BLOOD & HAEMOPOIESIS

Objective

The main objective is for you to familiarise with the normal composition of blood so that you can easily spot changes due to infection or disease leading to marked changes in some cell types.

You should also become familiar with the development and differentiation of blood cells in haemopoeitic tissues.

Mammalian blood smears

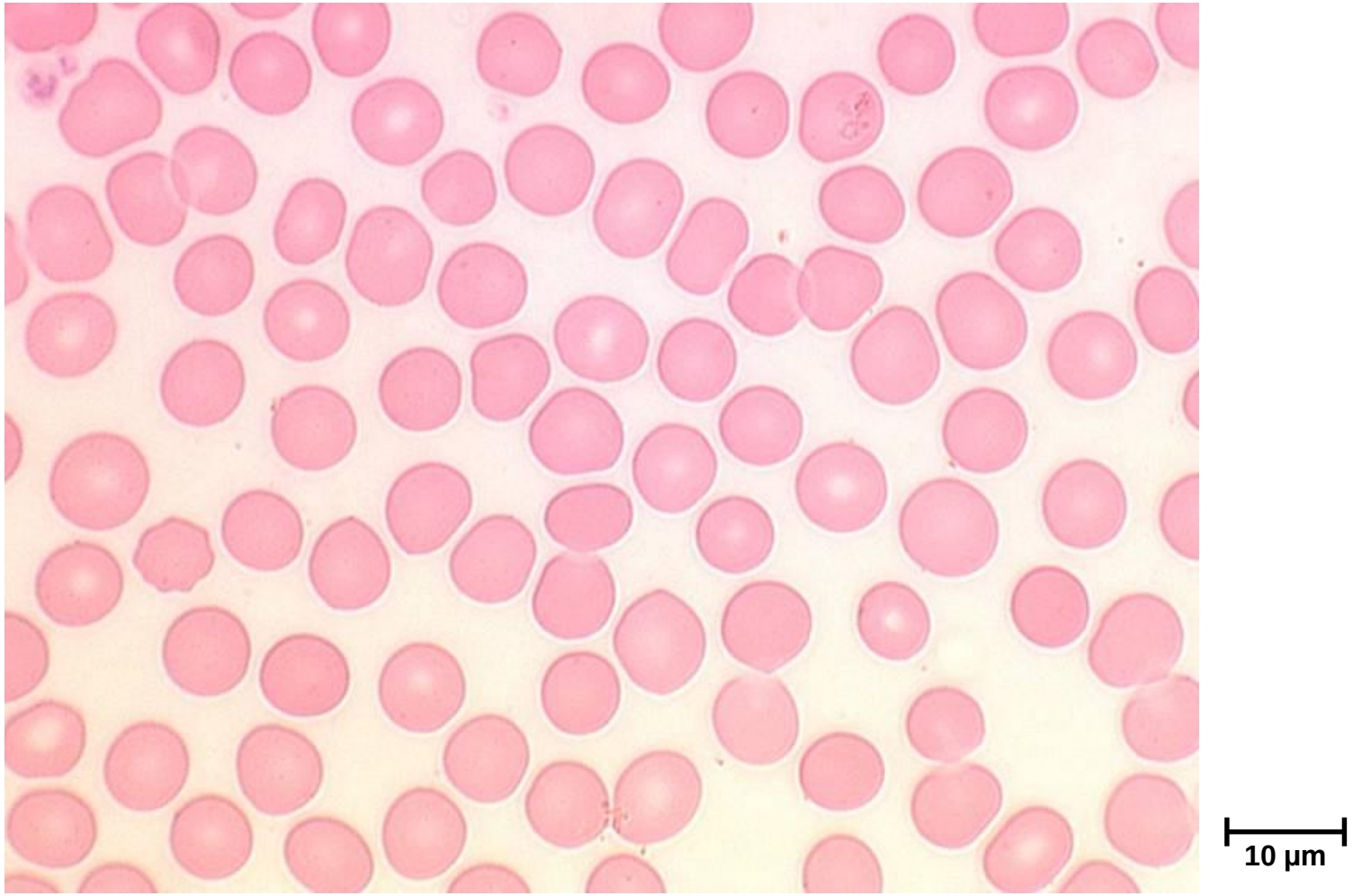
Examination of a stained mammalian blood smear.
You should be able to identify most cell types.
Identify cells in the smear.
Erythrocytes.
Platelets.
Neutrophils.
Eosinophils.
basophils (if and when present).
Lymphocytes.
Monocytes.

You should base your identification on the following characteristics:

The staining characteristics of the cells.
The presence or absence of a nucleus.
The size and shape of the cell and its nucleus.
The presence or the absence of cytoplasmic granules.

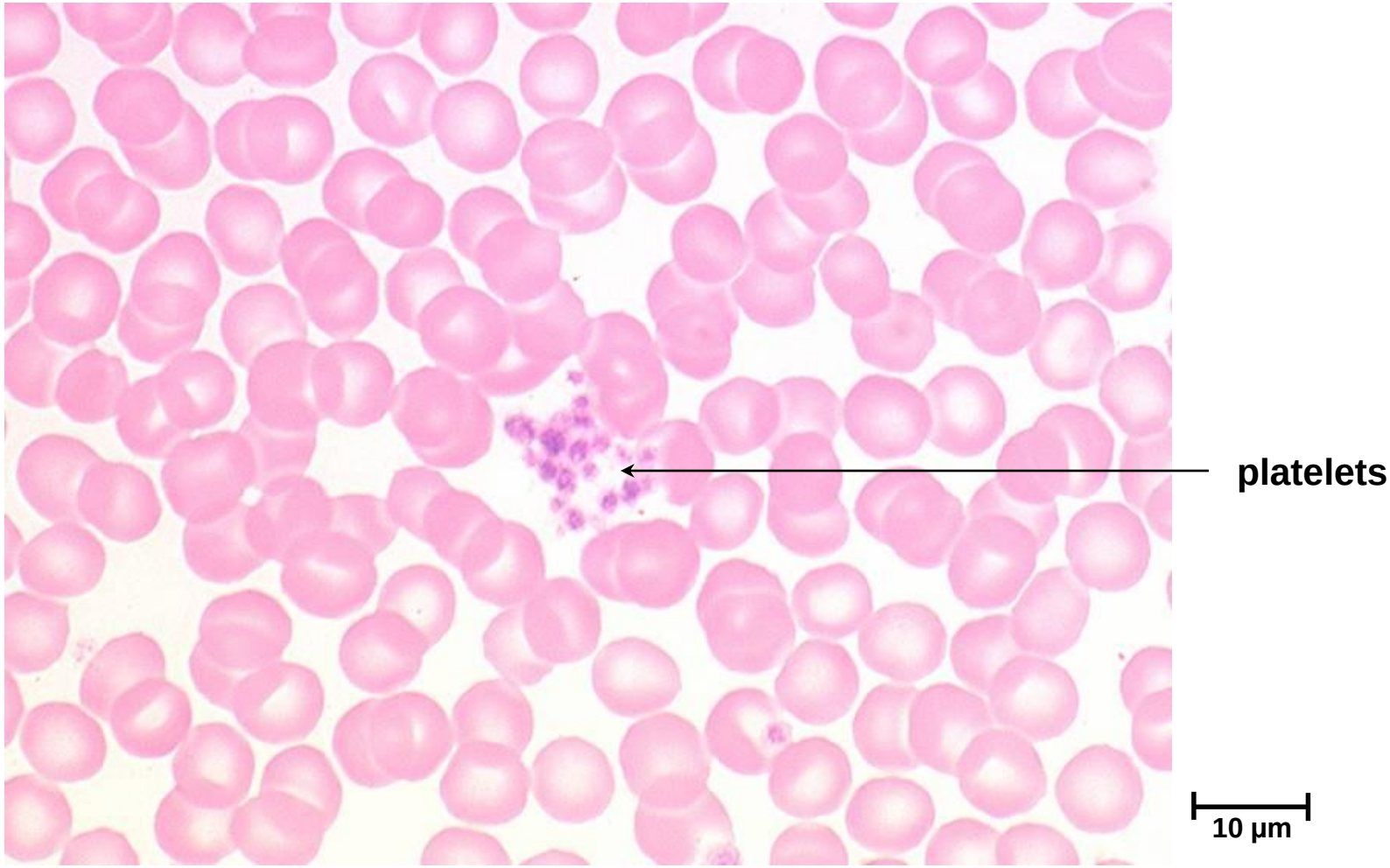
Mammalian blood smears

Erythrocytes



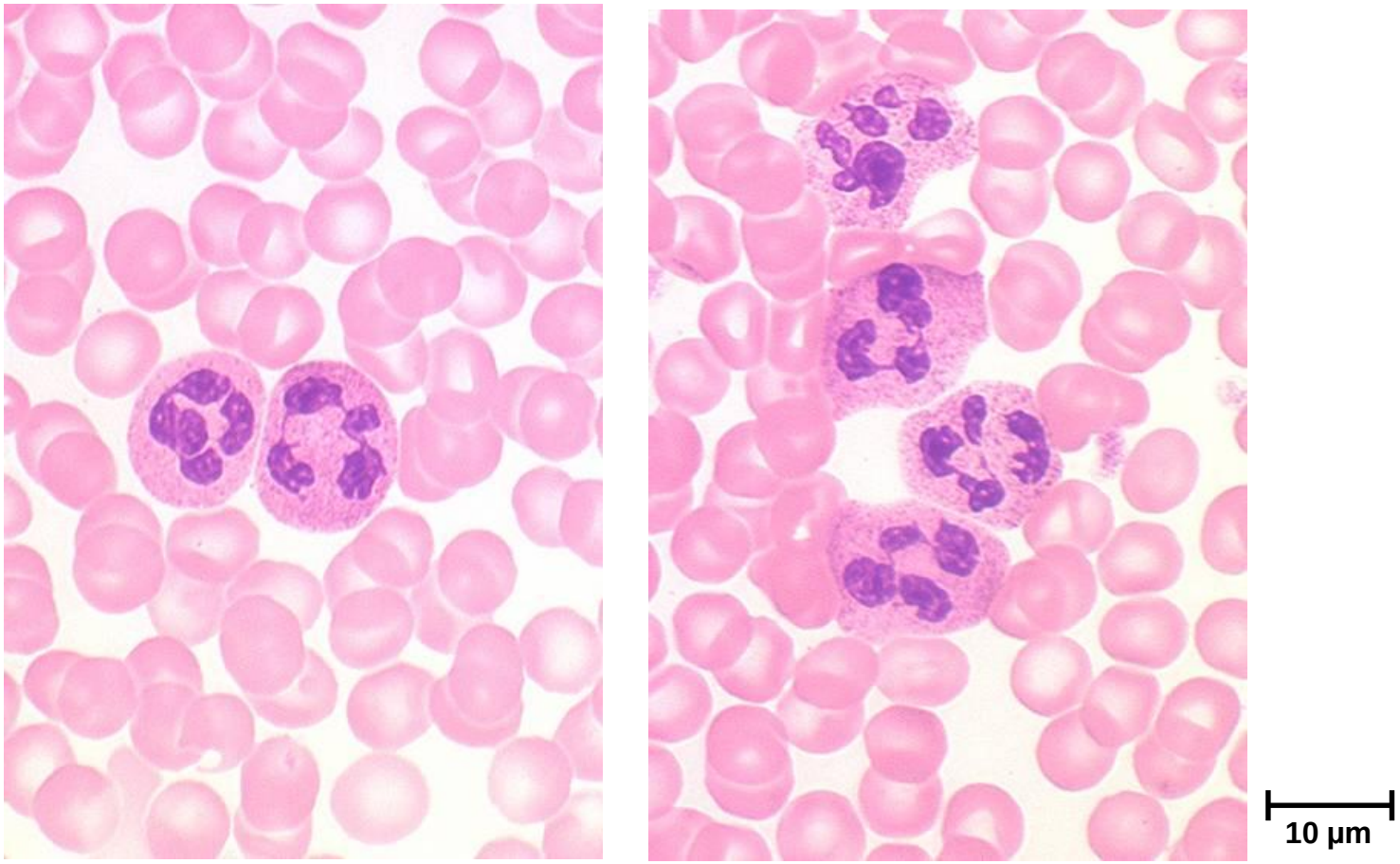
Mammalian blood smears

Platelets



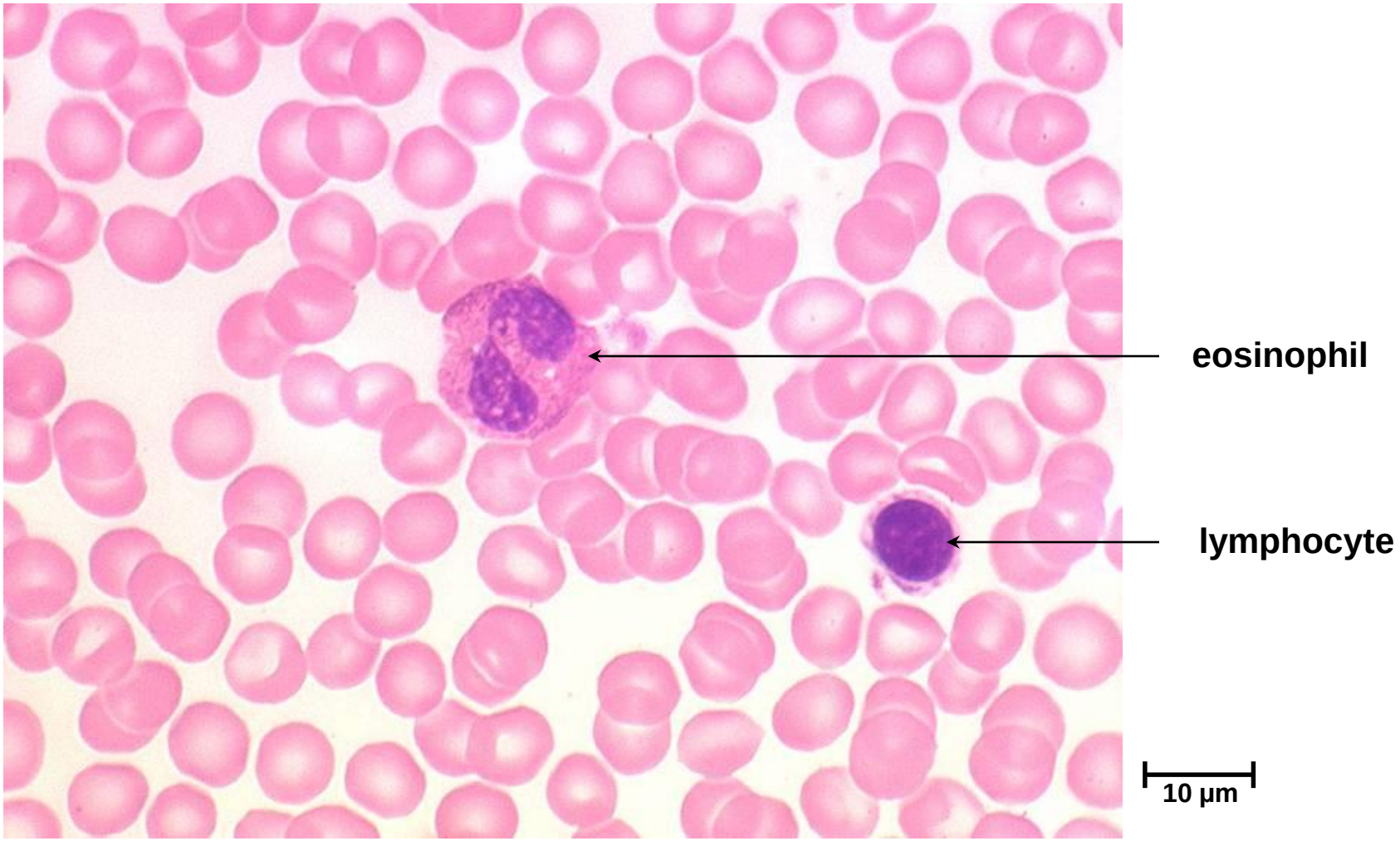
Mammalian blood smears

Neutrophils



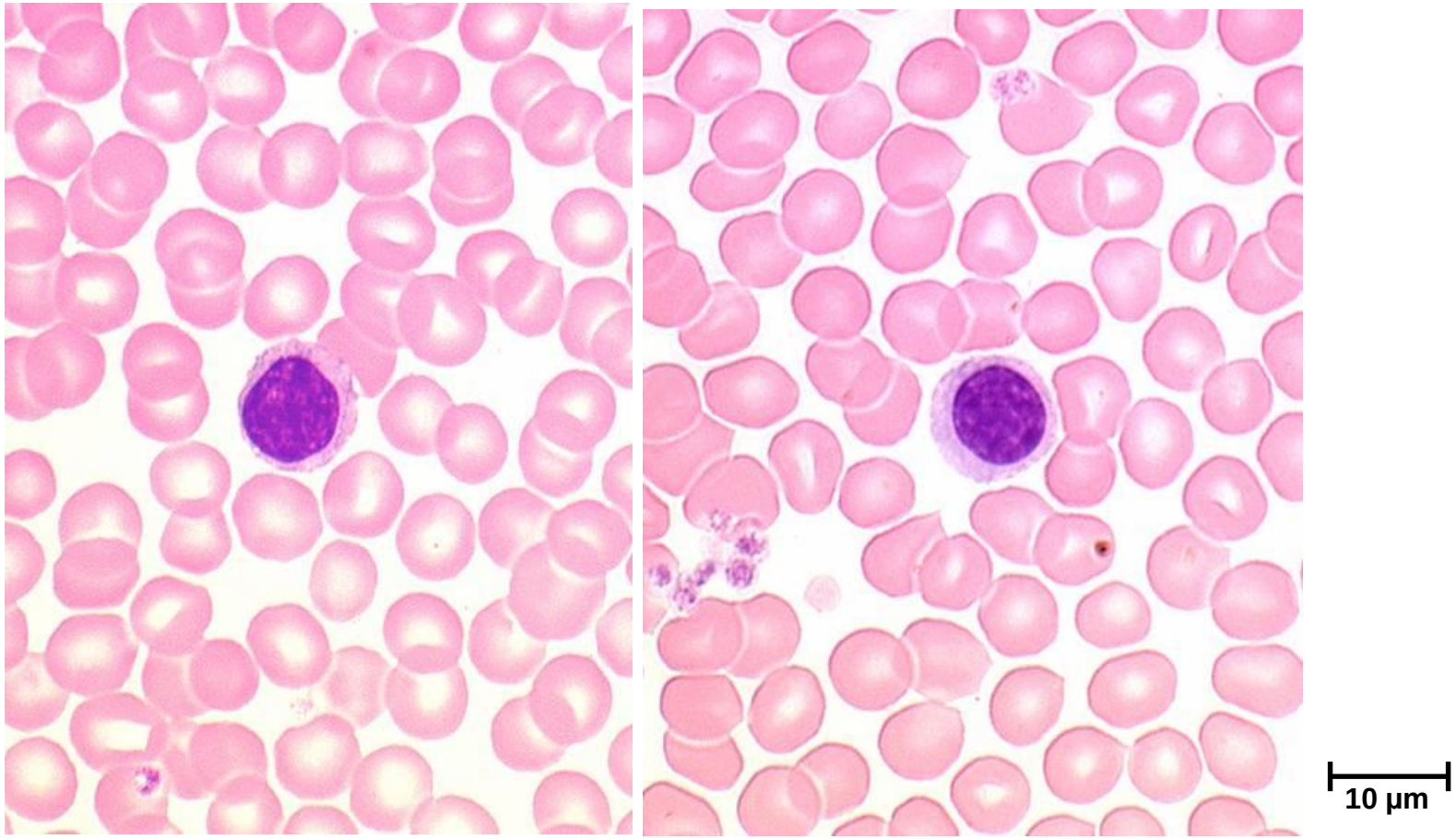
Mammalian blood smears

Eosinophil (and lymphocyte)



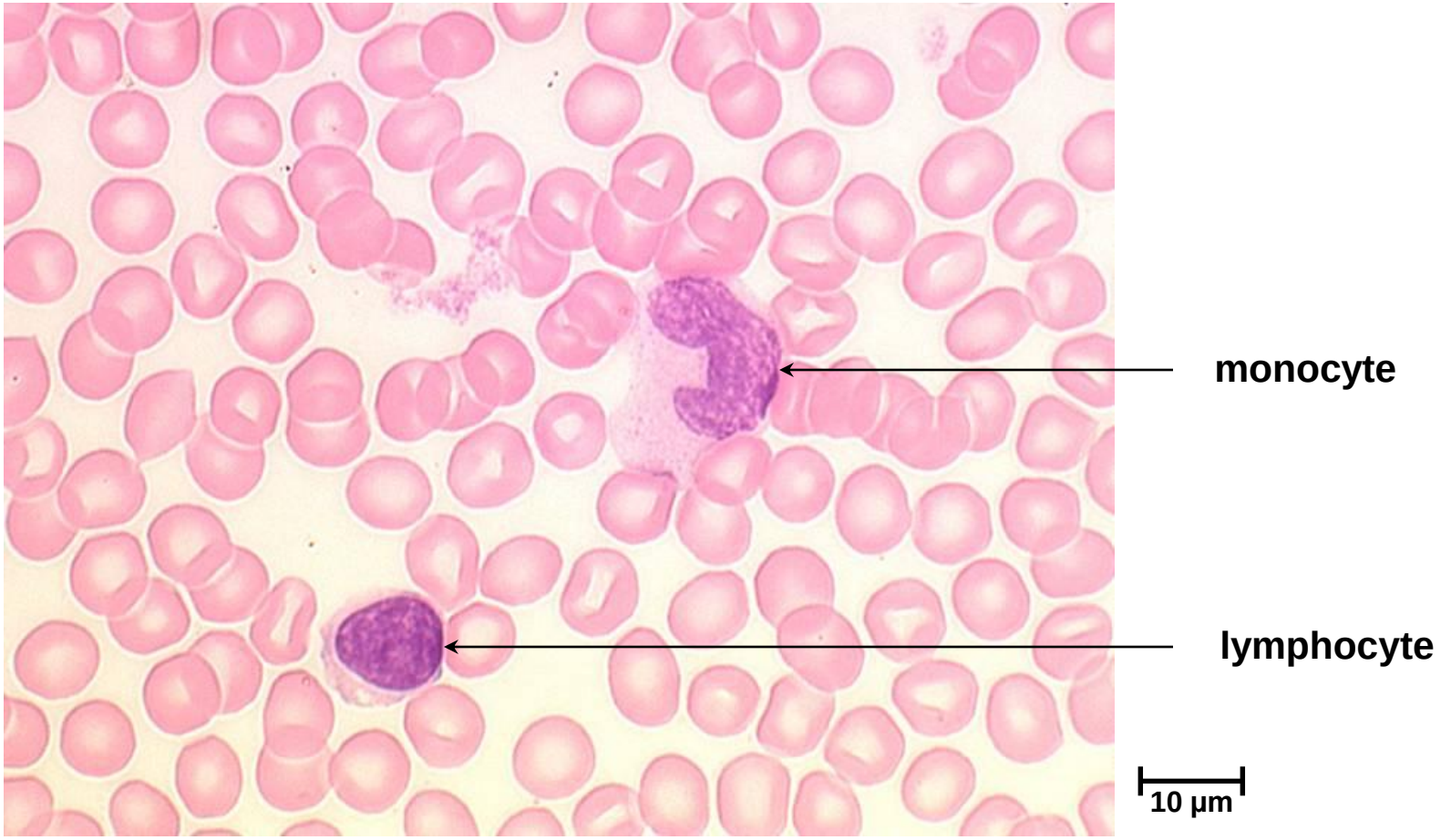
Mammalian blood smears

Lymphocytes



Mammalian blood smears

Monocyte (and lymphocyte)

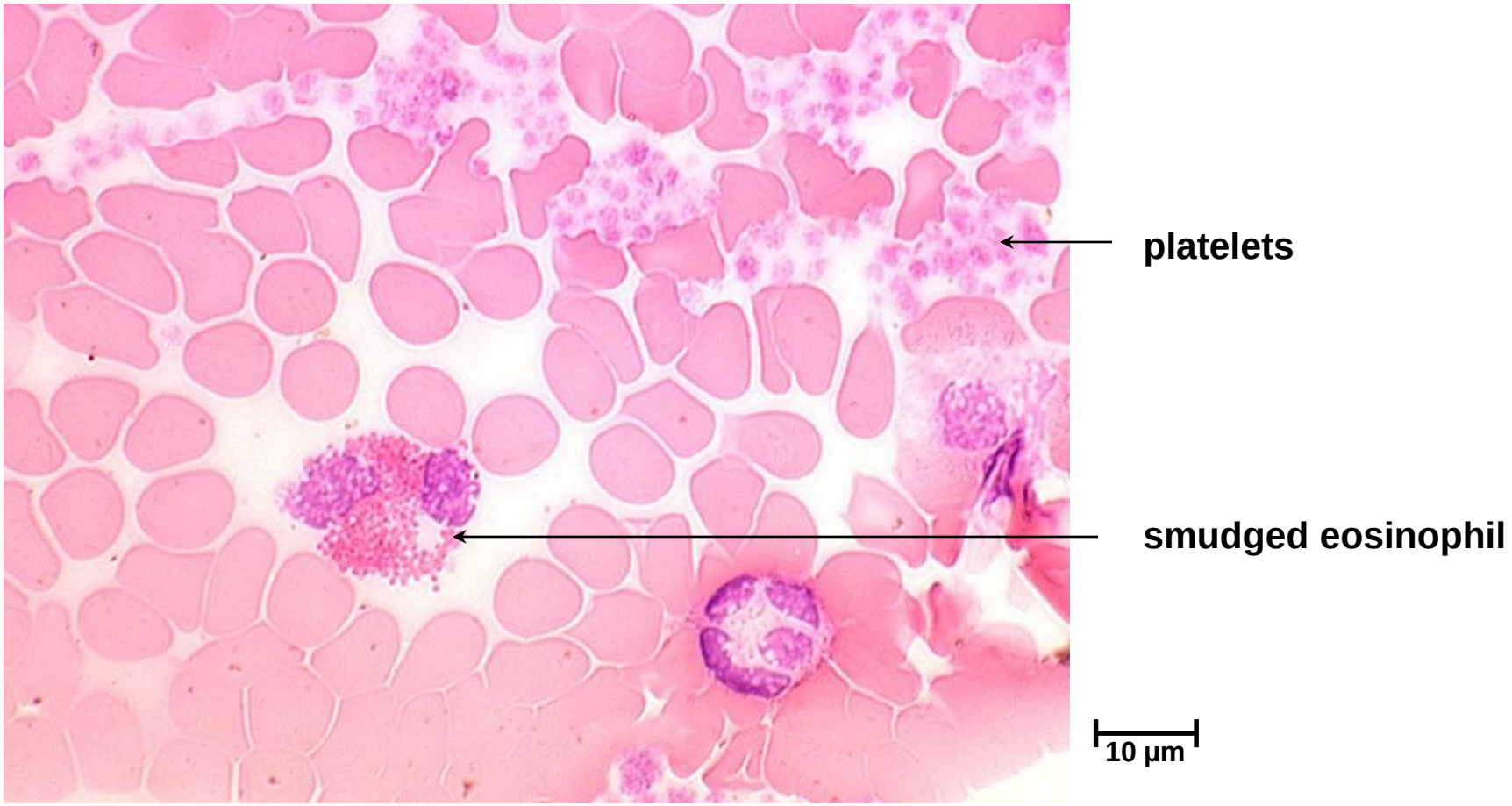


Mammalian blood smears

Smudged and distorted blood smear.

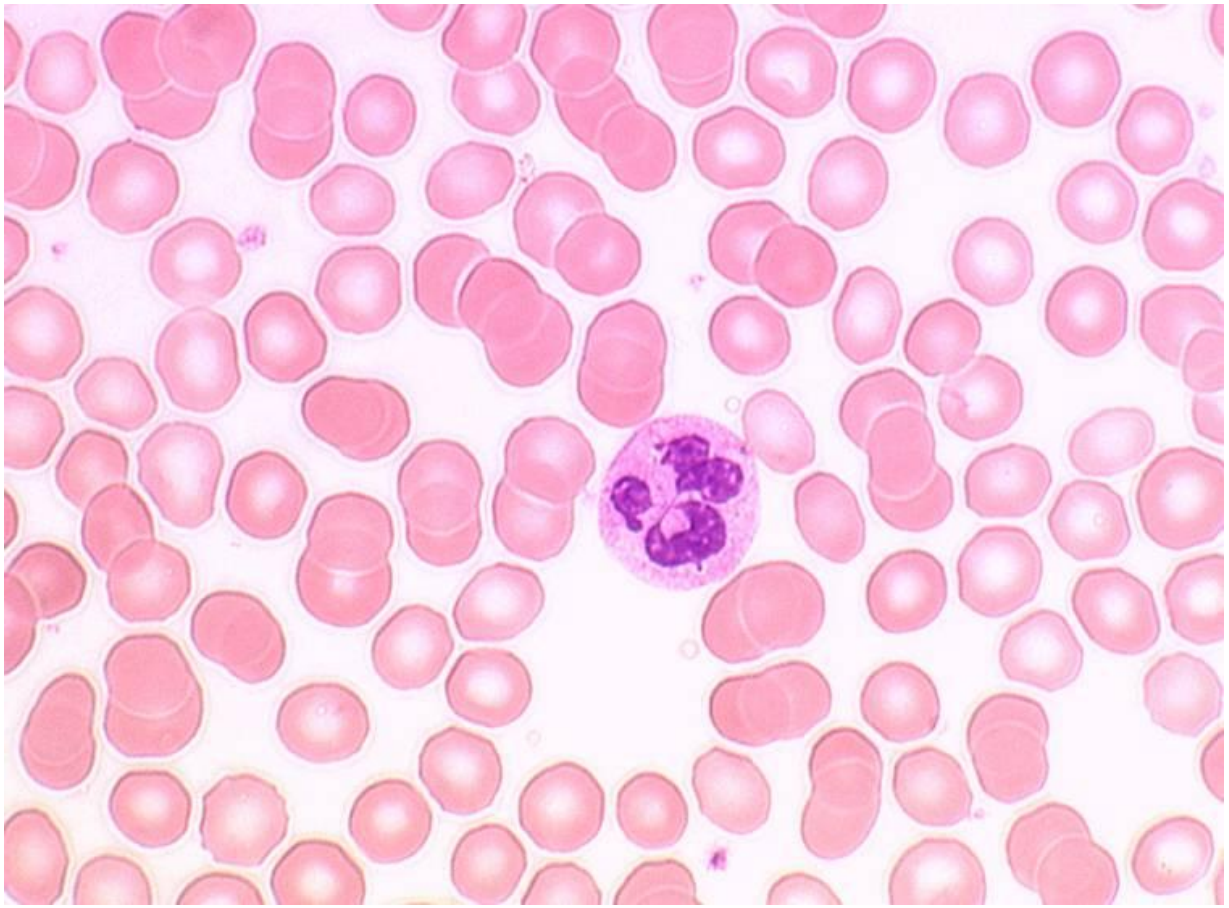
Although this smear has distorted cells, it shows well the granules in a smudged and partially ruptured eosinophil.

A large quantity of platelets can also be seen.



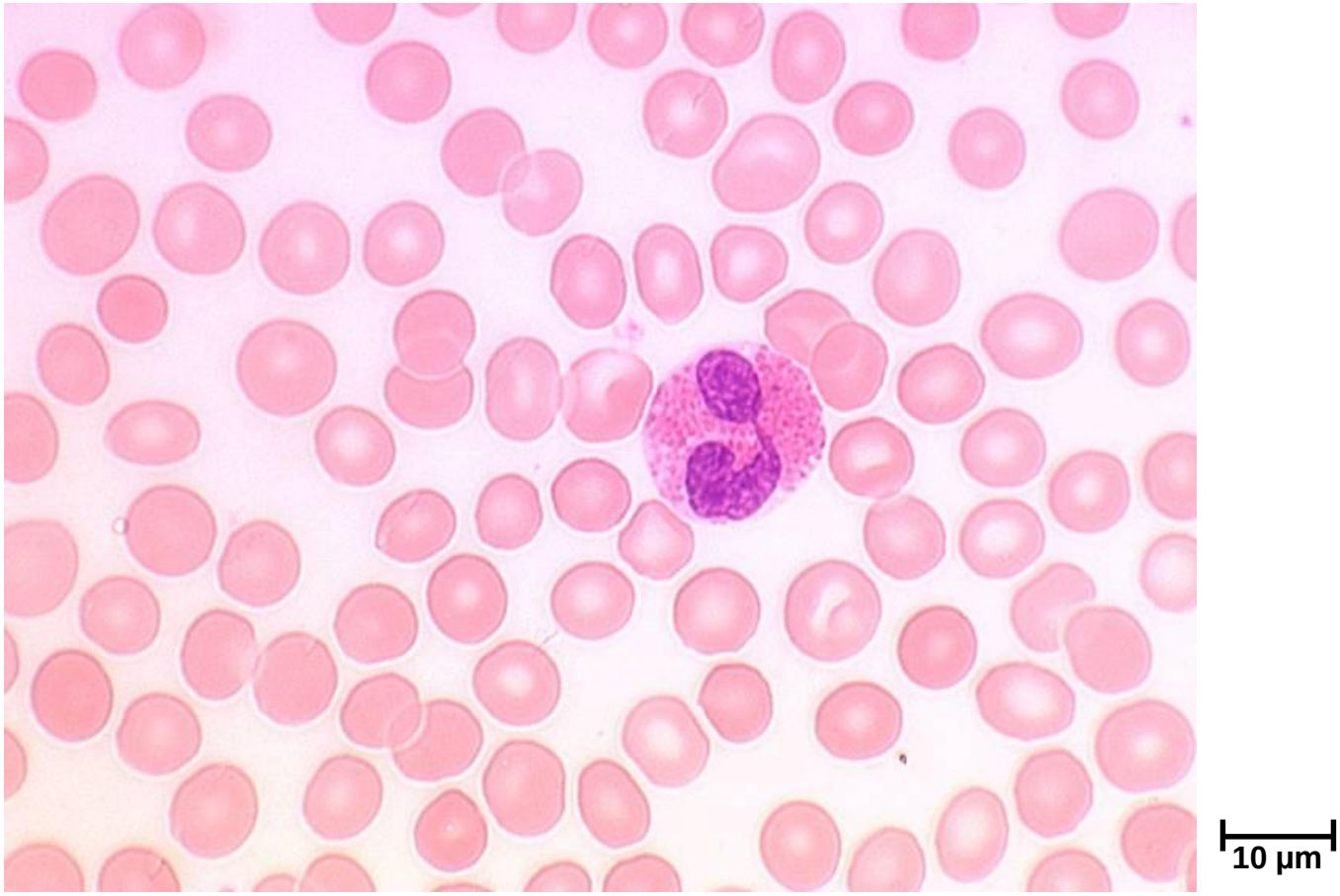
Mammalian blood smears (human)

Neutrophil.



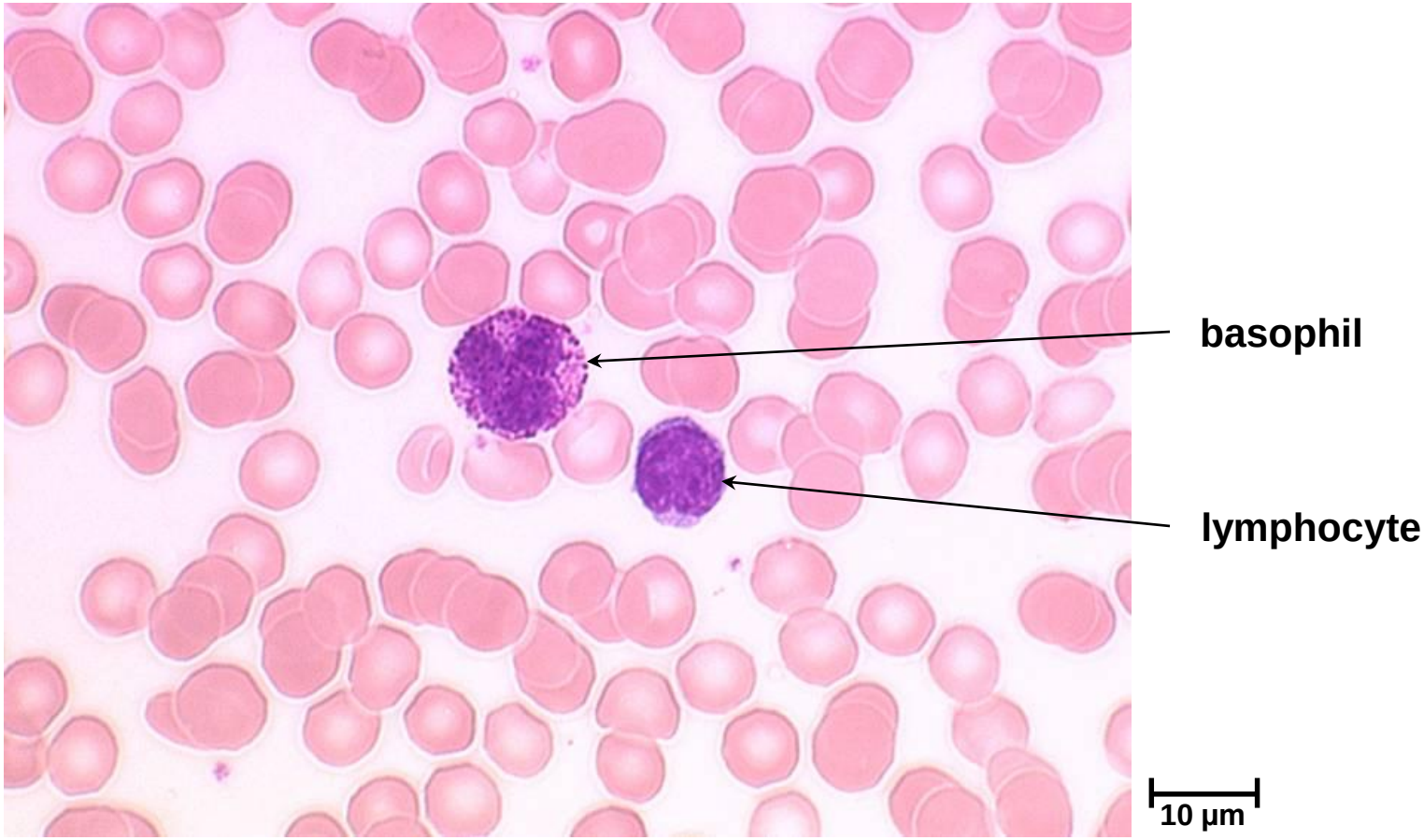
Mammalian blood smears (human)

Eosinophil.



Mammalian blood smears (human)

Basophil and lymphocyte.

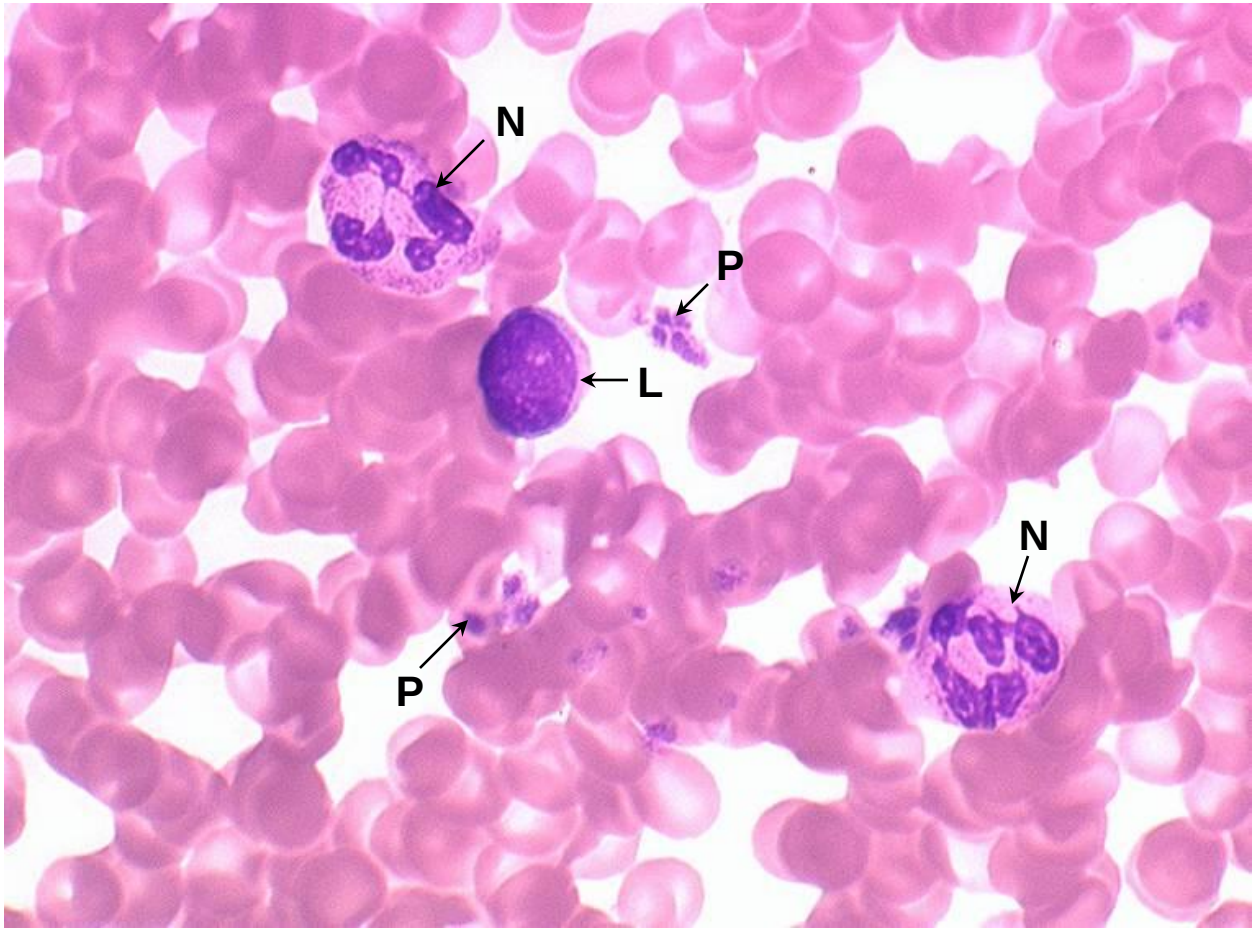


Mammalian blood smears (human)

Neutrophils.

Platelets.

Lymphocyte.



N : neutrophils

P : platelets

L : lymphocyte

Mammalian blood smears (dog)

Is there any difference in the colour of the cytoplasm of these cells e.g. do they all stain pink or blue?

Cytoplasm of erythrocytes stains pink, that of leucocytes is blue-grey with cytoplasmic granules staining grey/pink, red/pink or blue/purple.

Which cells in this blood smear lack a nucleus?

Erythrocytes and platelets.

What are the smallest components in this smear?

Platelets.

Which cells in this smear contain granules in their cytoplasm?

Neutrophils, Eosinophils and Basophils (granulocytes).

In which cells are the nuclei lobed?

Neutrophils, Eosinophils and Basophils (granulocytes).

Which cells show the most lobed nucleus?

The Neutrophil with 3-5 lobes.

Which cell has little cytoplasm with most of the cell space taken up by the nucleus?

The Lymphocyte.

In which cell is the nucleus most obviously eccentrically placed?

The Monocyte.

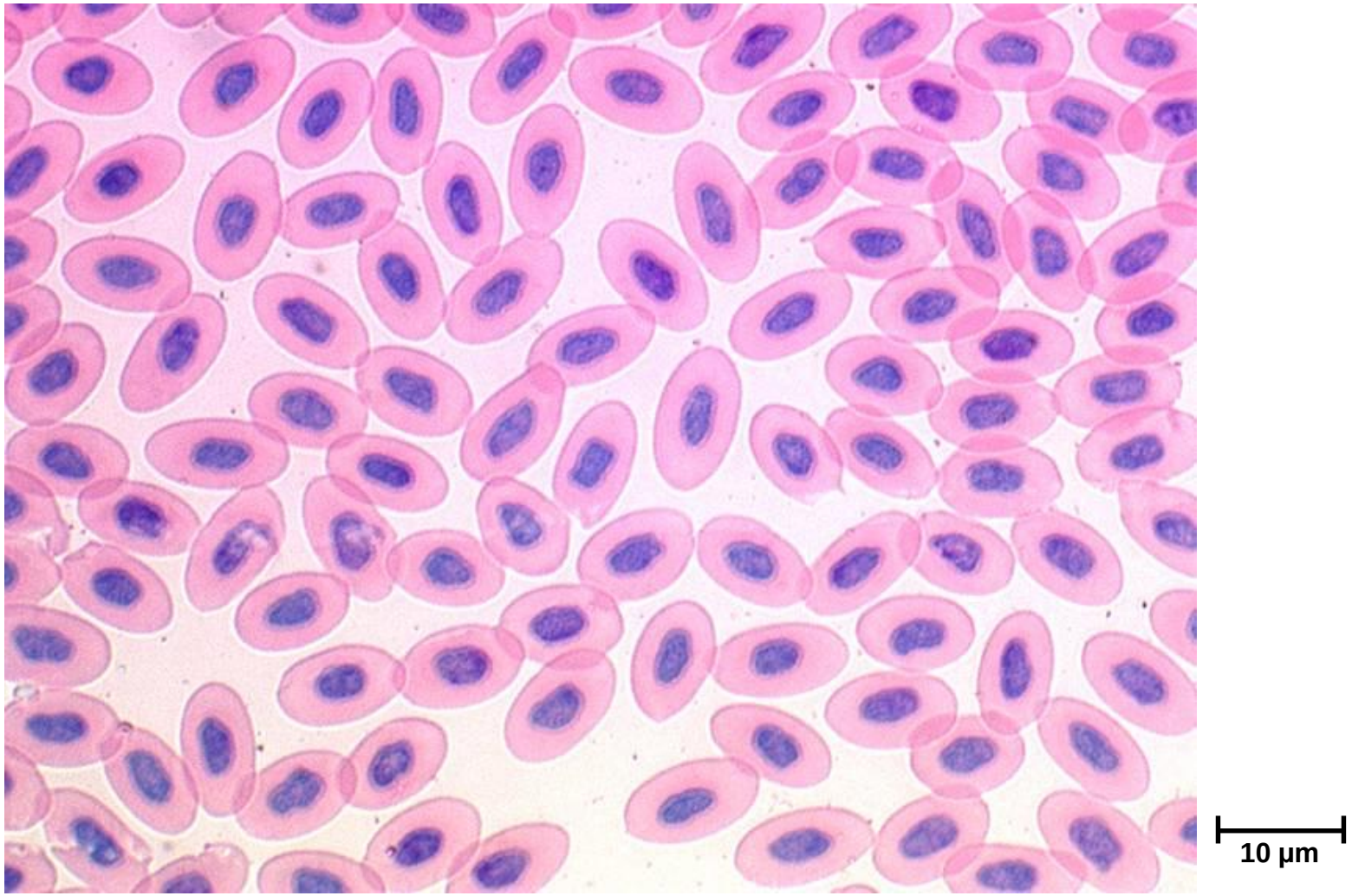
Avian blood smears

Examination of a stained avian blood smear.
You should be able to identify most cell types.

Erythrocytes. **Avian erythrocytes are elongated cells with an oval nucleus.**
Thrombocytes. **Nucleated cells, smaller than the erythrocytes, function as platelets.**
Lymphocytes.
Monocytes.
Heterophils. **Eosinophilic rod or spindle shaped granules. (the most numerous of the granulocytes)**
Eosinophils. **Eosinophilic granules round.**
Basophils. **More numerous than in mammals, nucleus often without lobes.**

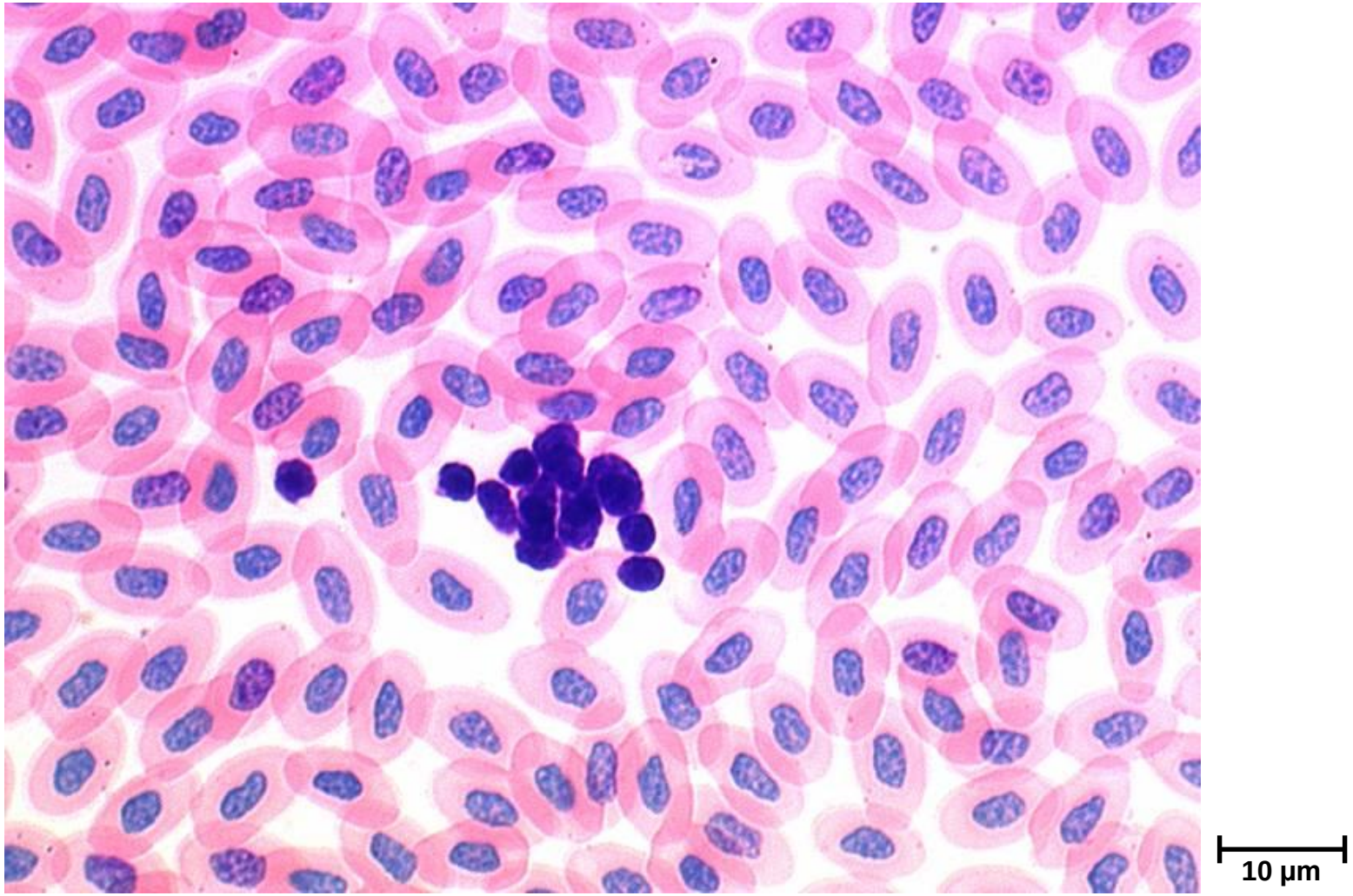
Avian blood smears

Erythrocyte.



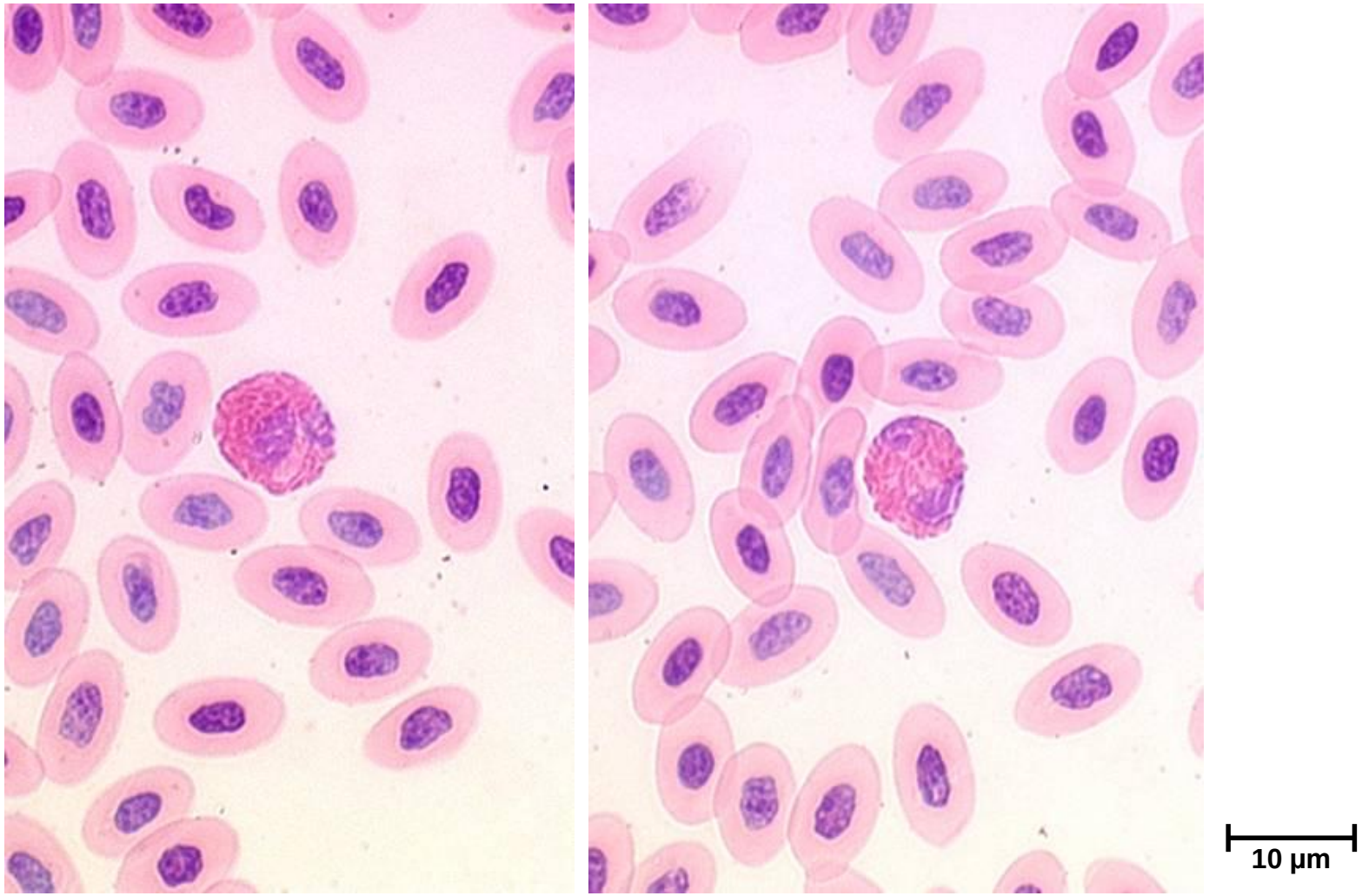
Avian blood smears

Thrombocytes.



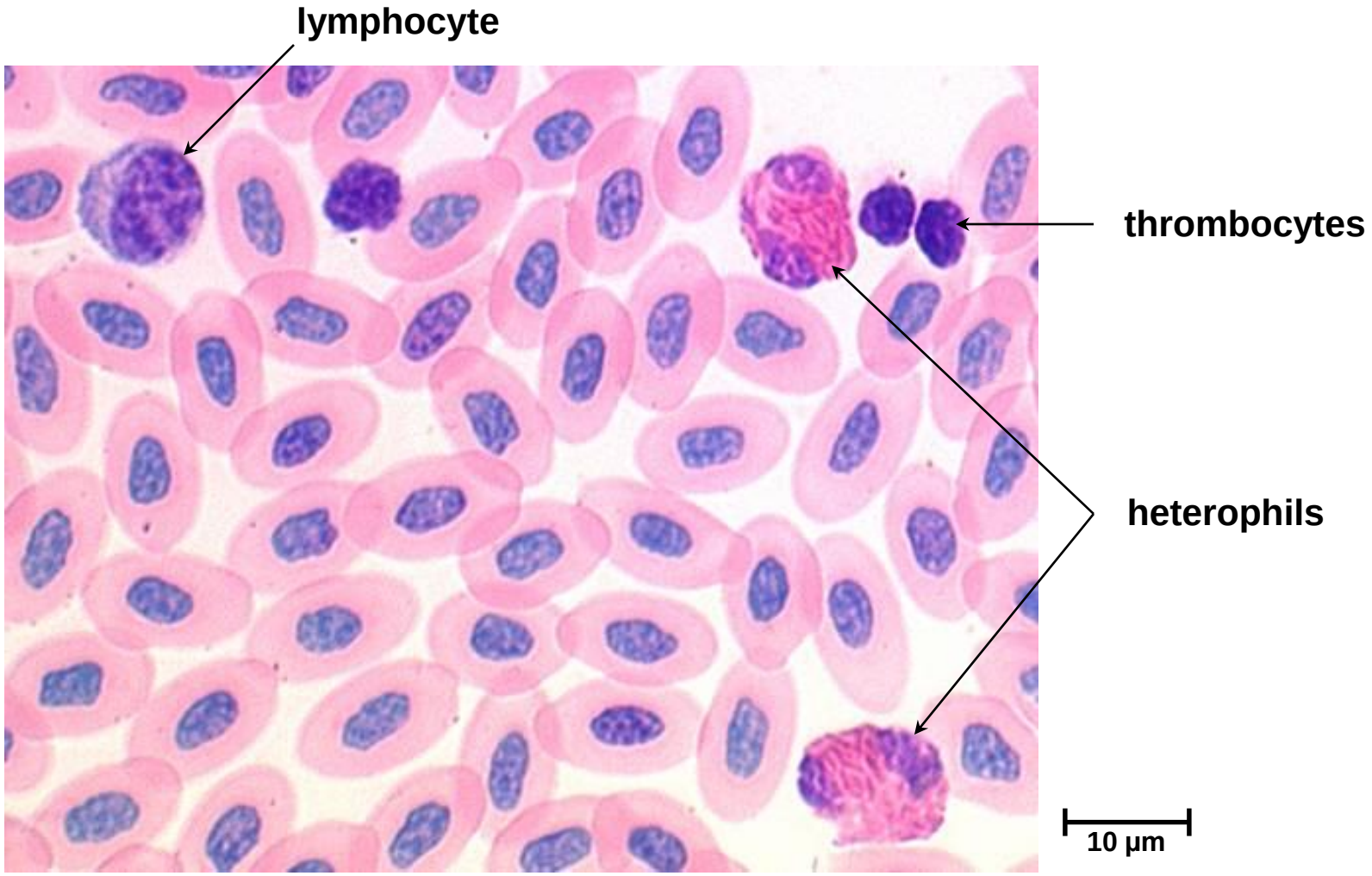
Avian blood smears

Heterophils.



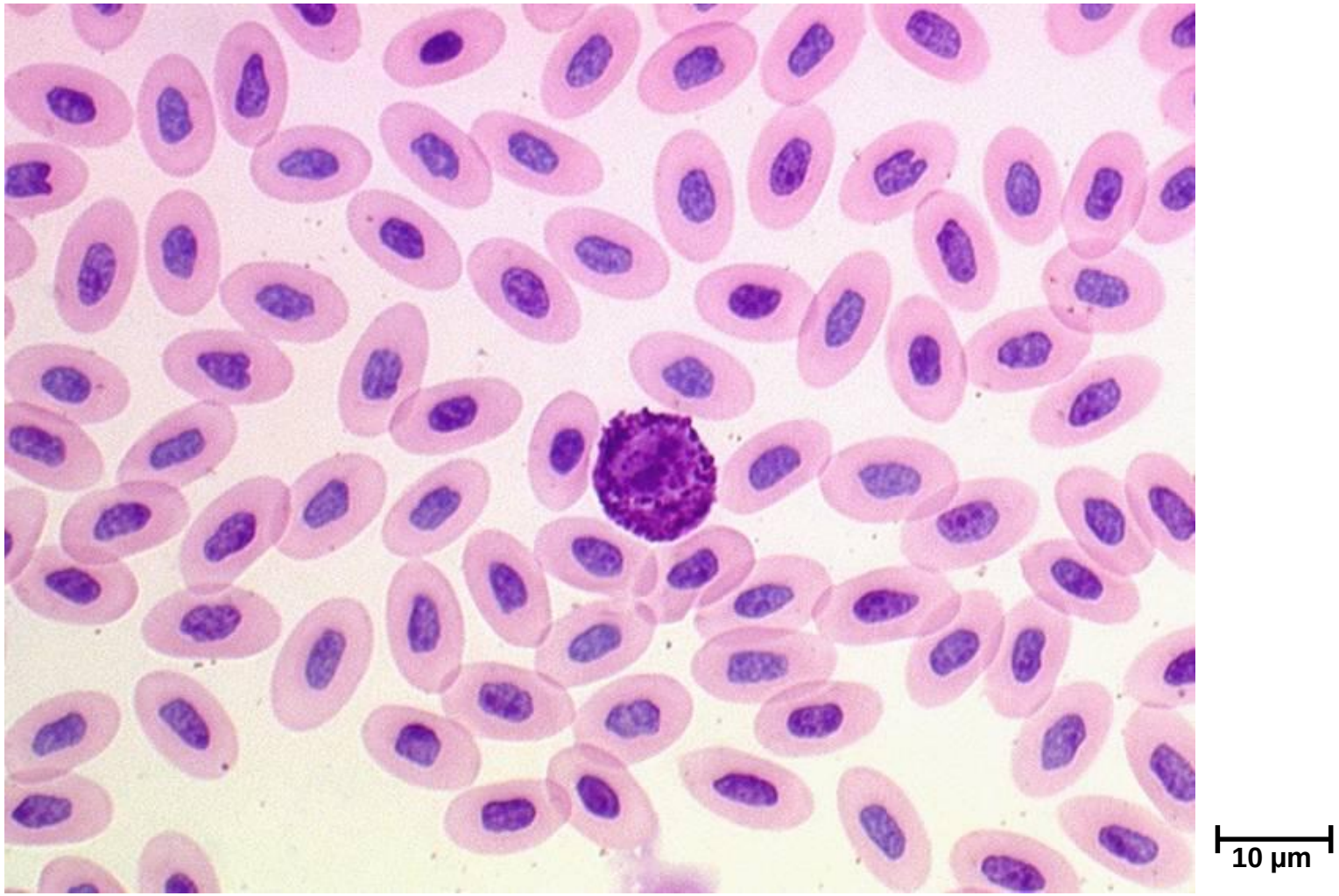
Avian blood smears

Lymphocyte, heterophils and thrombocytes.



Avian blood smears

Basophil.



Avian blood smears

What is the major difference between the mammalian and the avian blood smears?

Erythrocytes and platelets are nucleated. Platelets much larger than mammalian.

Do any cells in the avian smear lack a nucleus?

No.

How does the morphology of erythrocytes and thrombocytes vary in mammalian and avian blood?

Erythrocytes

Mammalian : A biconcave flattened disc in the mature state lacking a nucleus and cell organelles.

Avian : Elongated cells with an oval nucleus.

Erythrocyte size in both mammalian and avian blood is species dependant.

Thrombocytes

Mammalian : Cell fragments bounded by membranes, from the megakaryocytes found in the bone marrow and spleen.

Avian : Nucleated cells, smaller than the erythrocytes with a more rounded nucleus.

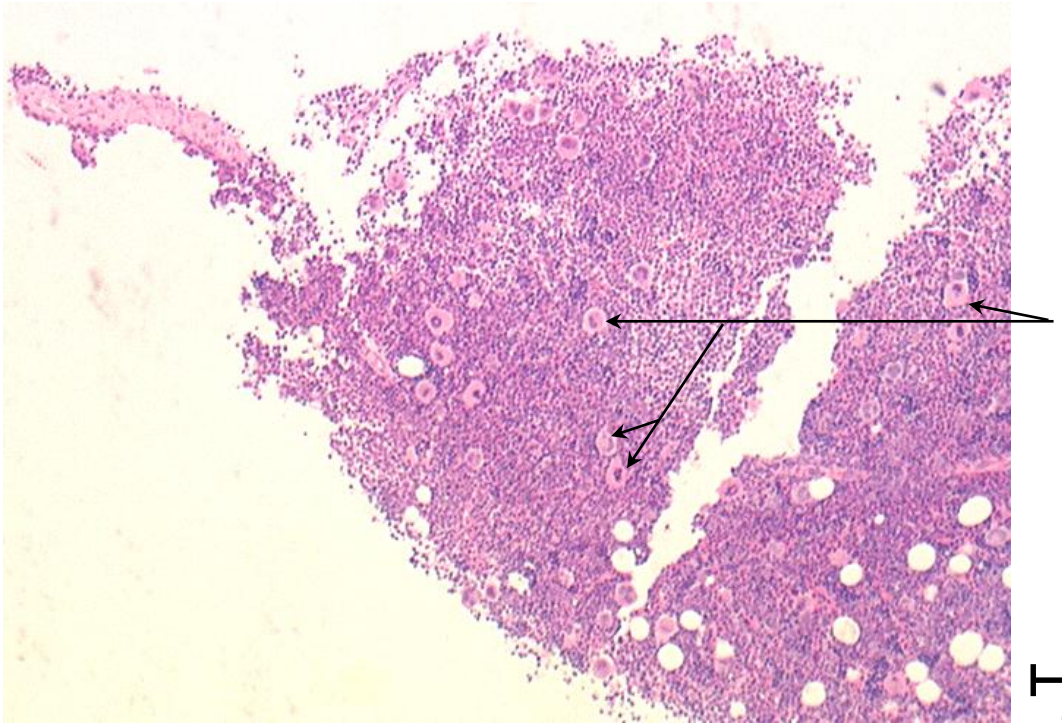
Bone marrow Haemopoeisis

You will observe blood cells at different stages of development and differentiation.

It may be difficult to identify different cells with certainty until they approach later stages of differentiation e.g. accumulation of cytoplasmic granules that also impart specific staining characteristics and the development of lobulated nuclei.

The easiest cells to identify in these sections are the megakaryocytes very large cells with lobulated nuclei.

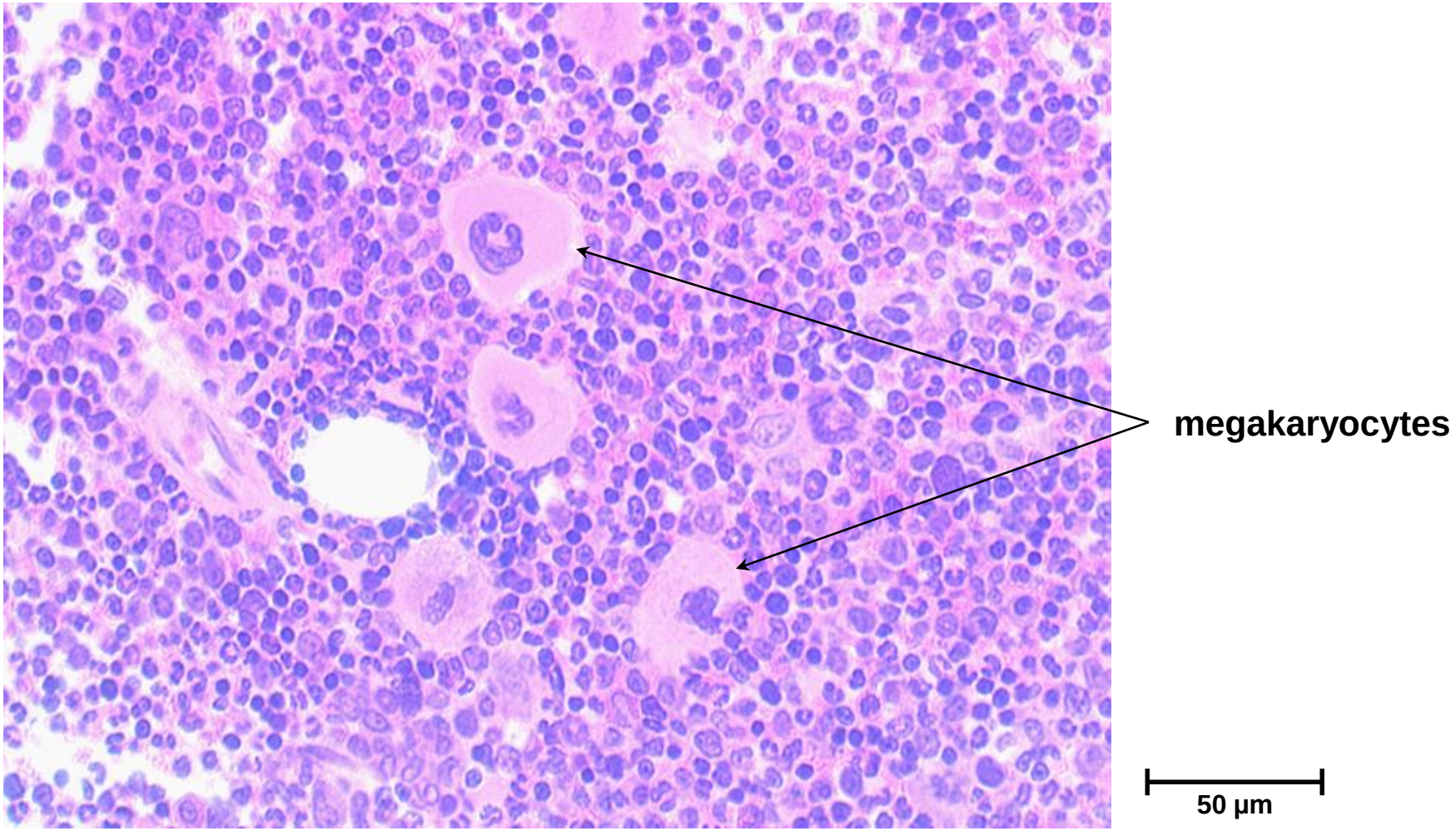
You should see many granulocytes showing different levels of nuclear lobulation.



Low magnification view of a portion of bone marrow. megakaryocytes can be seen.

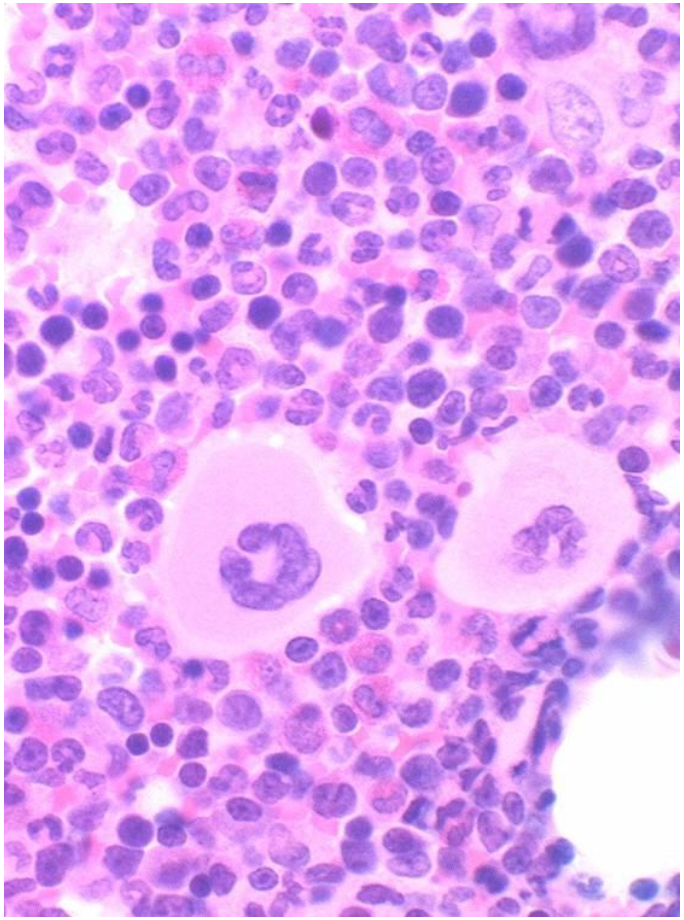
SLIDE 192 Bone marrow Haemopoeisis

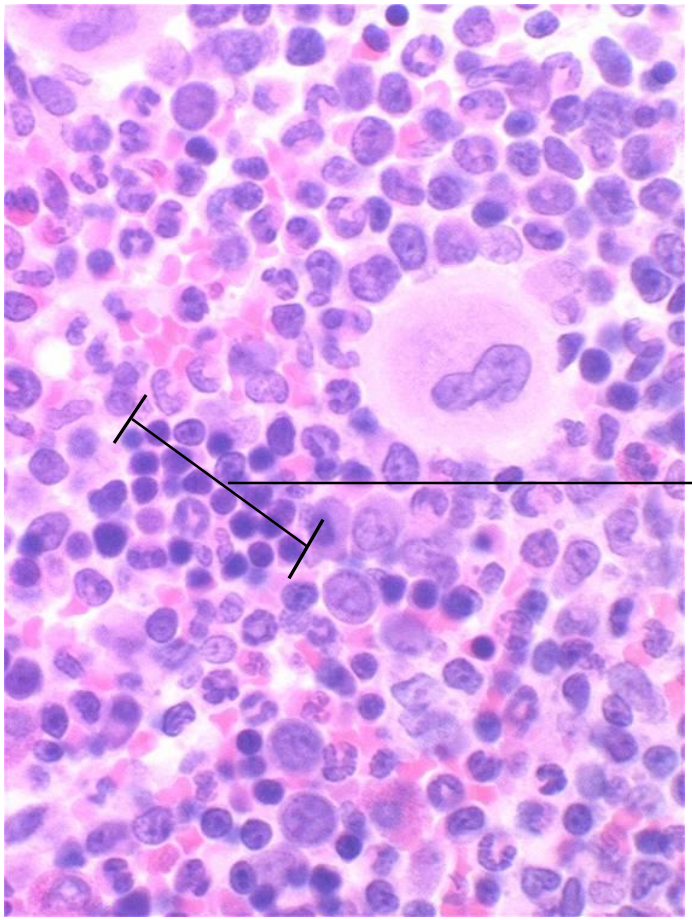
The easiest cells to identify in these sections are the megakaryocytes very large cells with lobulated nuclei.



Bone marrow Haemopoeisis

Megakaryocytes and developing erythrocytes and granulocytes.

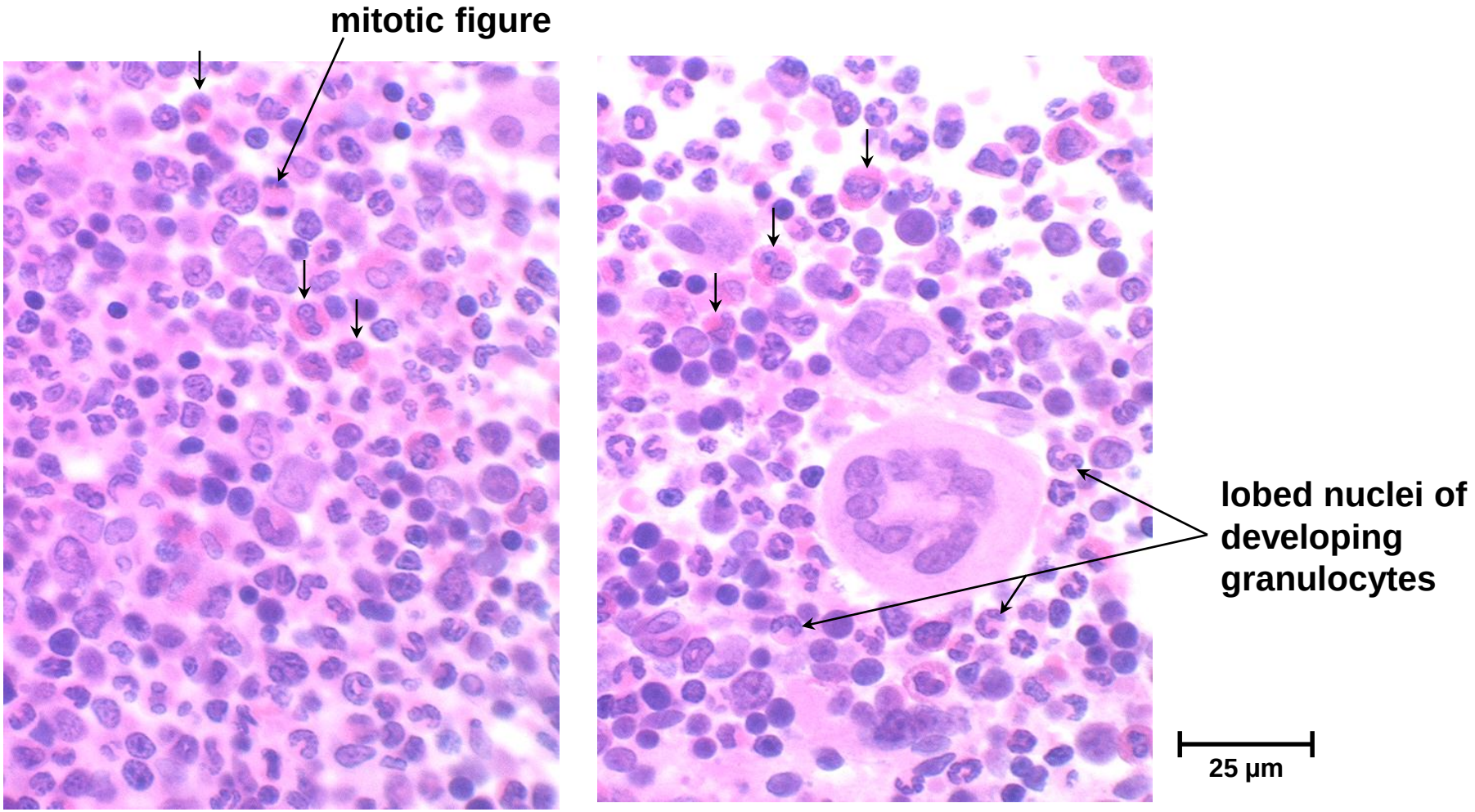




Bone marrow Haemopoeisis

The lobed nucleus of the megakaryocyte is clear in the right hand picture.

Eosinophilic staining cells arrowed.



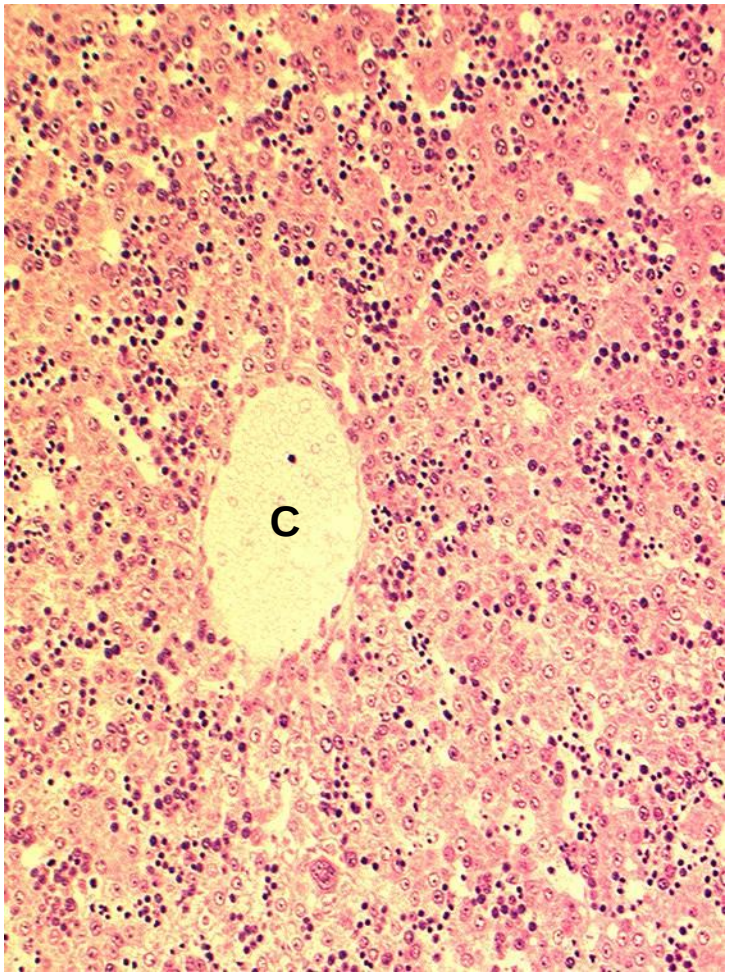
Foetal liver Haemopoiesis
Adult liver

Foetal

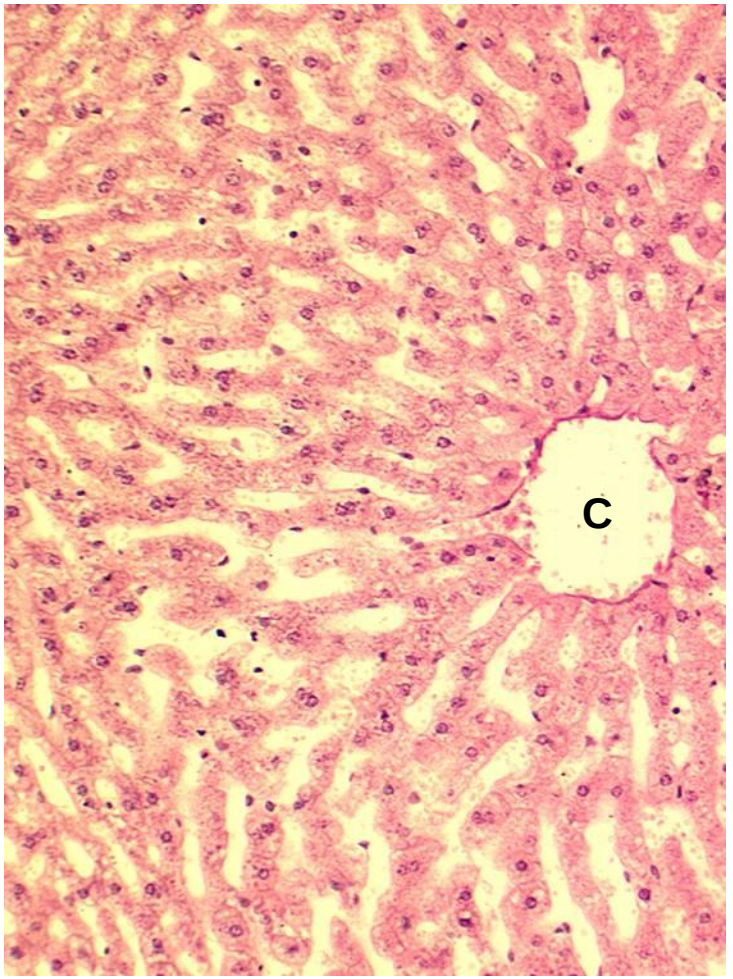
Adult

Foetal liver Haemopoiesis
Adult liver

Foetal with haemopoietic tissue.



Adult with clearly defined cords of hepatocytes and sinusoids

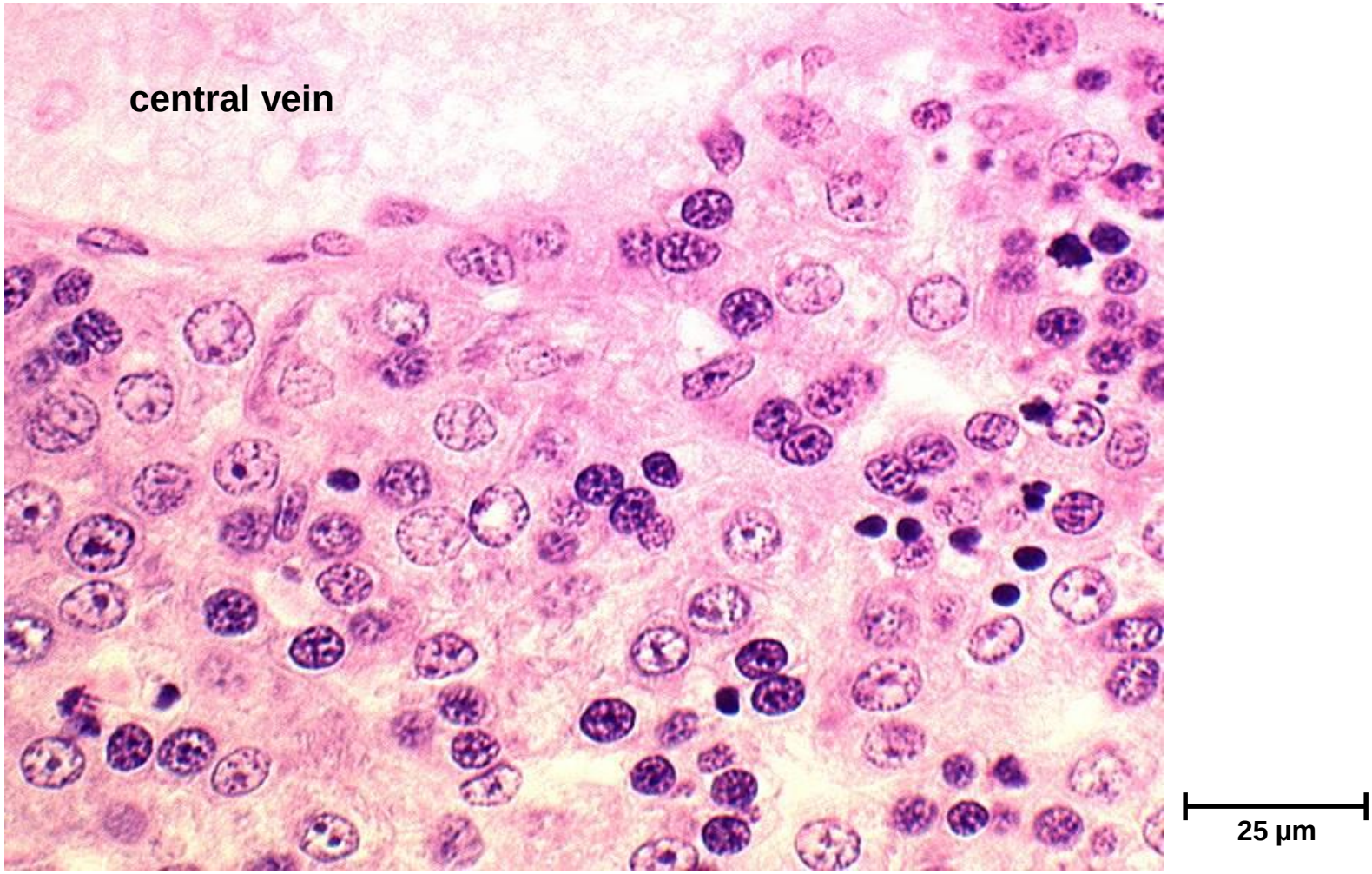


C : central vein

100 µm

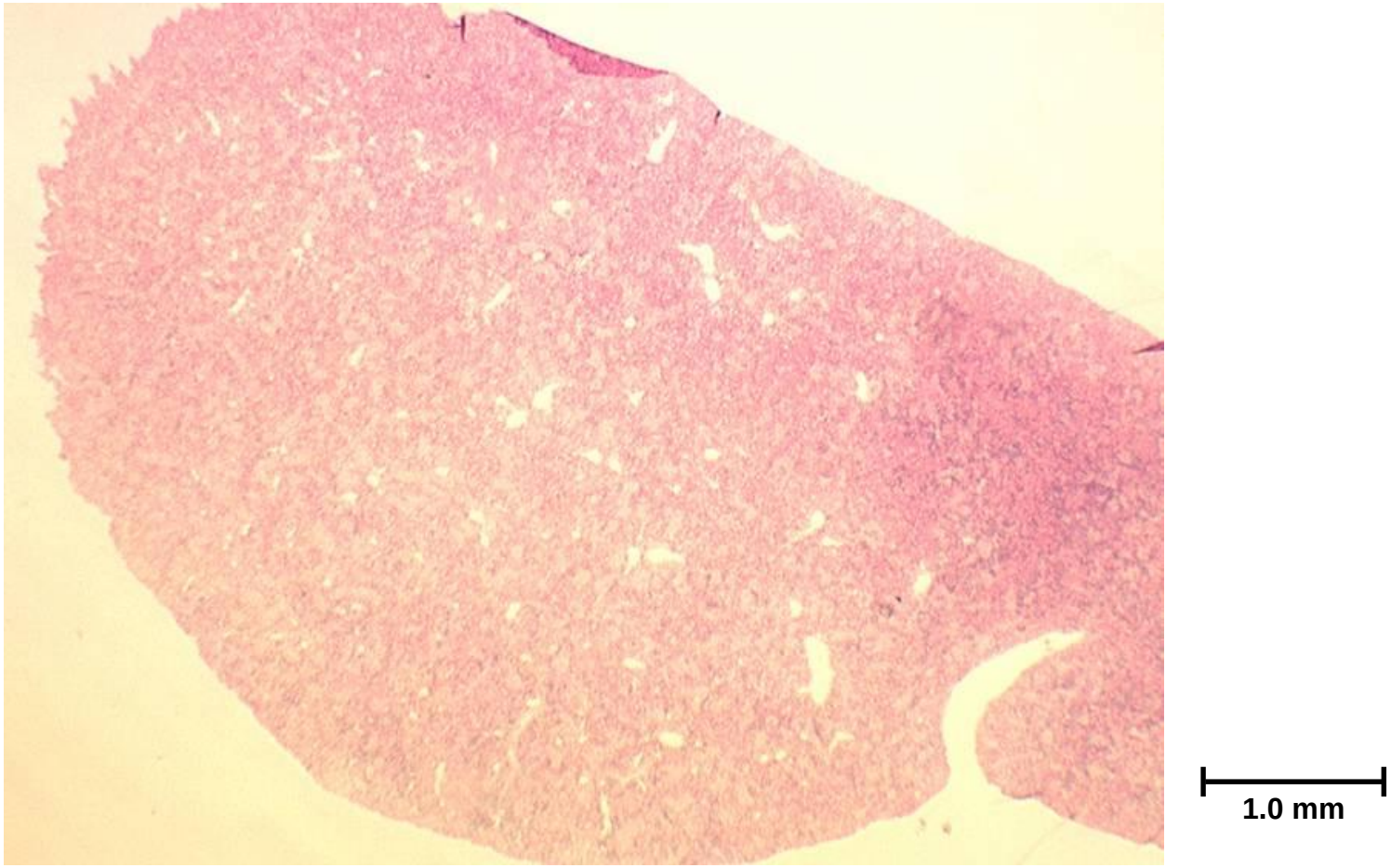
Foetal liver Haemopoiesis

Haemopoietic tissue in the foetal liver.



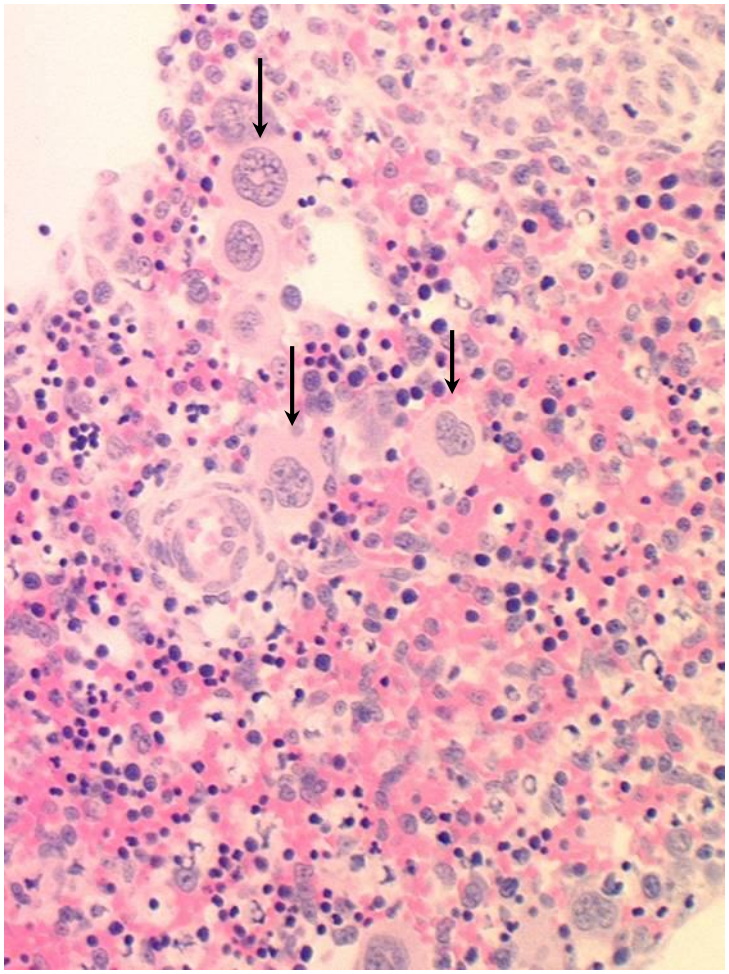
Foetal spleen Haemopoiesis

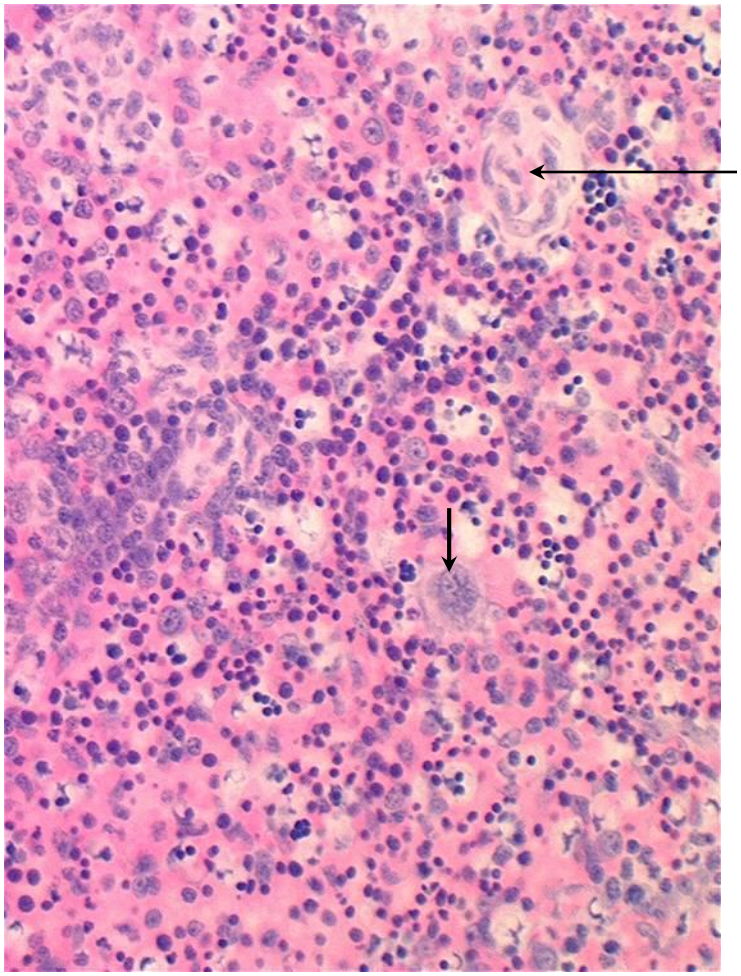
General low magnification view of slide.



Foetal spleen Haemopoiesis

Again the giant megakaryocytes (arrowed) are the most prominent cells.





Foetal spleen Haemopoiesis

Maturing cells become more recognisable as lobed nuclei develop or cytoplasmic granules with specific staining characteristics appear.