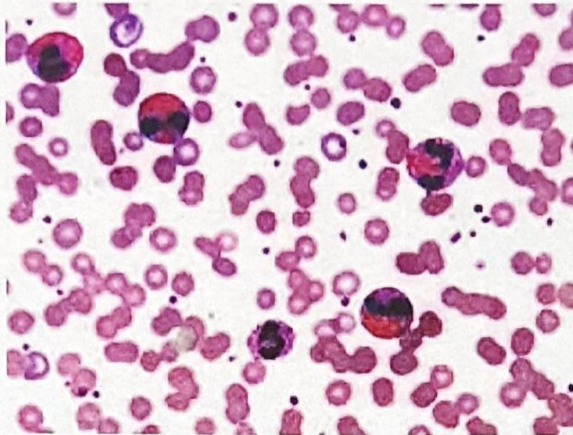


## Eosinophilia



In this condition the absolute eosinophil count is above  $0.4 \times 10^9/L$

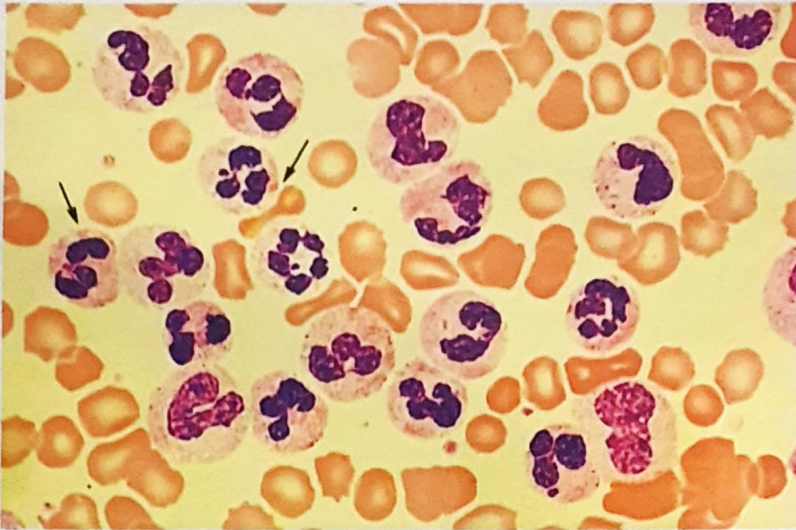
The causes:

- Allergic disorders : Asthma, hay fever, urticaria, food sensitivity etc.,
- Parasitic infestations : Helminthic, Malaria, Filariasis, Ascariasis, Hookworm
- Drugs : Liver extract, Pencillin
- Skin diseases : Eczema, Dermatitis herpetiformis, Scabies, Psoriasis, Pemphigus
- Loeffler's Syndrome, Hypereosinophilic Syndrome
- Malignancies : Hodgkins disease, Eosinophilic leukemia
- Microbial infections : Scarlet fever, Tuberculosis, Infections causing erythema multiforme

QUESTIONS :-

- How will you do an Absolute Eosinophil Count ?

## NEUTROPHILIA



Neutrophil count is above  $7 \times 10^9/L$ .

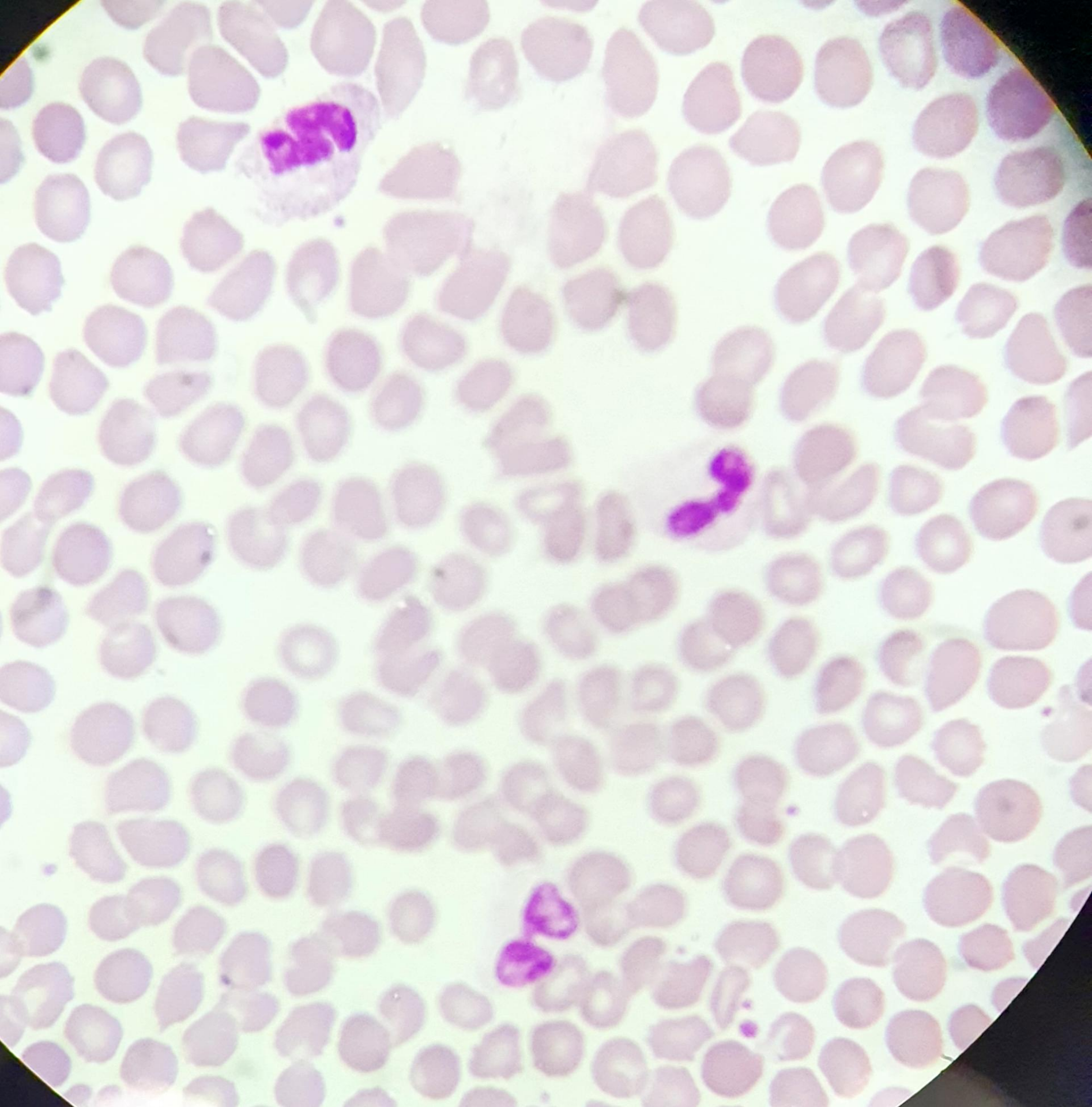
In the WBC series neutrophils predominate and show a shift to left and may show toxic granules.

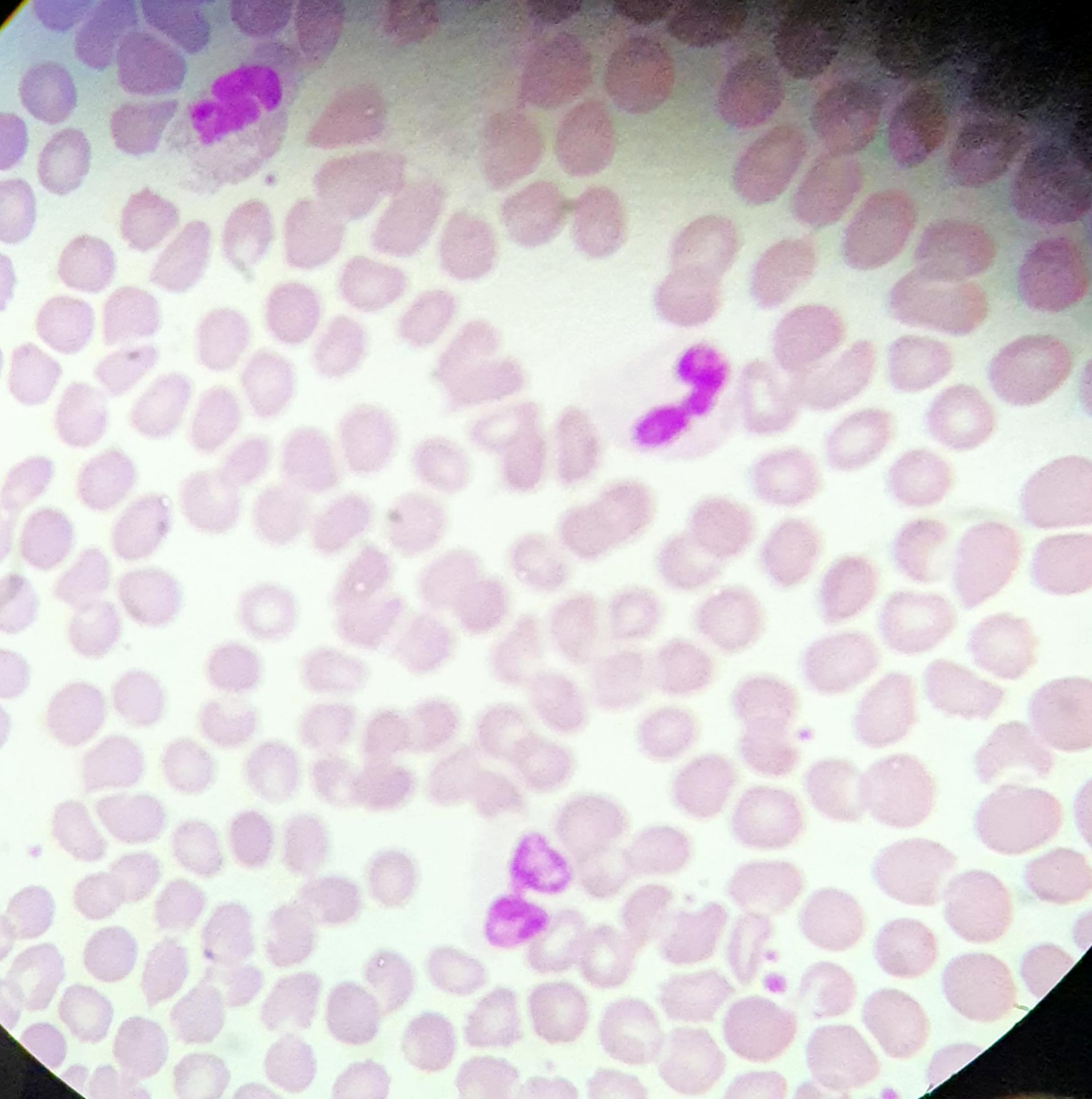
Causes of neutrophilia are:

- 1) Infections – acute pyogenic infections, fungal and rickettsial infections.  
Eg:- acute tonsillitis, acute otitis media, acute appendicitis, lobar pneumonia, pyogenic meningitis etc.
- 2) Non infectious acute inflammatory conditions eg:- Rheumatoid arthritis, SLE, gout etc.
- 3) Extensive tissue necrosis following burns, infarction, severe trauma.
- 4) Metabolic diseases- uraemia, diabetic ketoacidosis, eclampsia etc.,
- 5) Malignancies like chronic myeloid leukemia.

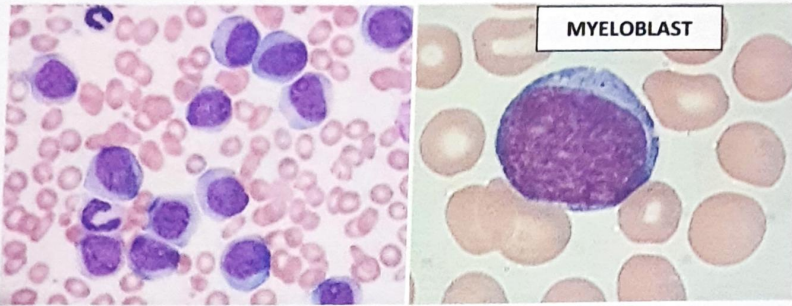
Questions :

Which is the acute bacterial infection where leucopenia and not leucocytosis is a characteristic blood finding?





## Acute Myeloid Leukemia (AML)

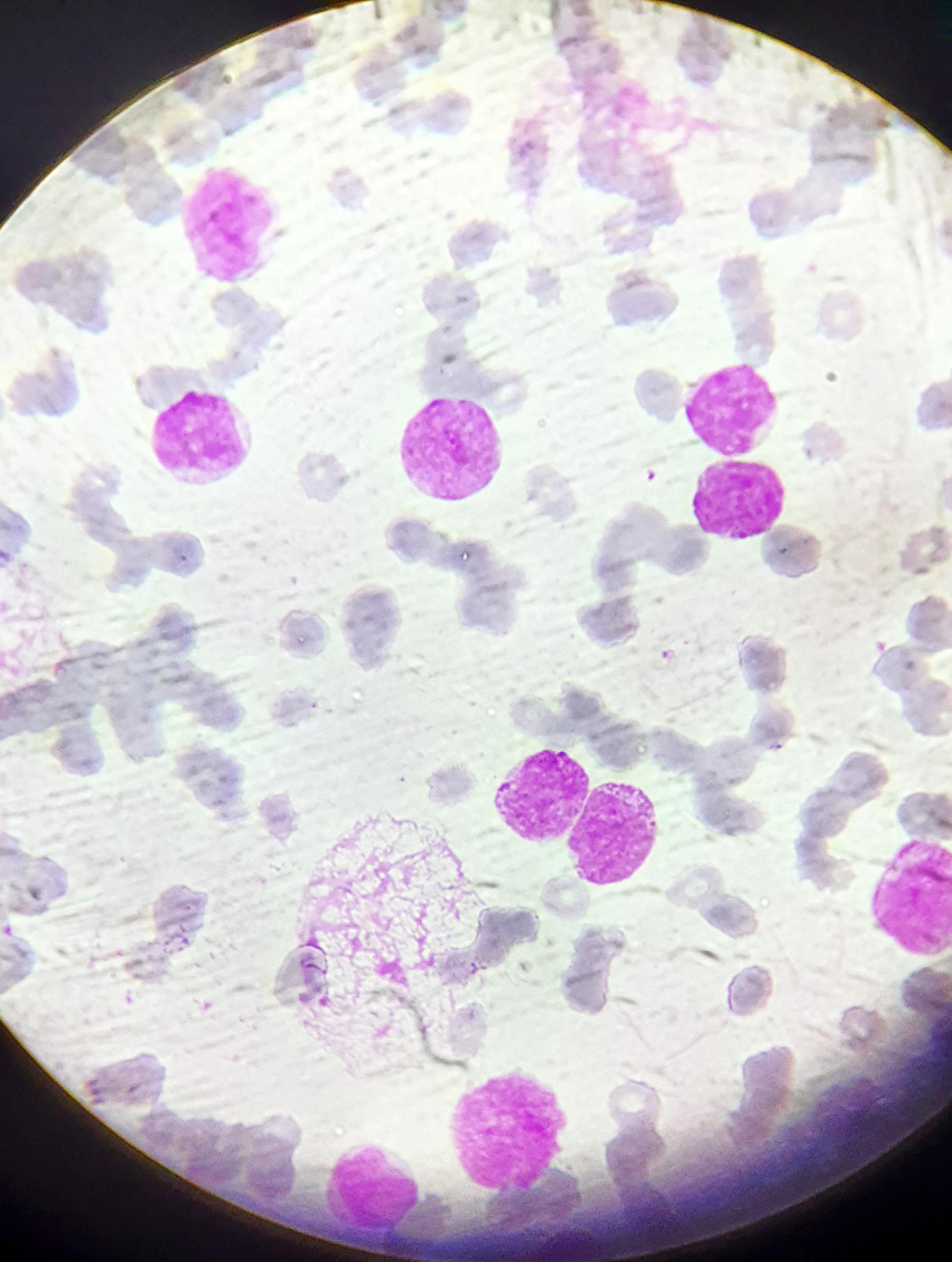


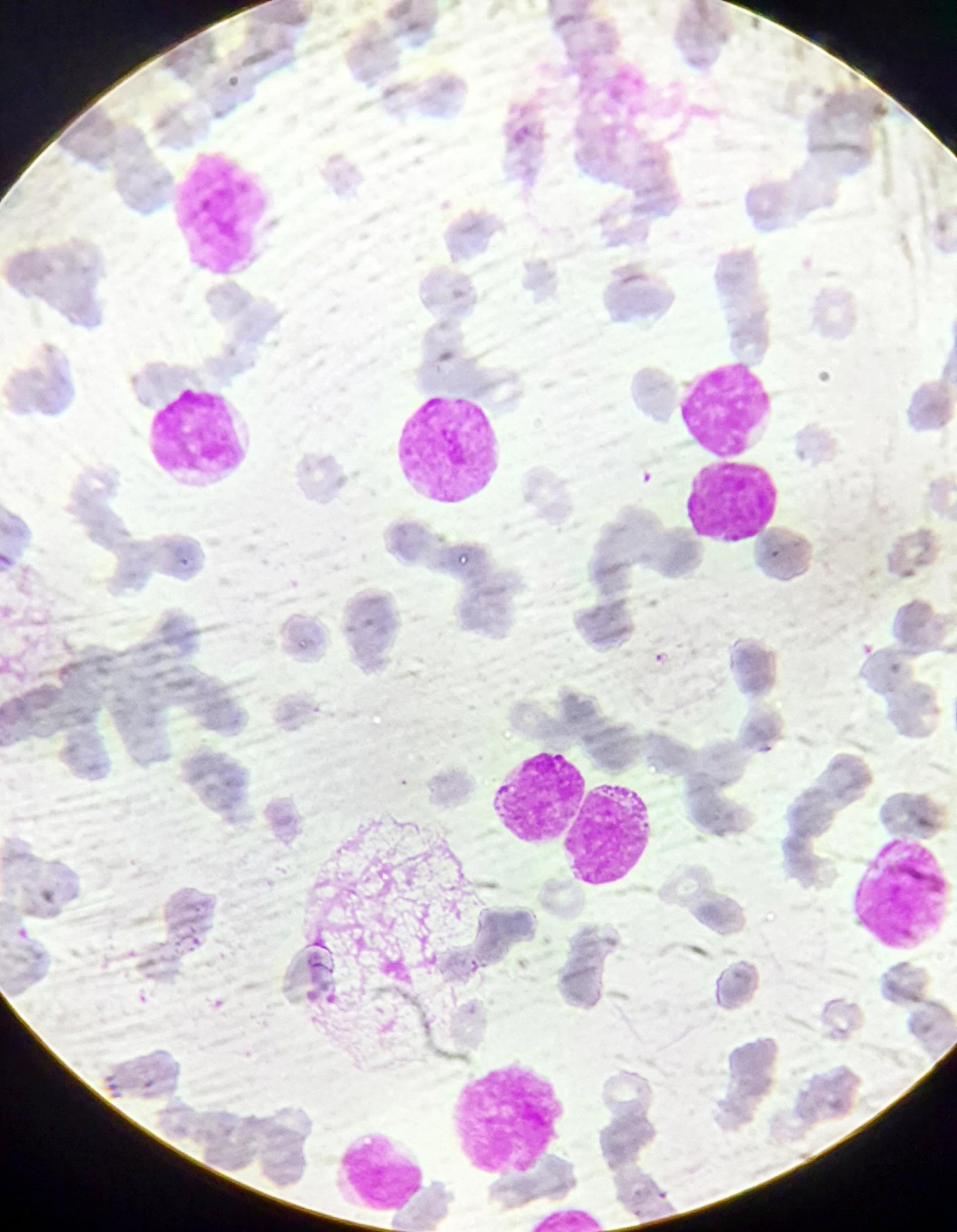
- Number of blast cells in the marrow > 20%.

| FAB subtype | Name                                                |
|-------------|-----------------------------------------------------|
| M0          | Undifferentiated acute myeloblastic leukemia        |
| M1          | Acute myeloblastic leukemia with minimal maturation |
| M2          | Acute myeloblastic leukemia with maturation         |
| M3          | Acute promyelocytic leukemia                        |
| M4          | Acute myelomonocytic leukemia                       |
| M4eos       | Acute myelomonocytic leukemia with eosinophilia     |
| M5          | Acute monocytic leukemia                            |
| M6          | Acute erythroid leukemia                            |
| M7          | Acute megakaryocytic leukemia                       |

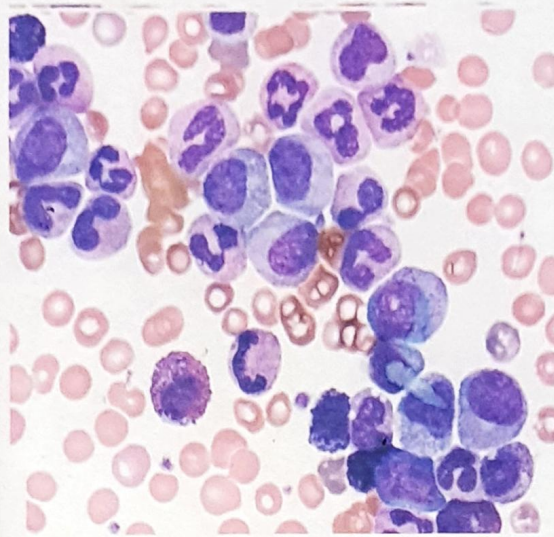
### MYELOBLASTS

- 3-4x larger than a mature RBC
- **High nuclear to cytoplasmic (N/C) ratio**
- **Round Nucleus with immature chromatin (not clumped)**
- **Prominent nucleoli**
- **Cytoplasm is scant, gray to pale blue and usually lacks granules**
- **One or more red-pink rod shaped structures called Auer rod(s) are noted in the cytoplasm**





## CHRONIC MYELOID LEUKEMIA



**MARKED LEUCOCYTOSIS**

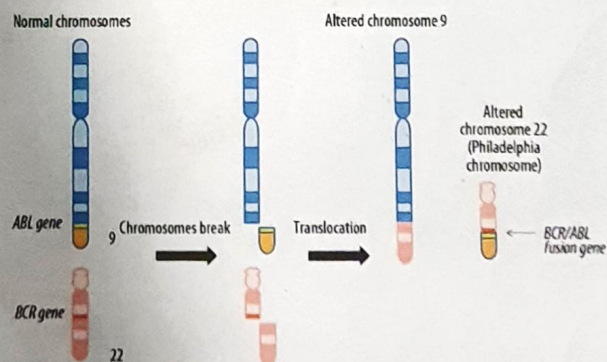
**MODERATE ANEMIA**

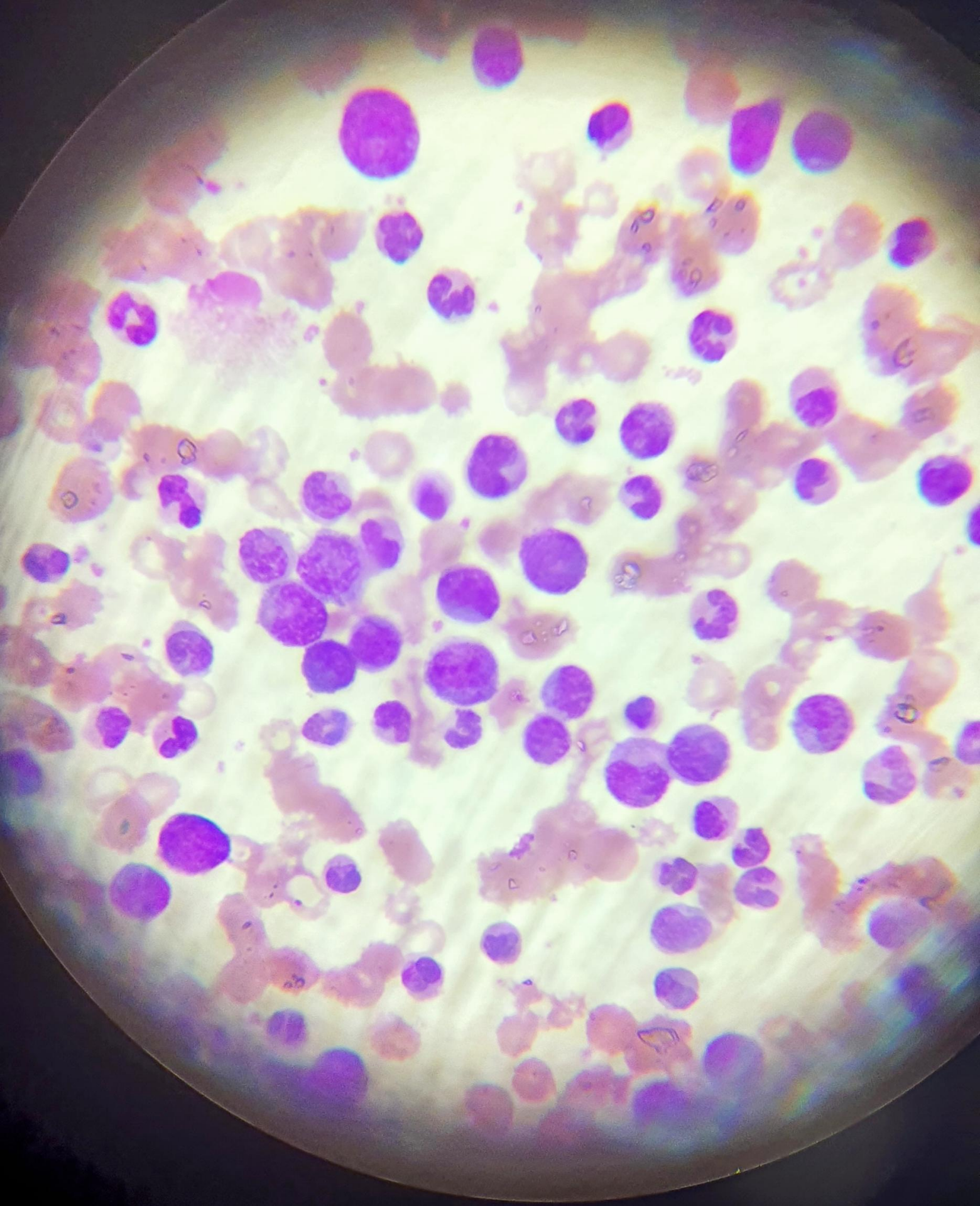
**PLATELET COUNT RAISED IN 50% OF CASES.**

**Full spectrum of cells of granulocyte series- Myelocytes and segmented neutrophils constitute the majority of cells.**

Questions :

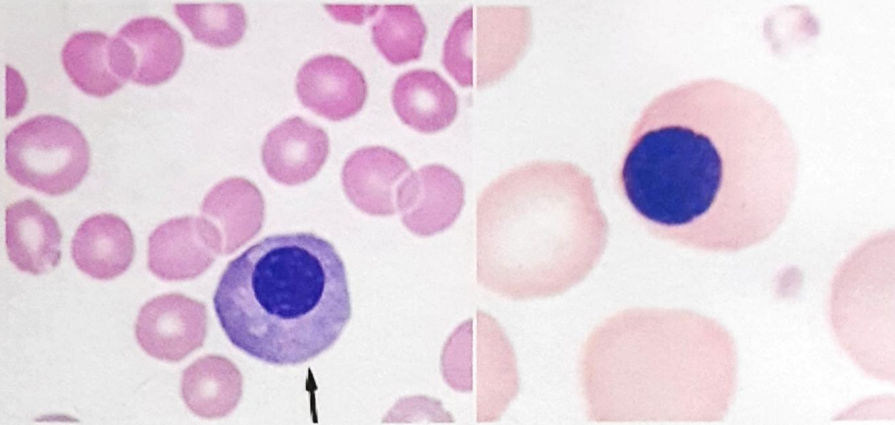
- 1) How will you differentiate CML from leukaemoid reaction?
- 2) What is the chromosomal abnormality in CML and what is its significance ?







## NORMOBLAST



- Nucleated RBC
- Represents the final stage of maturation of nucleated red cell series.
- Diameter – 8-12 micrometers.
- Nucleus – small, pyknotic with homogeneous blue black appearance.
- Cytoplasm – predominantly acidophilic in late normoblast with a basophilic tint in intermediate normoblast.

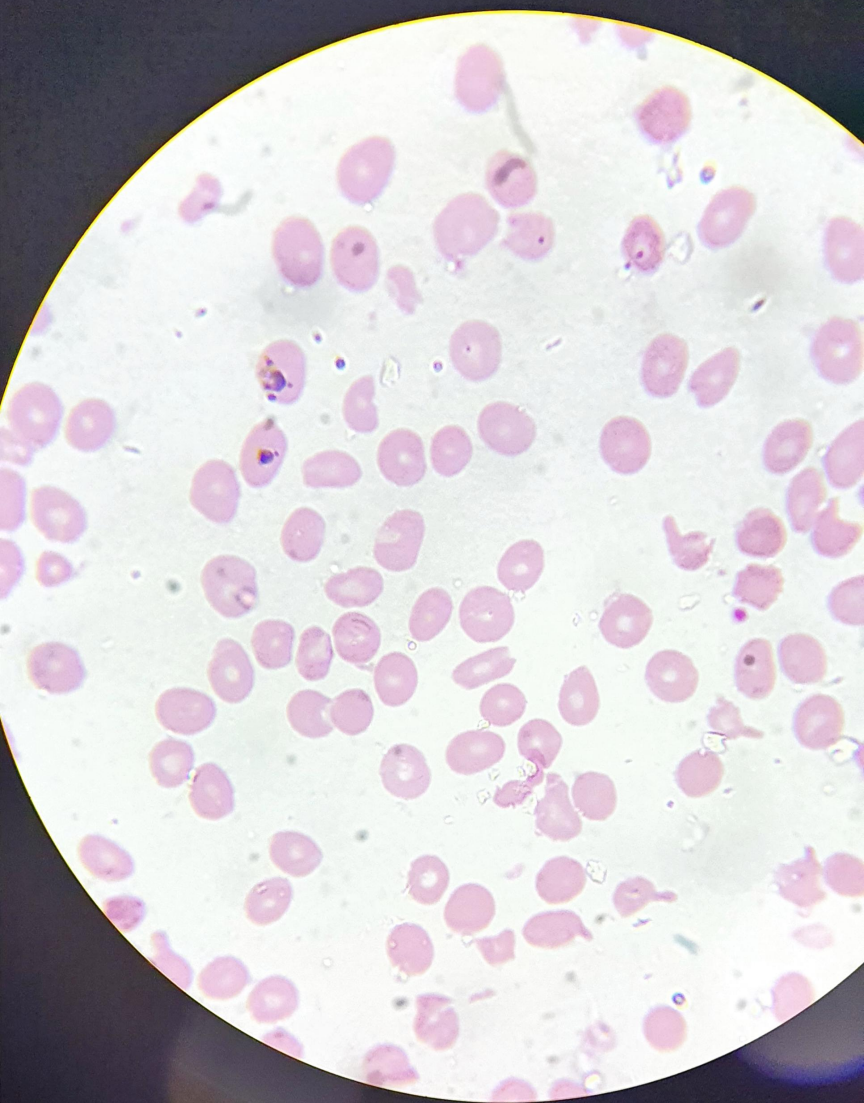
### Question :

1. Name the conditions where normoblasts are seen in peripheral smear?
2. Name the different stages of this cell.

I Jaeger. 1801.

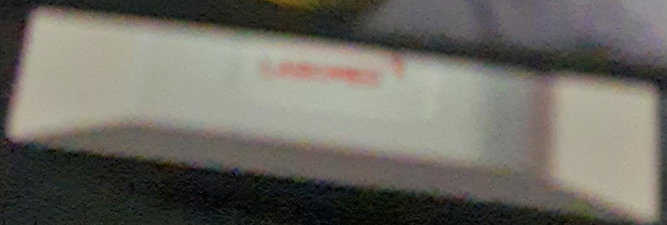
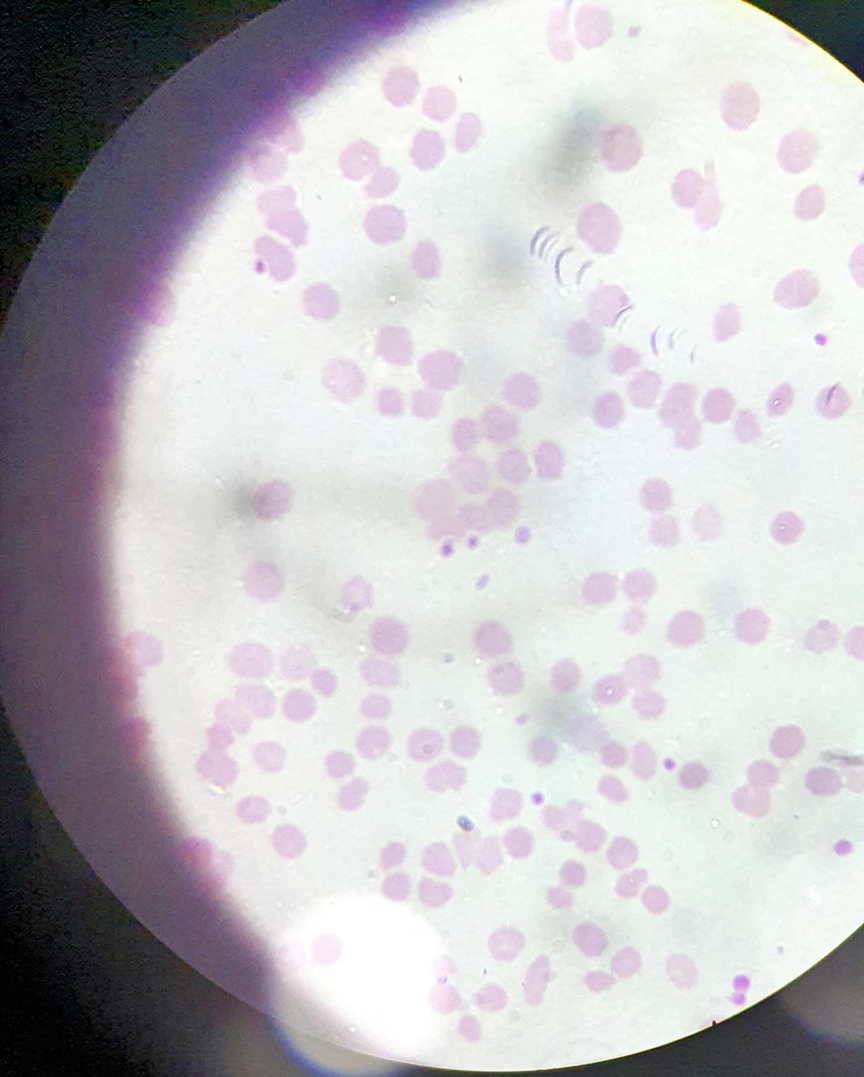




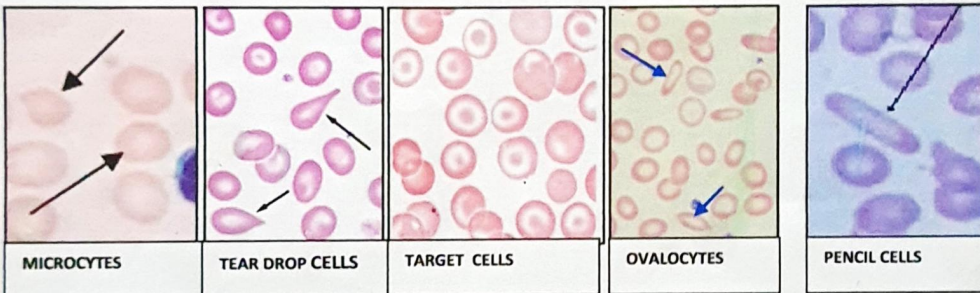
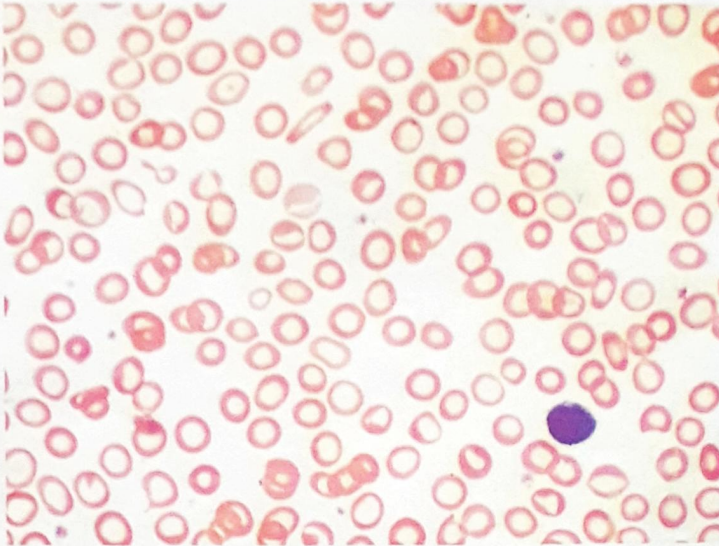


LABOMED

Sphaerocylas



## HYPOCHROMIC MICROCYTIC ANEMIA



Blood picture shows anisopoikilocytosis with microcytes, ovalocytes, pencil shaped cells, tear drop cells and target cells.

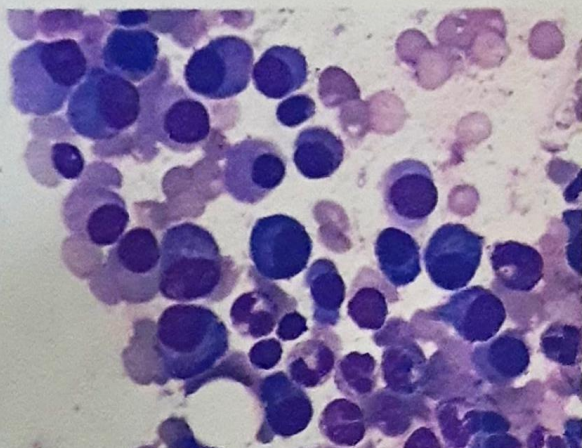
Hypochromic RBCs with central pallor more than  $\frac{1}{3}^{\text{rd}}$  of the diameter.

Causes of this blood picture are Iron deficiency anemia, Thalassemia.

### Questions:

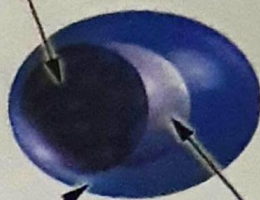
- 1) What is the cause of central pallor in RBC ?
- 2) What is the size of a normocyte, microcyte and macrocyte ?
- 3) What happens to the absolute indices in Hypochromic microcytic anemia ?

## Multiple myeloma – Bone Marrow



### PLASMACELL

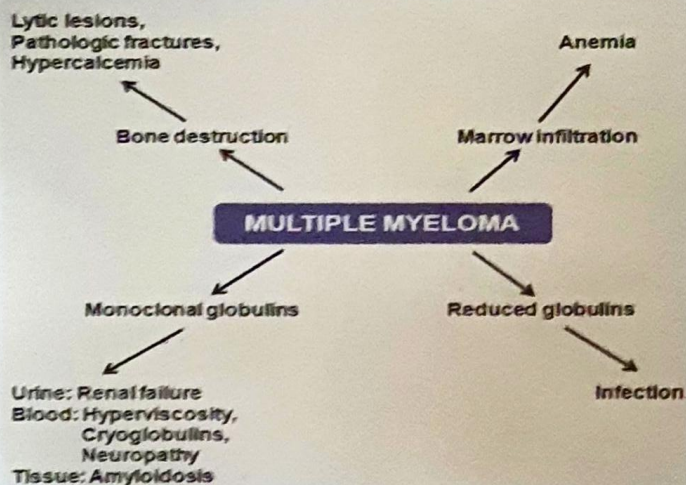
Round, eccentric nucleus  
with coarse chromatin  
(may have "clock face")



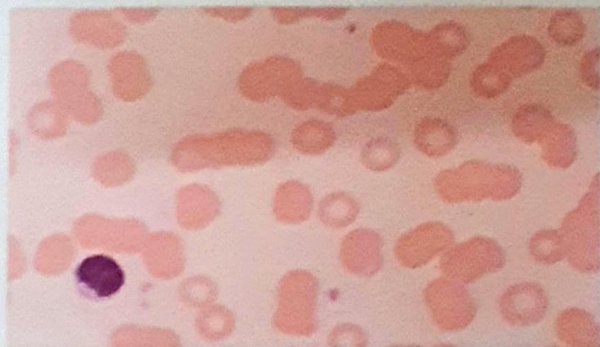
Abundant basophilic  
cytoplasm

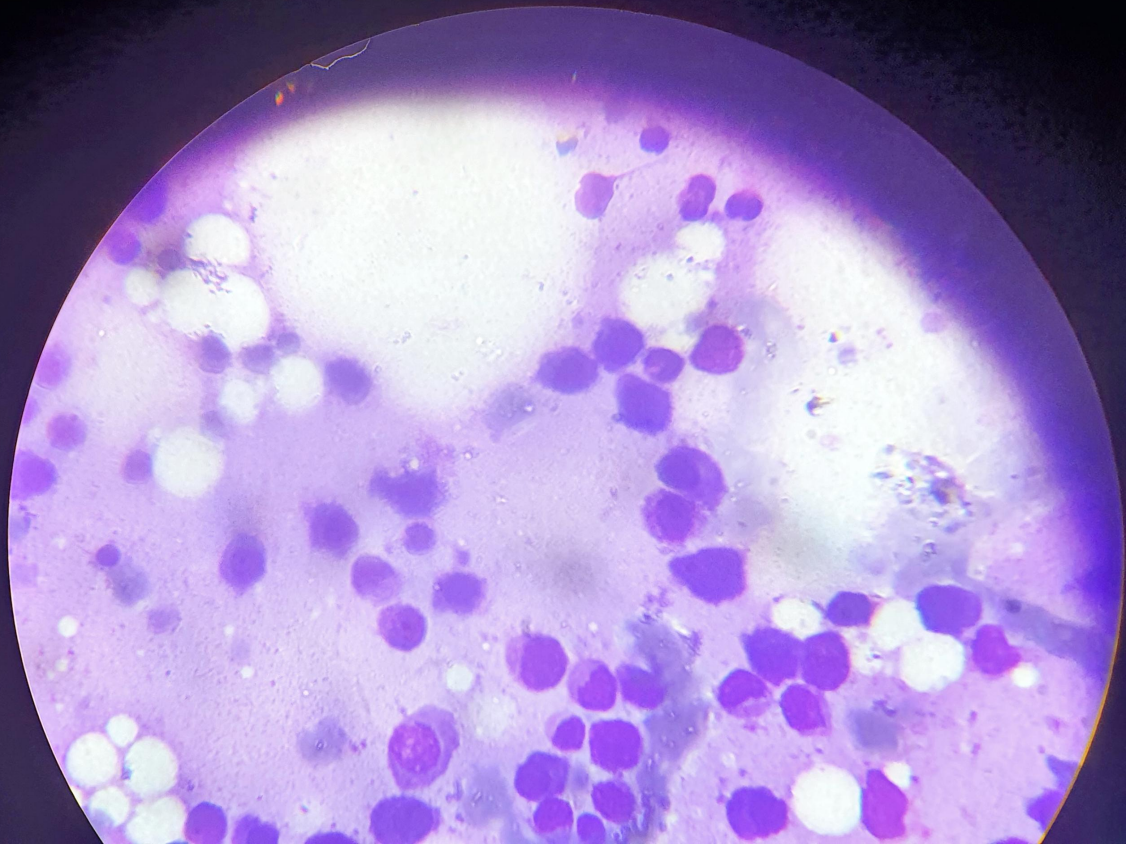
Prominent perinuclear  
hof (clearing)

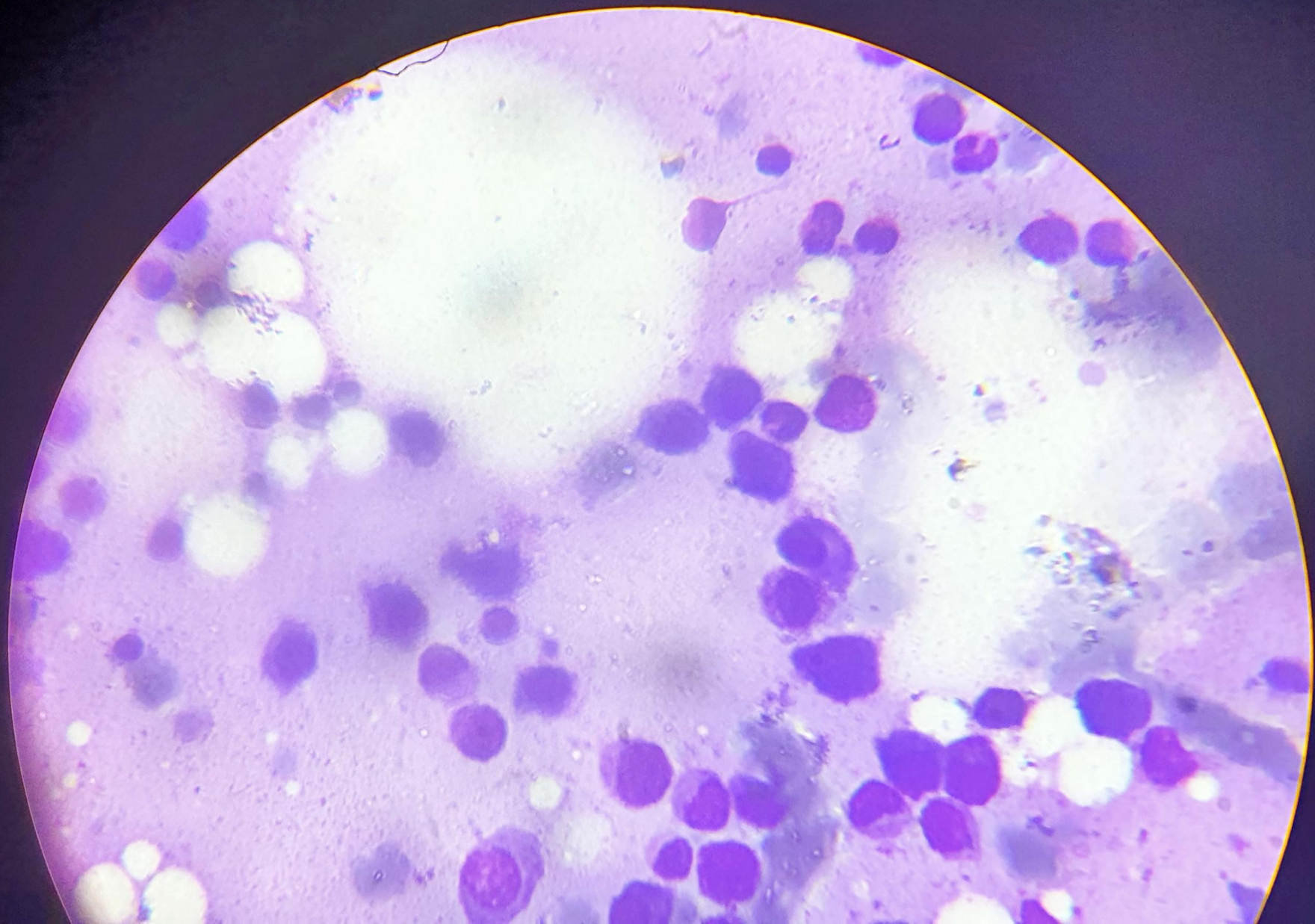
Increased no: of plasma cells in the bone marrow.



Multiple myeloma blood smear.  
Rouleaux formation.

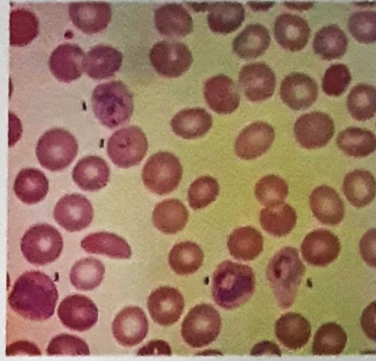






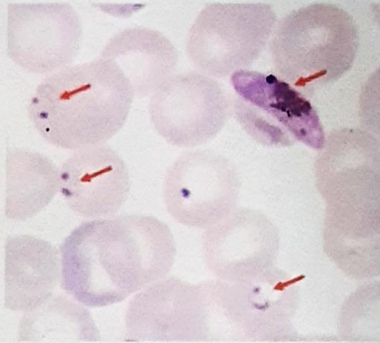
## Malarial Parasites – Blood smear

### In *Plasmodium vivax* :

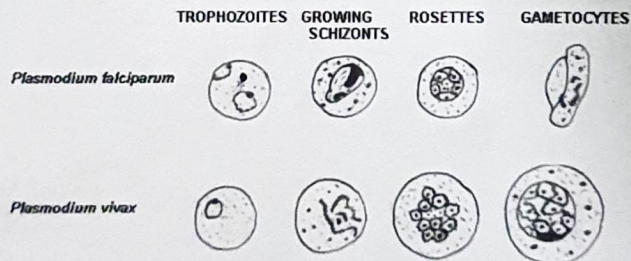


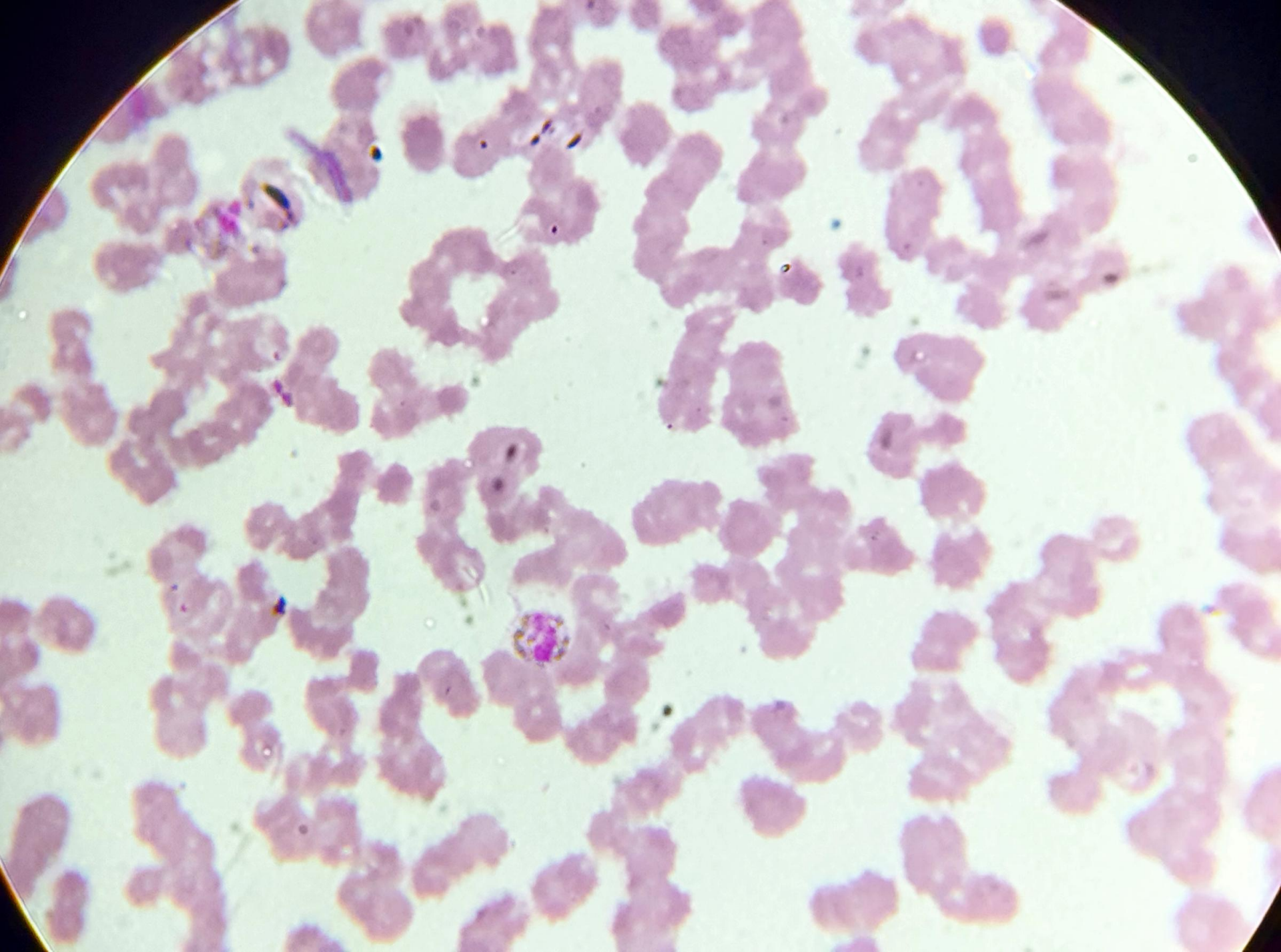
- Infected red cells are enlarged with Schuffner dots.
- Ring forms, Amoeboid trophozoites and Schizonts seen.

### In *Plasmodium falciparum* :

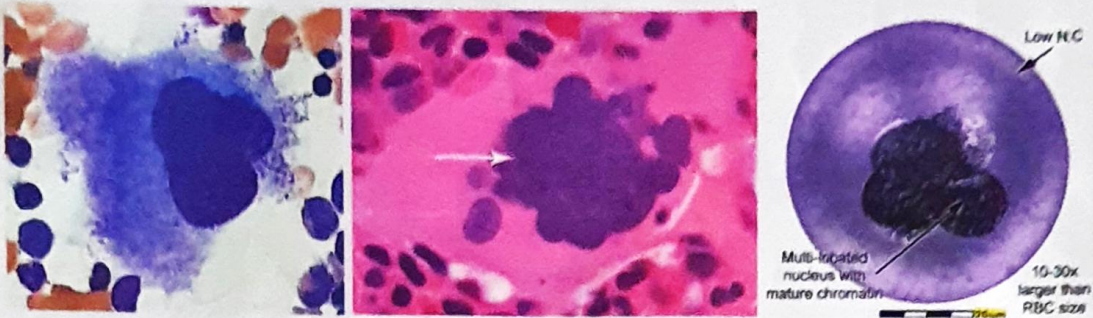


- Infected red cells are of normal size.
- Heavy parasitaemia with small ring forms; ring forms with double chromatin dots and multiple rings, some on the margin of the infected red cells are seen.
- Banana-shaped or crescentic gametocytes are characteristic.





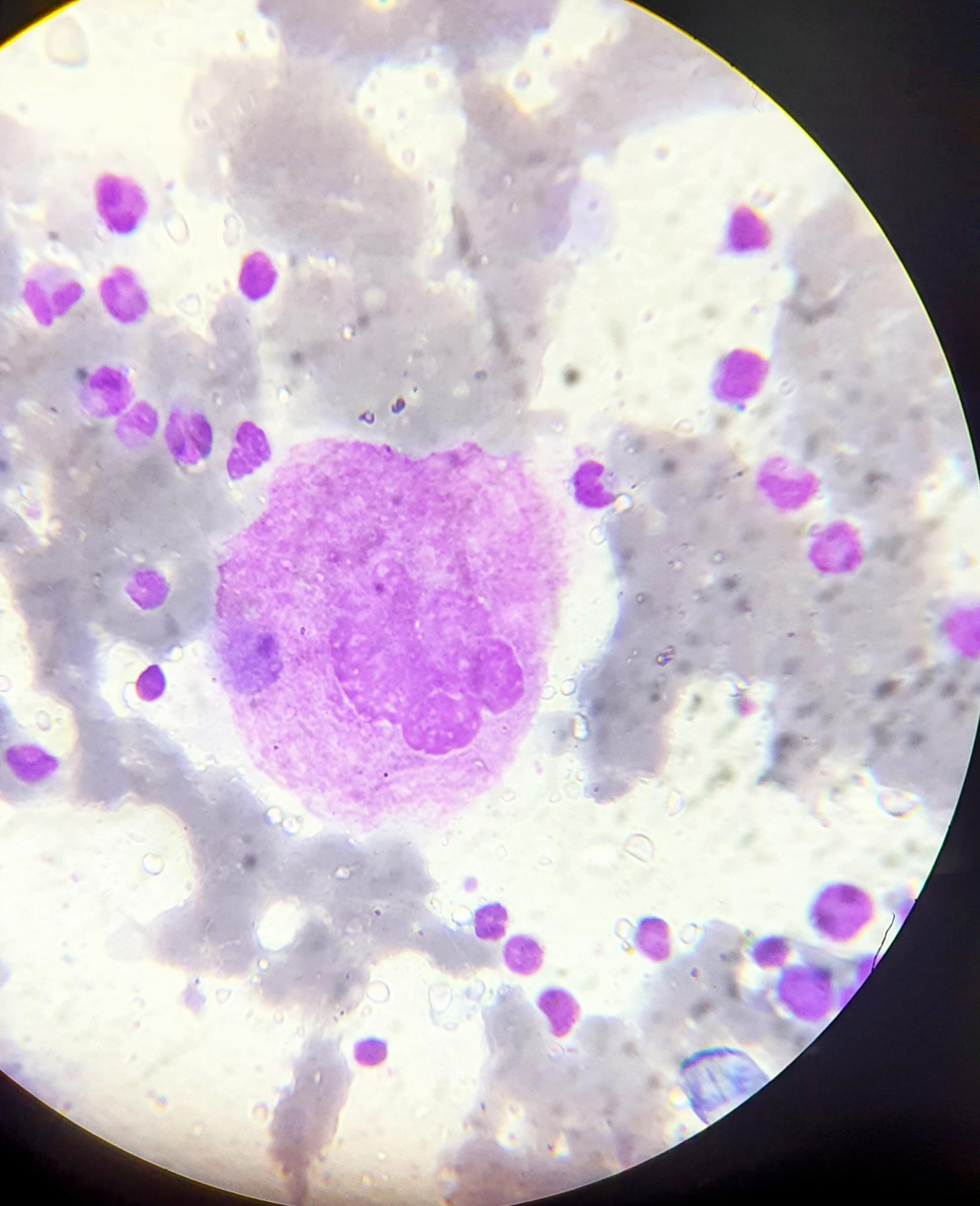
## Megakaryocyte



- Largest cell in the bone marrow.
- Morphology of mature megakaryocyte :
  - 30-90  $\mu$  in size.
  - Abundant cytoplasm which stains light blue and contains red-purple granules.
  - Multilobated nuclei (4-16 nuclear lobes) with coarsely clumped chromatin.
  - Cell margin is blurred due to the discharging platelets in an active cell.
- Platelets are formed by detachment of pseudopods of megakaryocyte.
- Increased no: of megakaryocytes is seen in Immune thrombocytopenia, Myeloproliferative disorders.
- Decreased in Acute leukemias.

### QUESTIONS :-

- What are the changes in the bone marrow in a typical case of Idiopathic thrombocytopenic purpura?



Aplastic Anaemia

