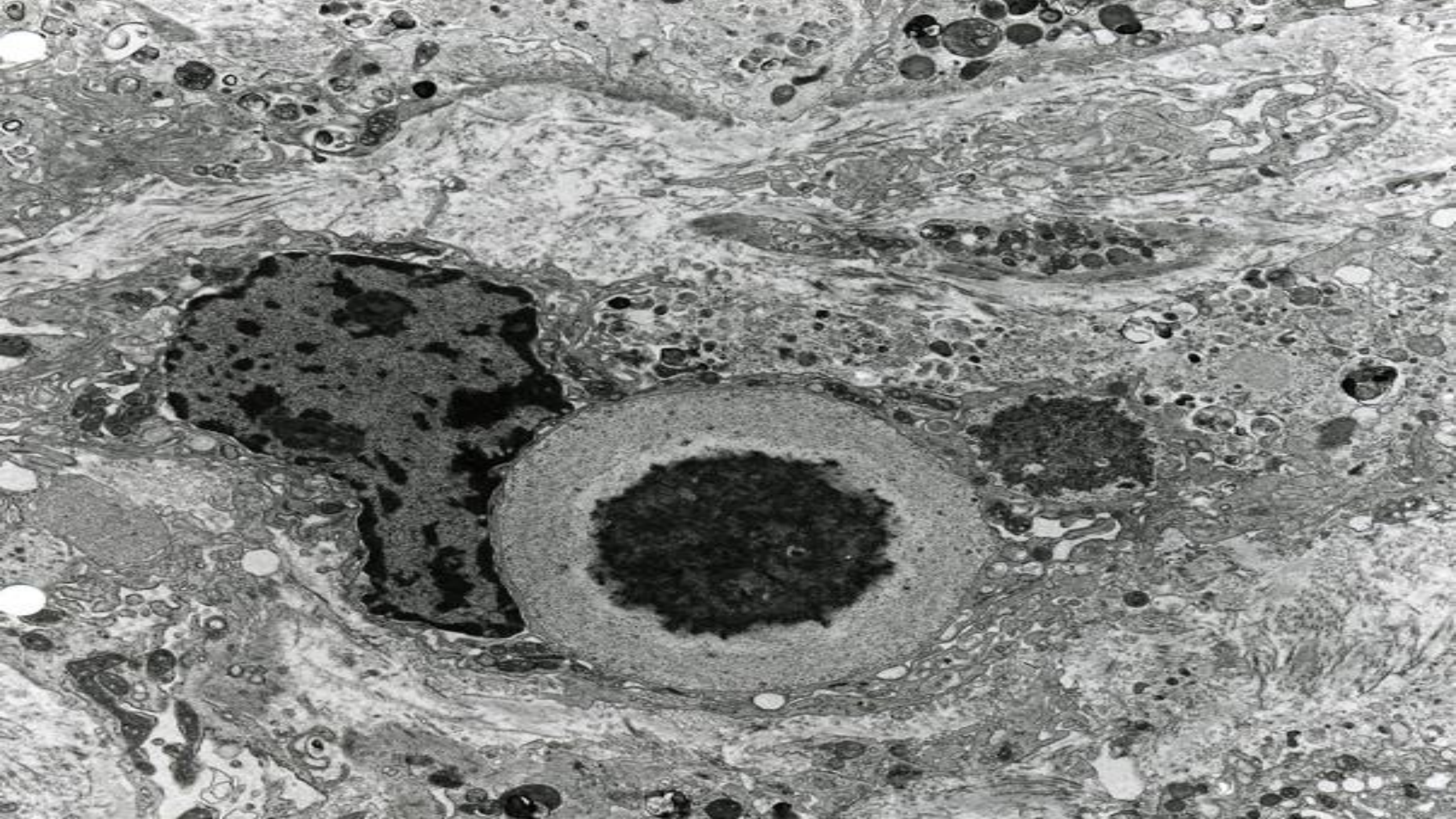




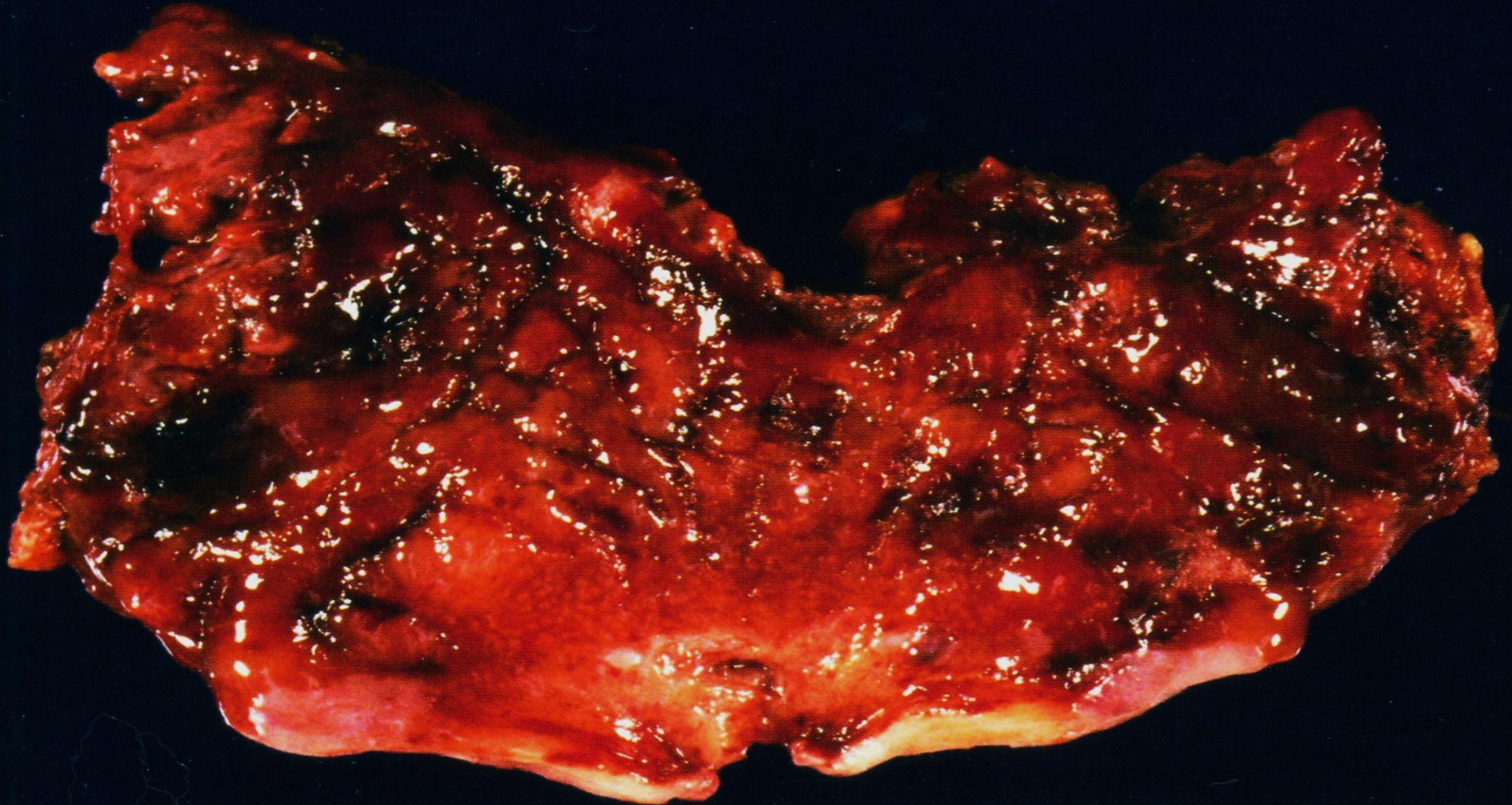


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ACUTE INFLAMMATION OF THE URINARY BLADDER.





Homework :

Specify what are the radiopaque and what are the radiolucent calculi.