Pathology lab 1

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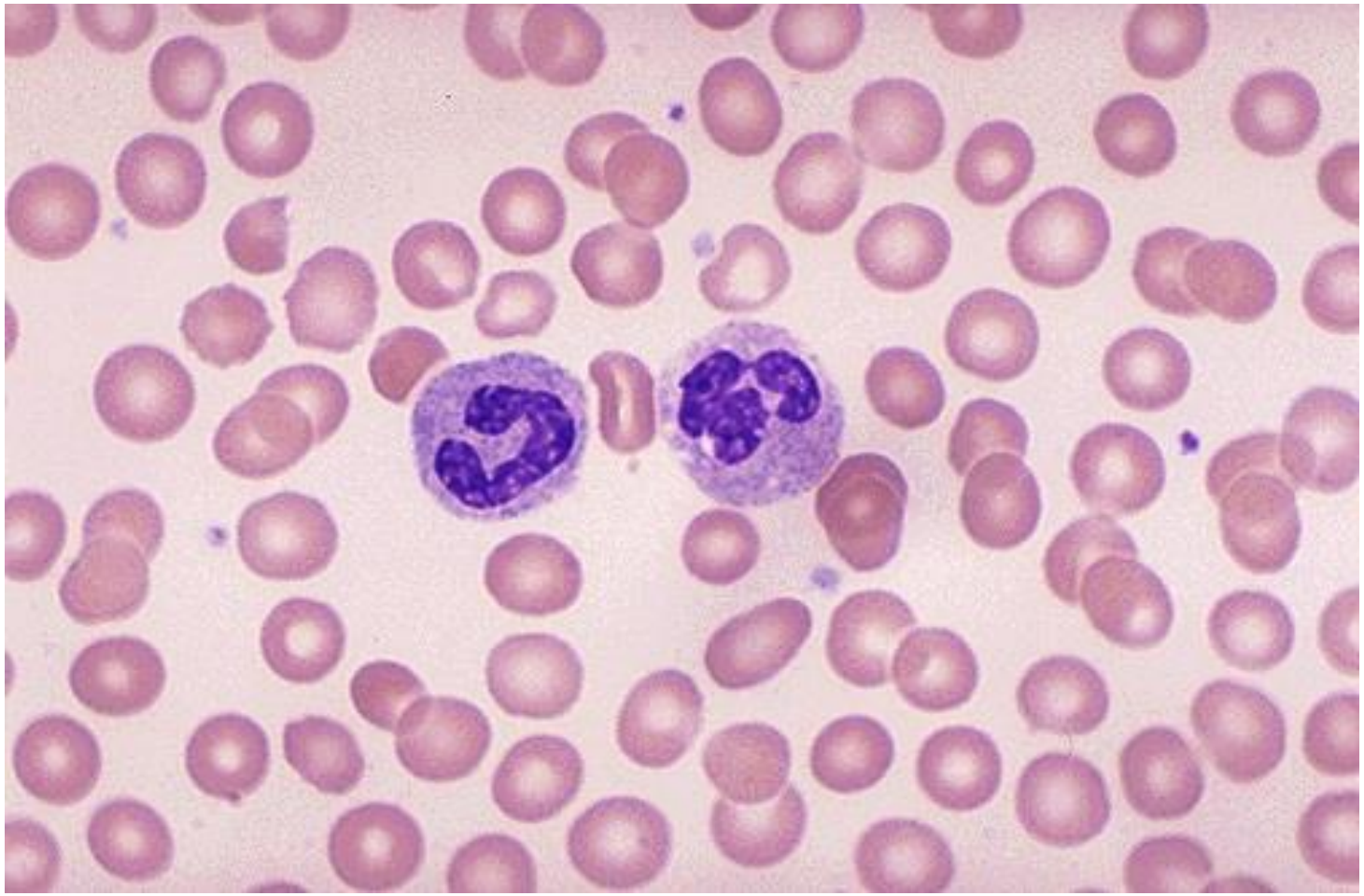
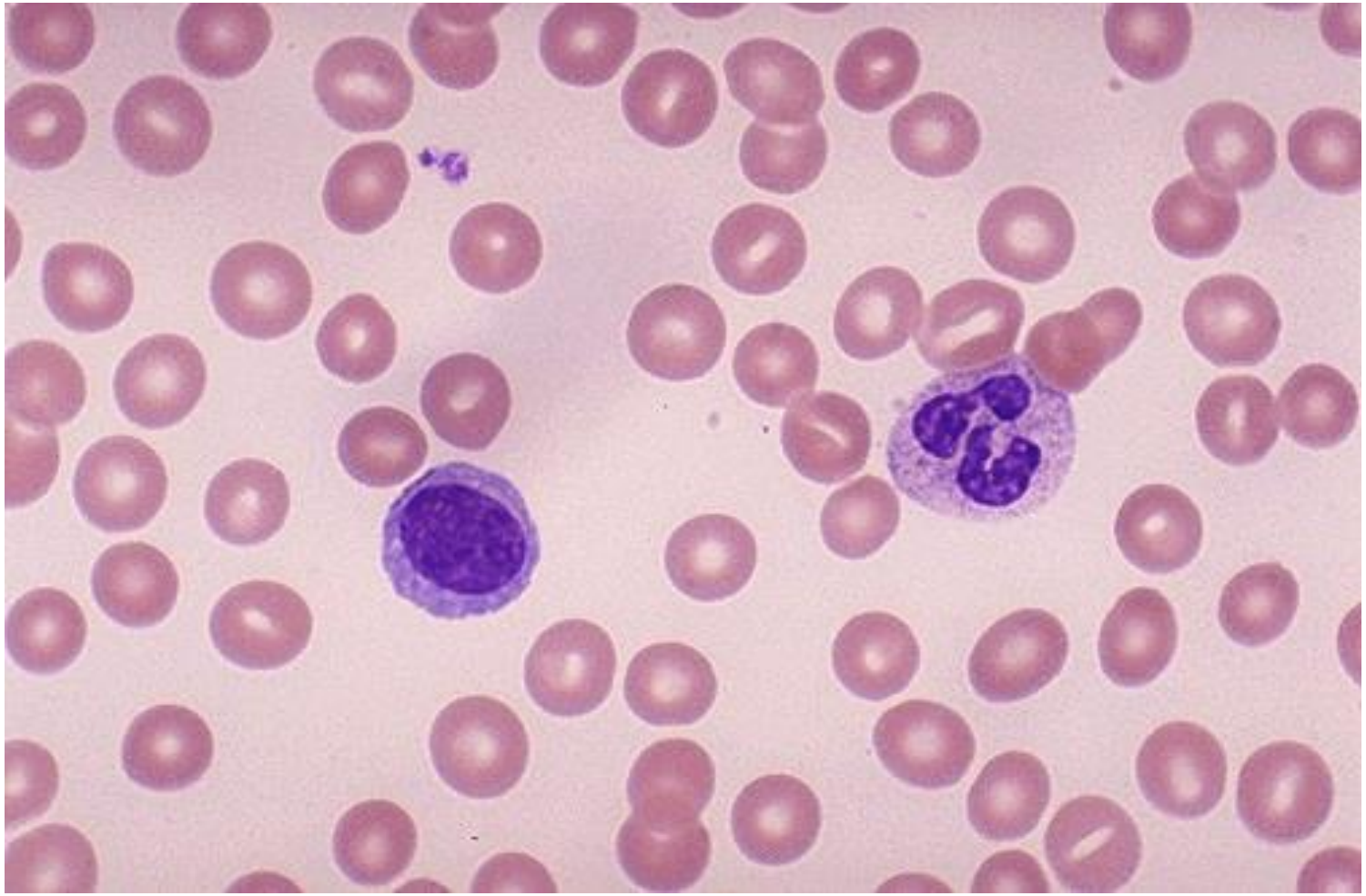
Normal Peripheral blood

The red blood cells here are normal, happy RBC's. They have a **zone of central pallor** about 1/3 the size of the RBC. The RBC's demonstrate minimal variation in size (anisocytosis) and shape (poikilocytosis). A few small fuzzy blue **platelets** are seen. In the center of the field are a **band neutrophil** on the left and a **segmented neutrophil** on the right.

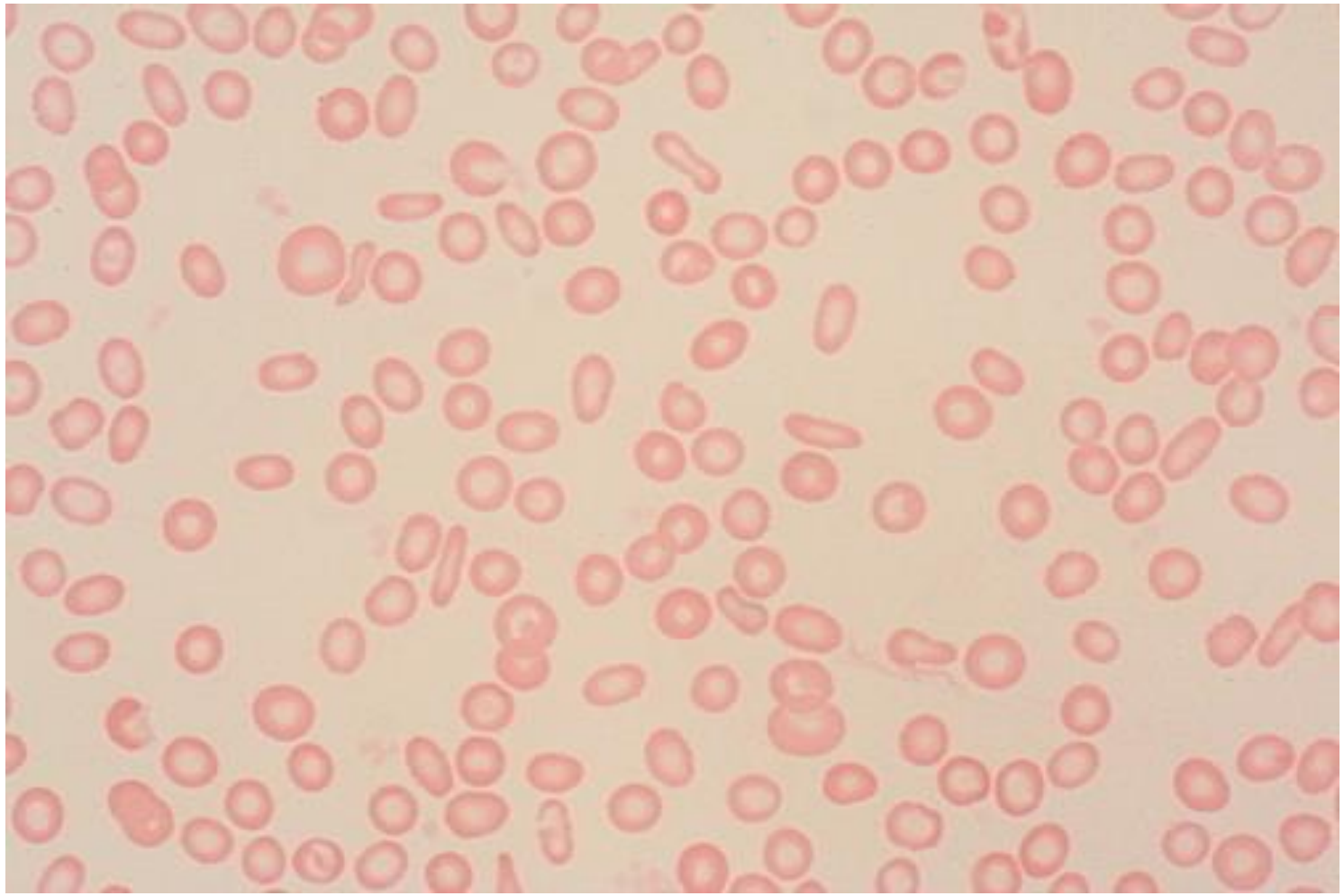


A normal mature lymphocyte with a single large nucleus is seen on the left, compared to a segmented neutrophil on the right with multiple nuclear lobes, along with cytoplasmic granules. An RBC is seen to be about 2/3 the size of a normal lymphocyte.

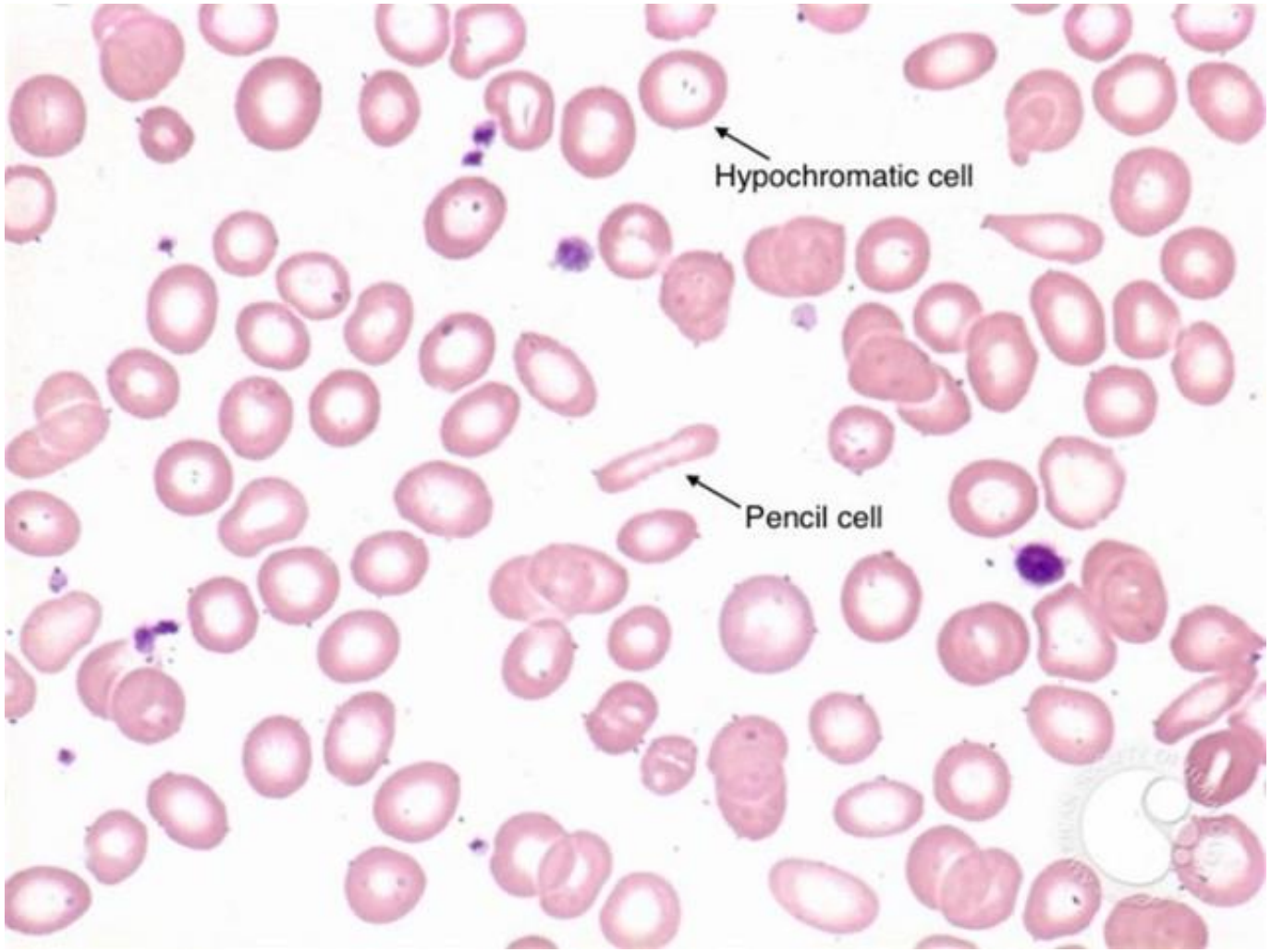


RBC disorders

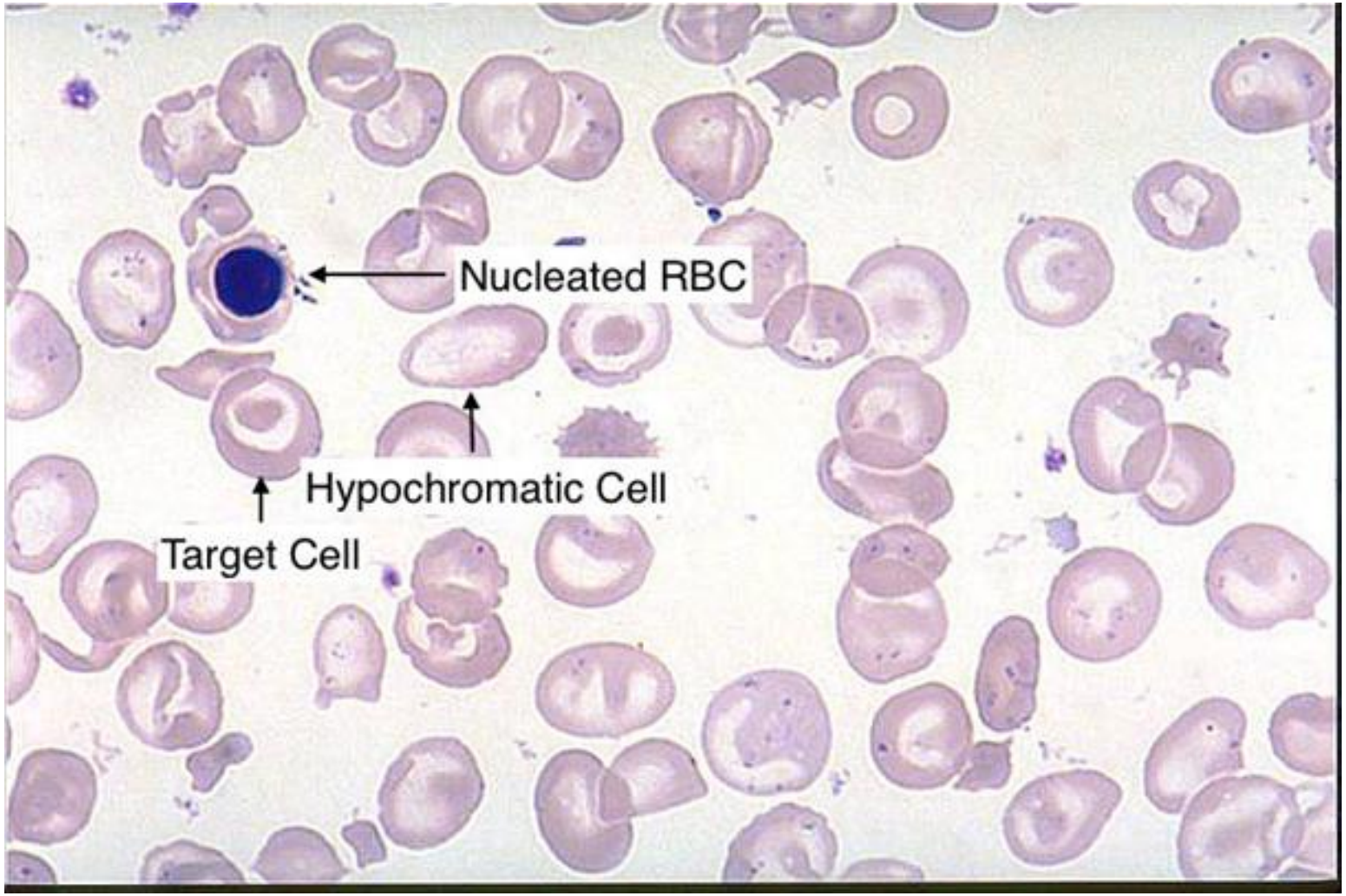
The RBC's here appear smaller than normal and have an increased zone of central pallor. This is indicative of a **hypochromic** (less hemoglobin in each RBC) and **microcytic** (smaller size of each RBC) anemia. There is also increased anisocytosis (variation in RBC size) and poikilocytosis (variation in RBC shape).



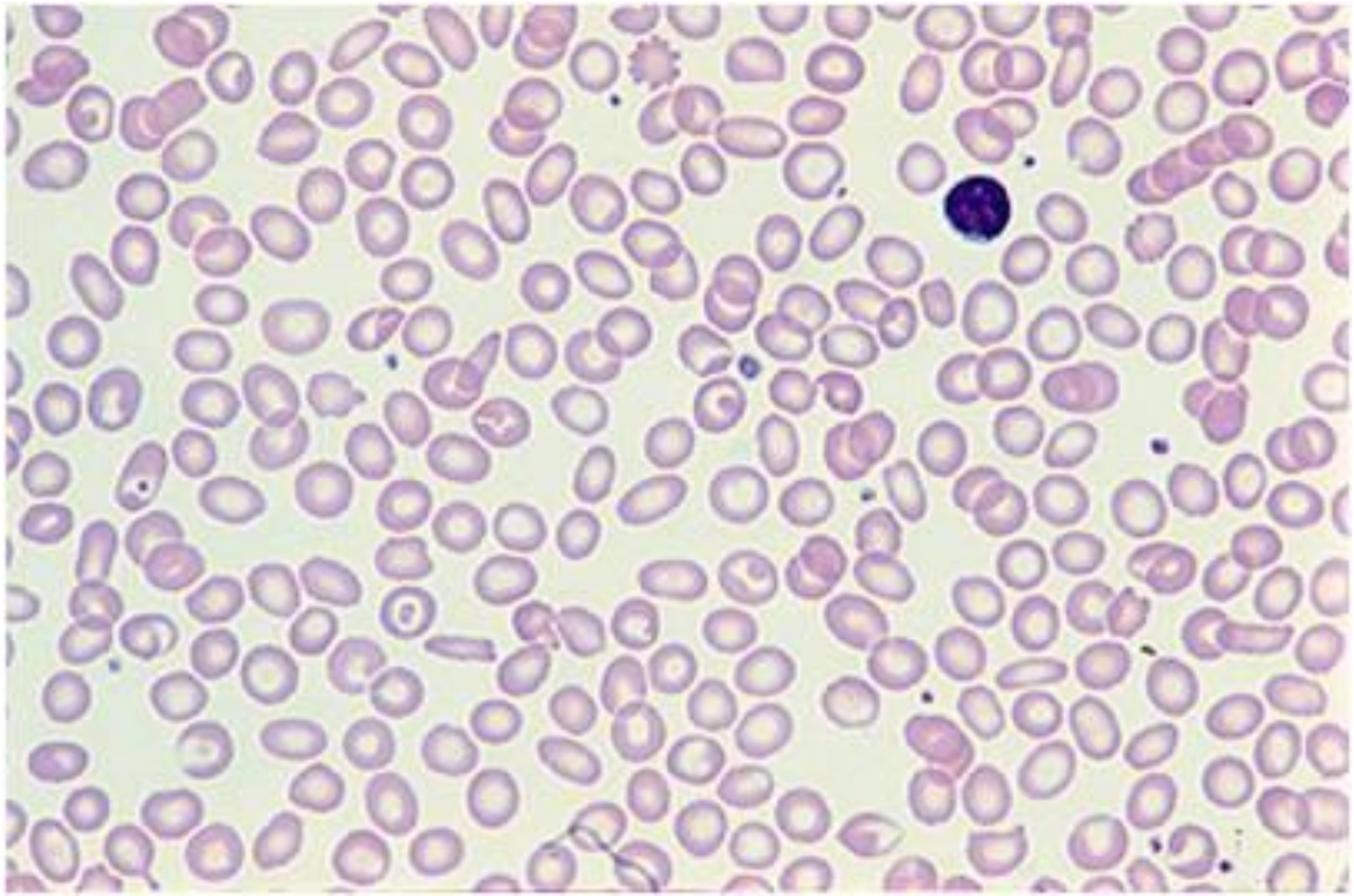
Iron deficiency anemia



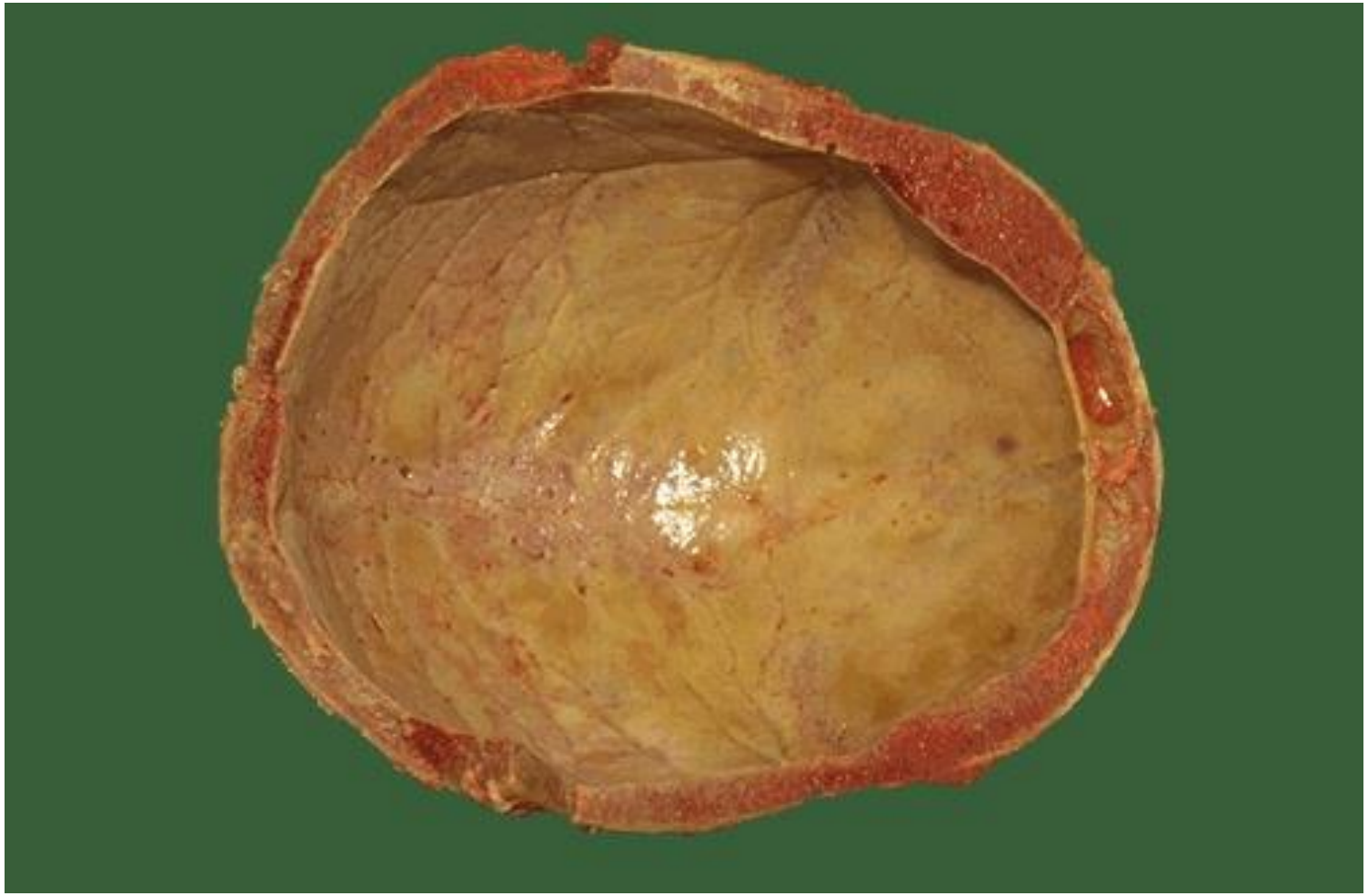
Thalassemia

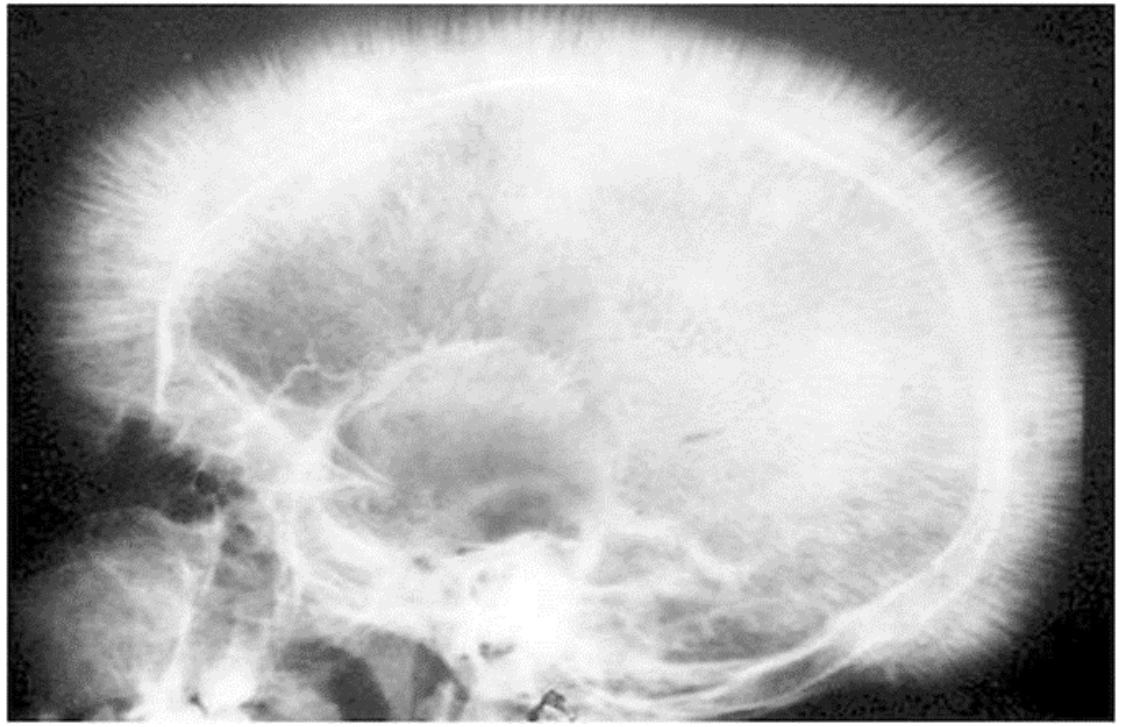


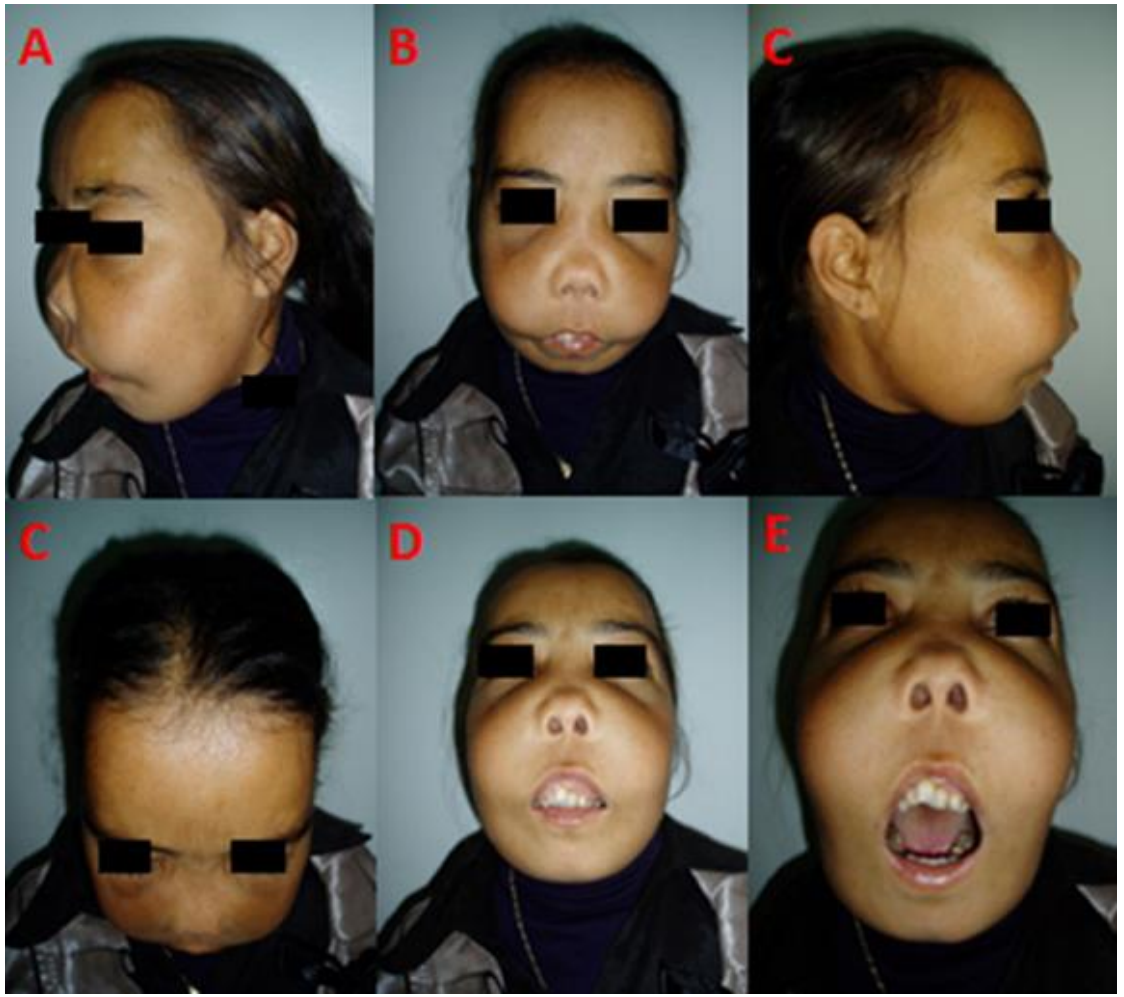
Thalassemia



Severe, chronic anemias (**such as thalassemias and sickle cell anemia**) can increase the bone marrow response to form RBC's. This drive for erythropoiesis may increase the mass of marrow and lead to increase in marrow in places, such as the skull seen here, that is not normally found. Such an increase in marrow in skull may lead to "frontal bossing" or forehead prominence because of the skull shape change.






A
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C
C
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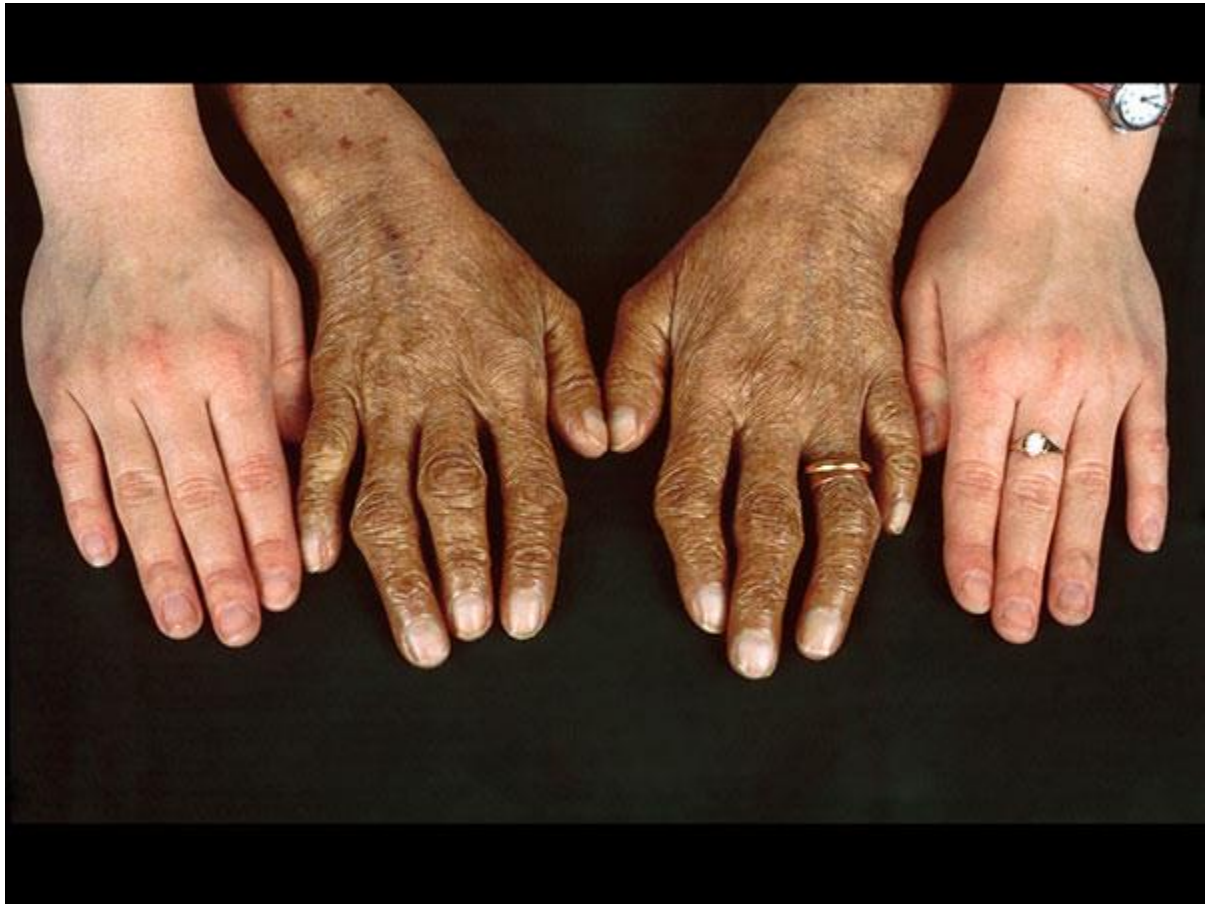
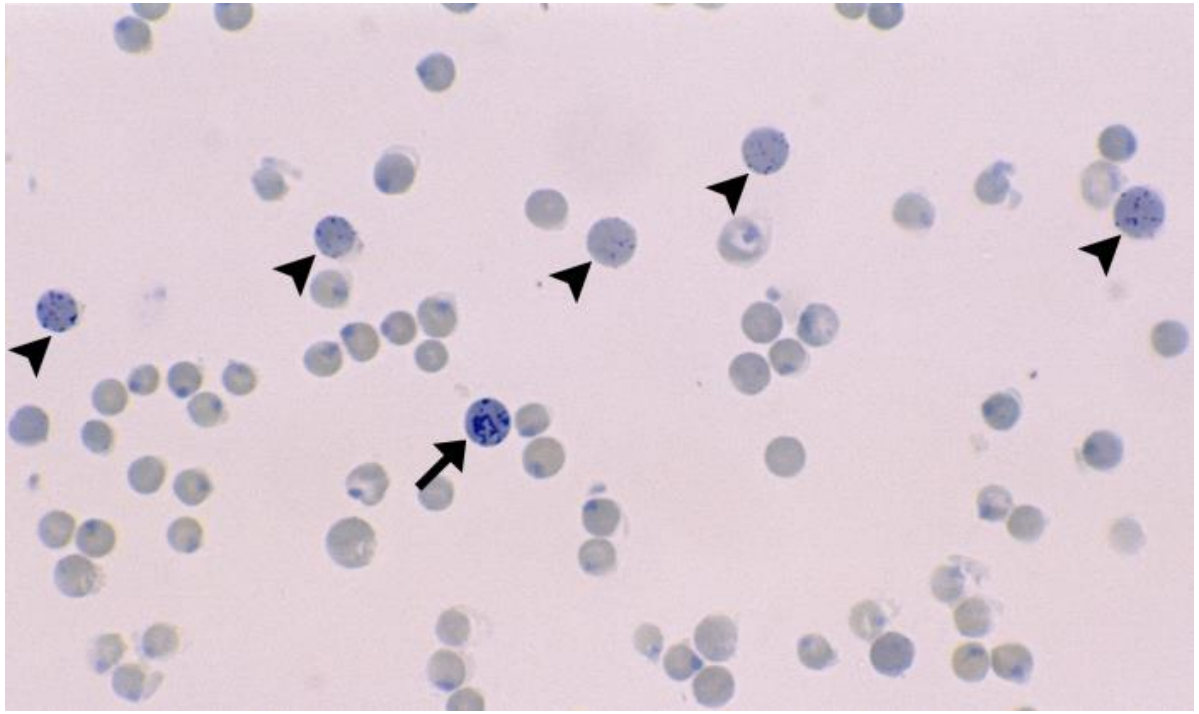
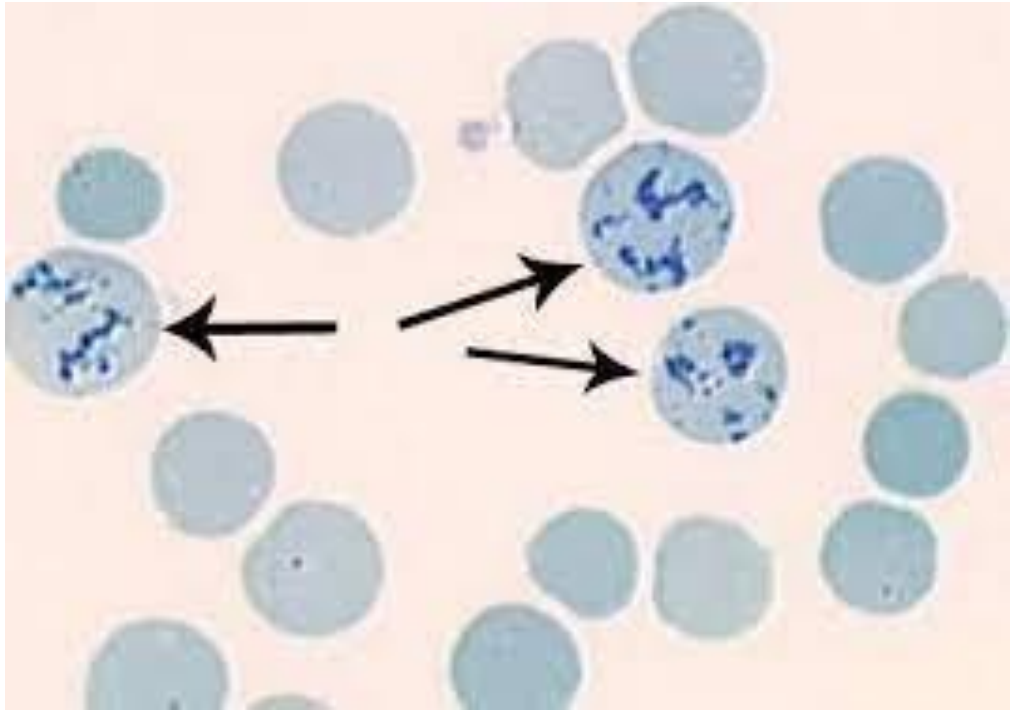
Secondary hemochromatosis in thalassemia major



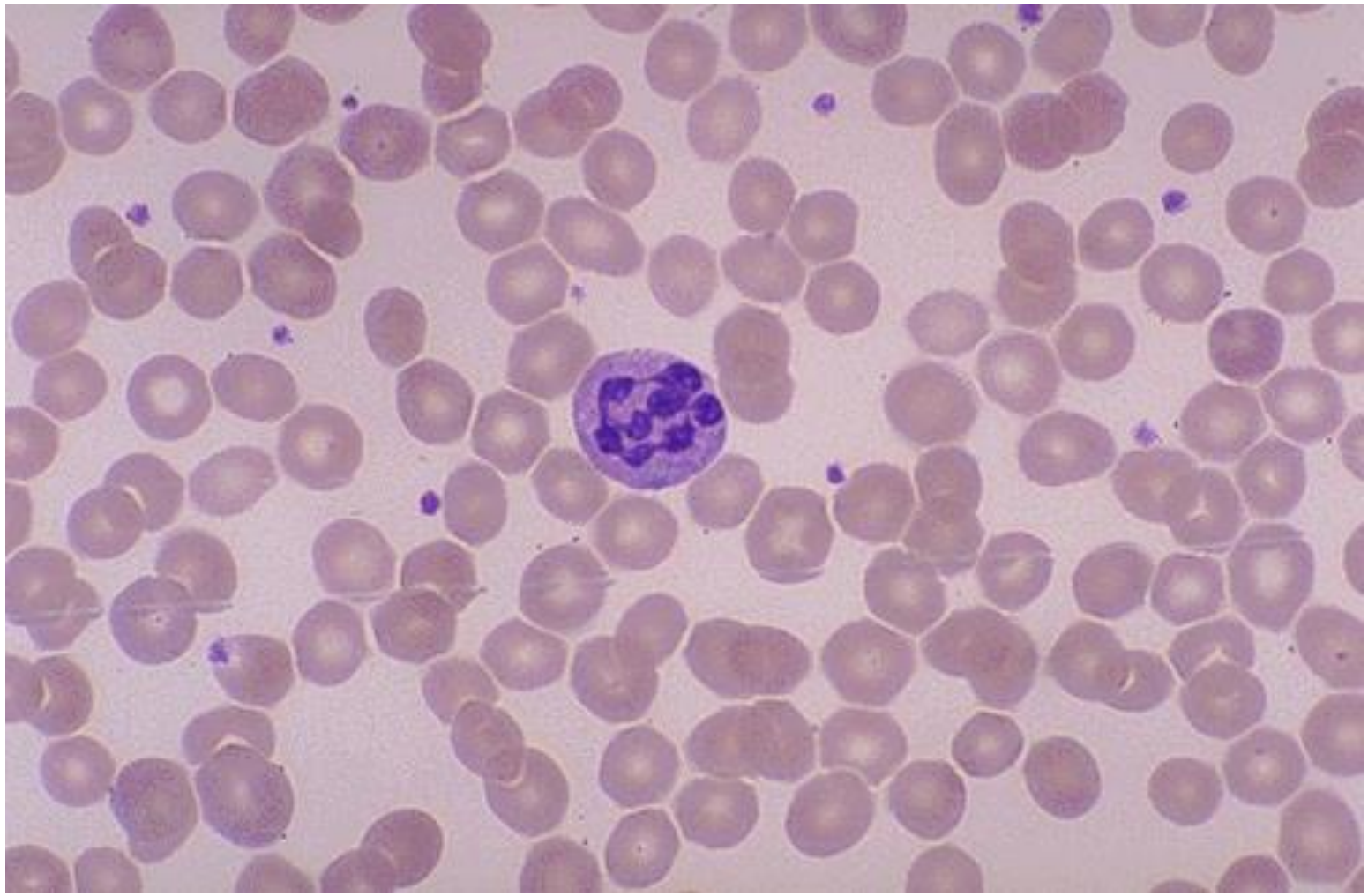
Reticulocytosis



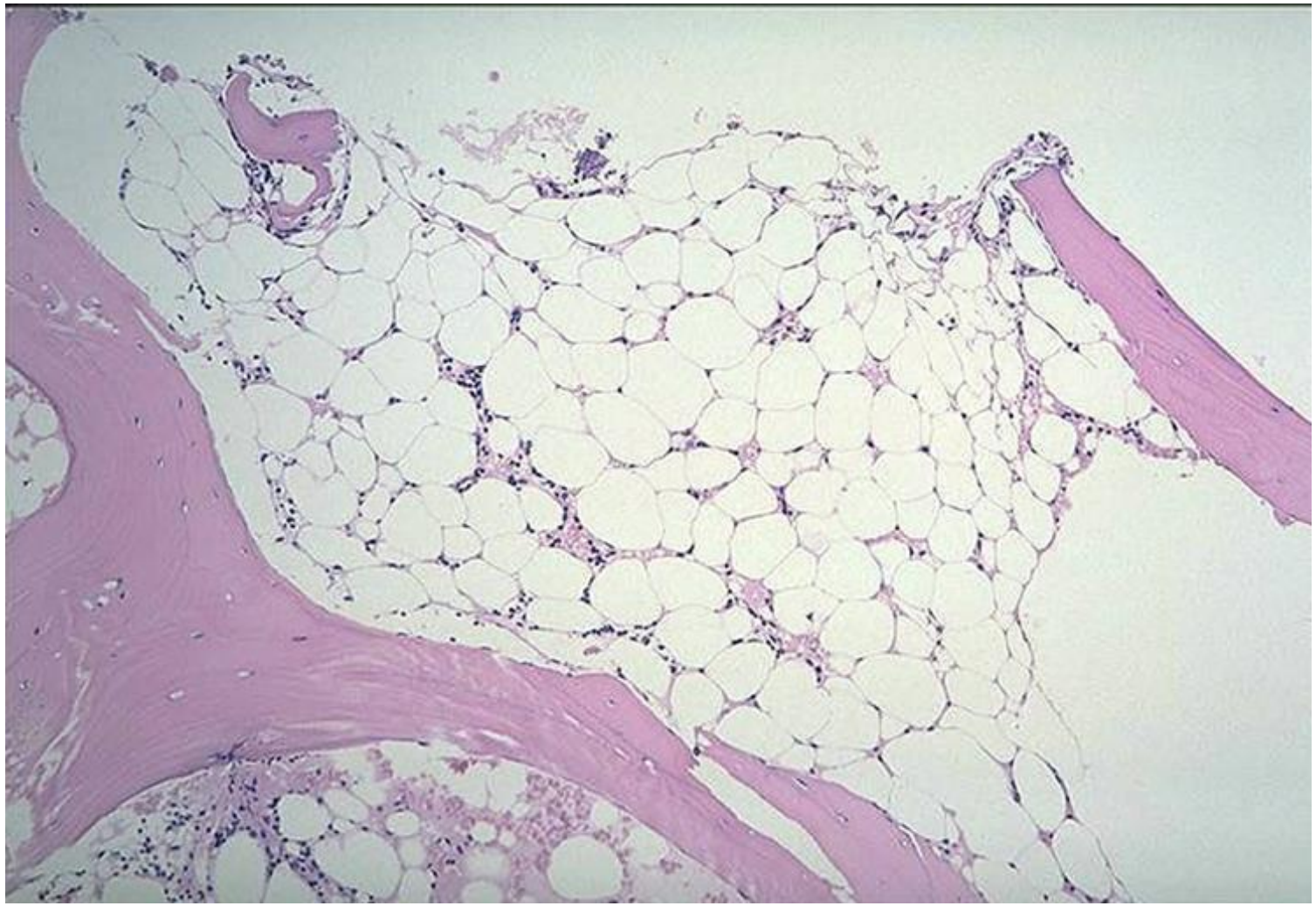


Megaloblastic anemia:

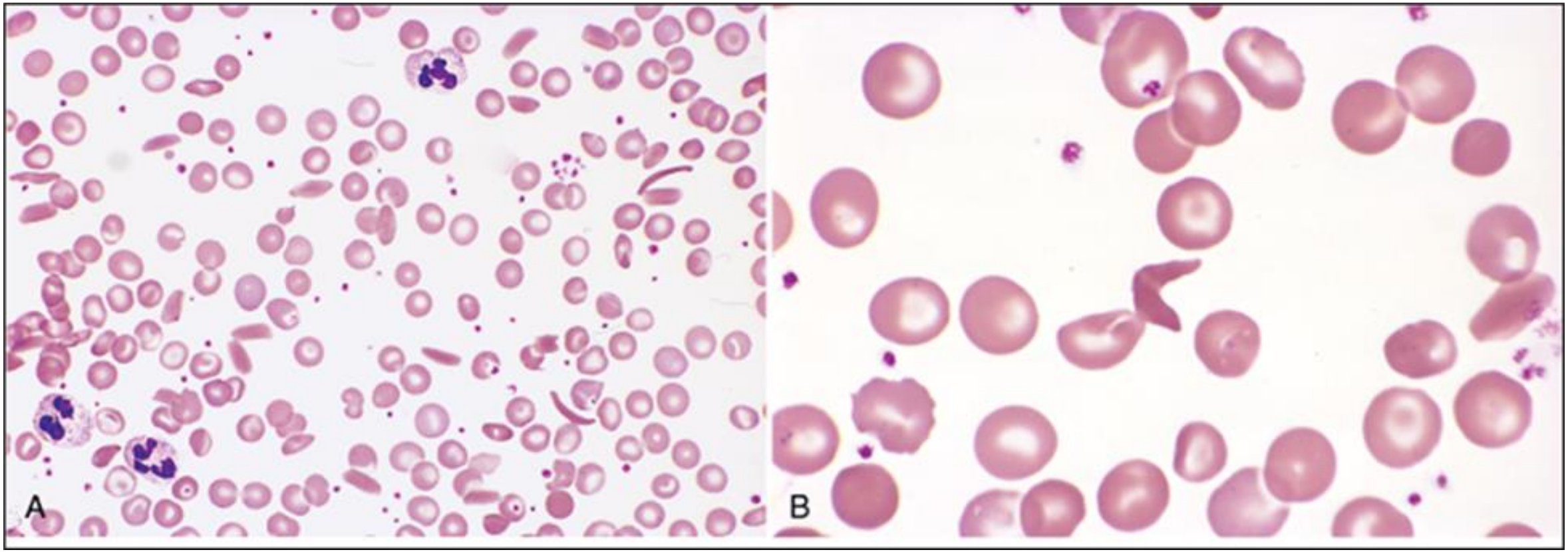
Here is a hypersegmented neutrophil that is present with megaloblastic anemias. There are 8 lobes instead of the usual 3 or 4. Such anemias can be due to folate or to B12 deficiency. The size of the RBC's is also increased (macrocytosis, which is hard to appreciate in a blood smear).



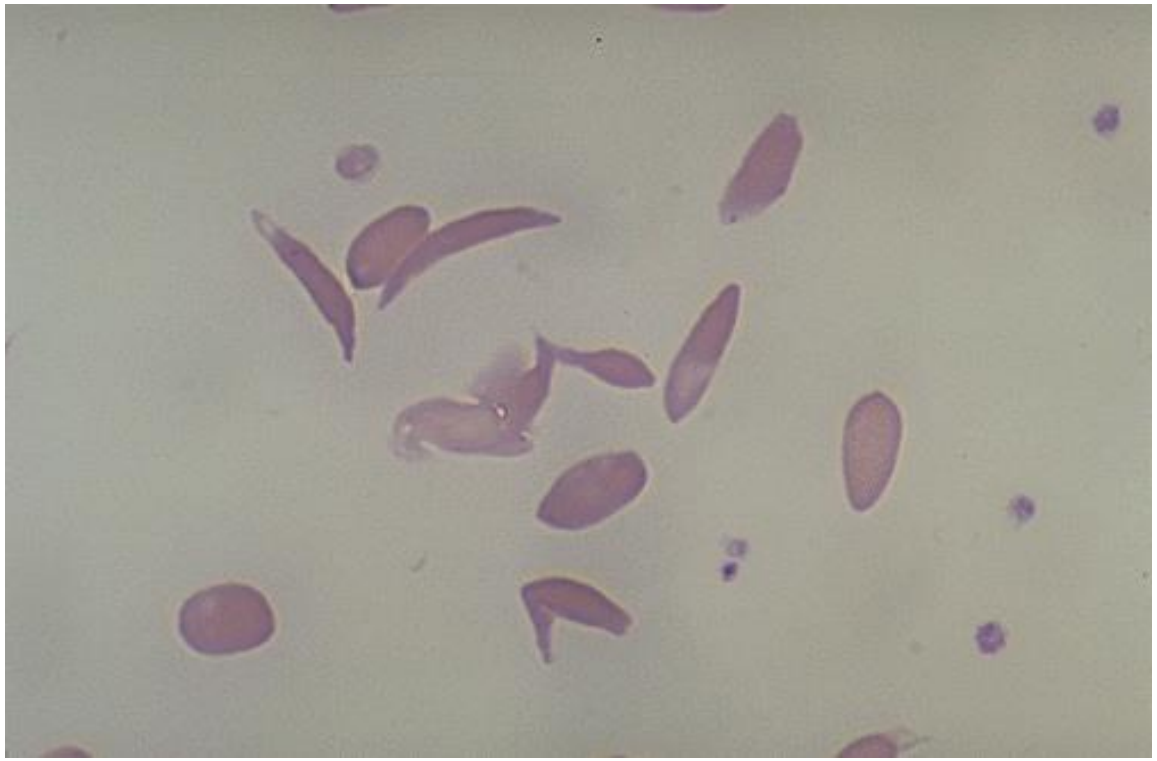
Aplastic anemia

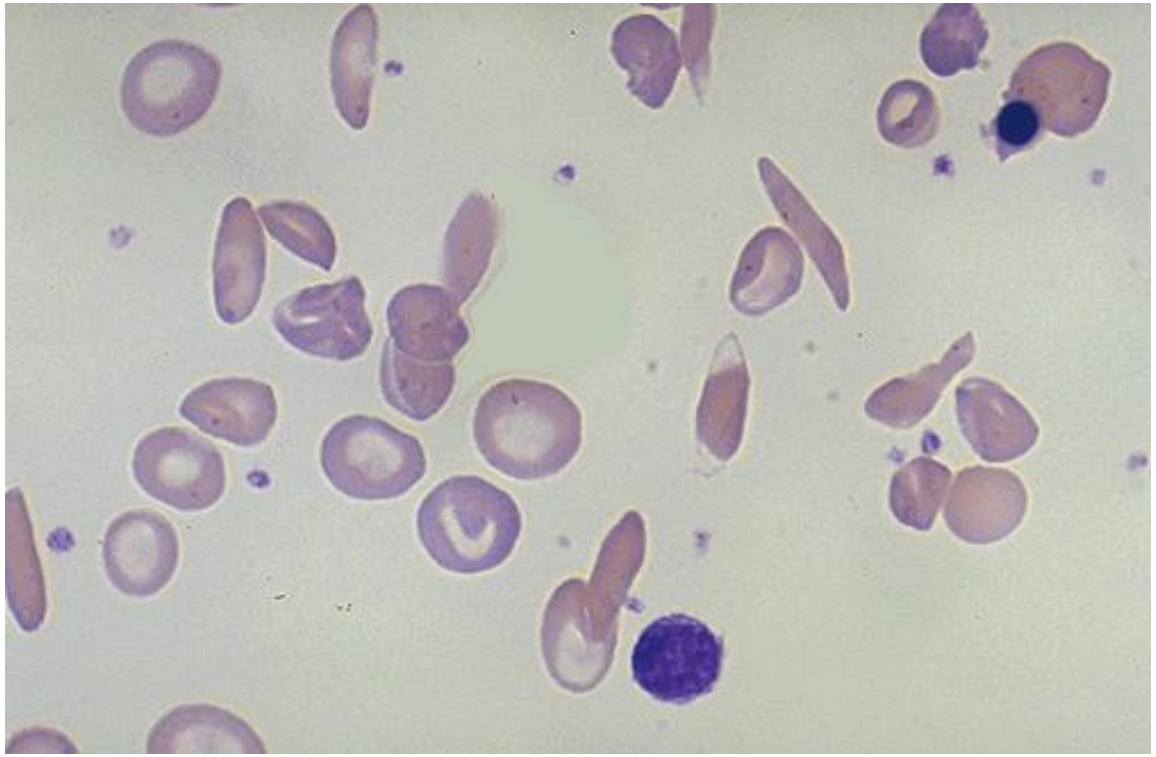


Sickle cell anemia



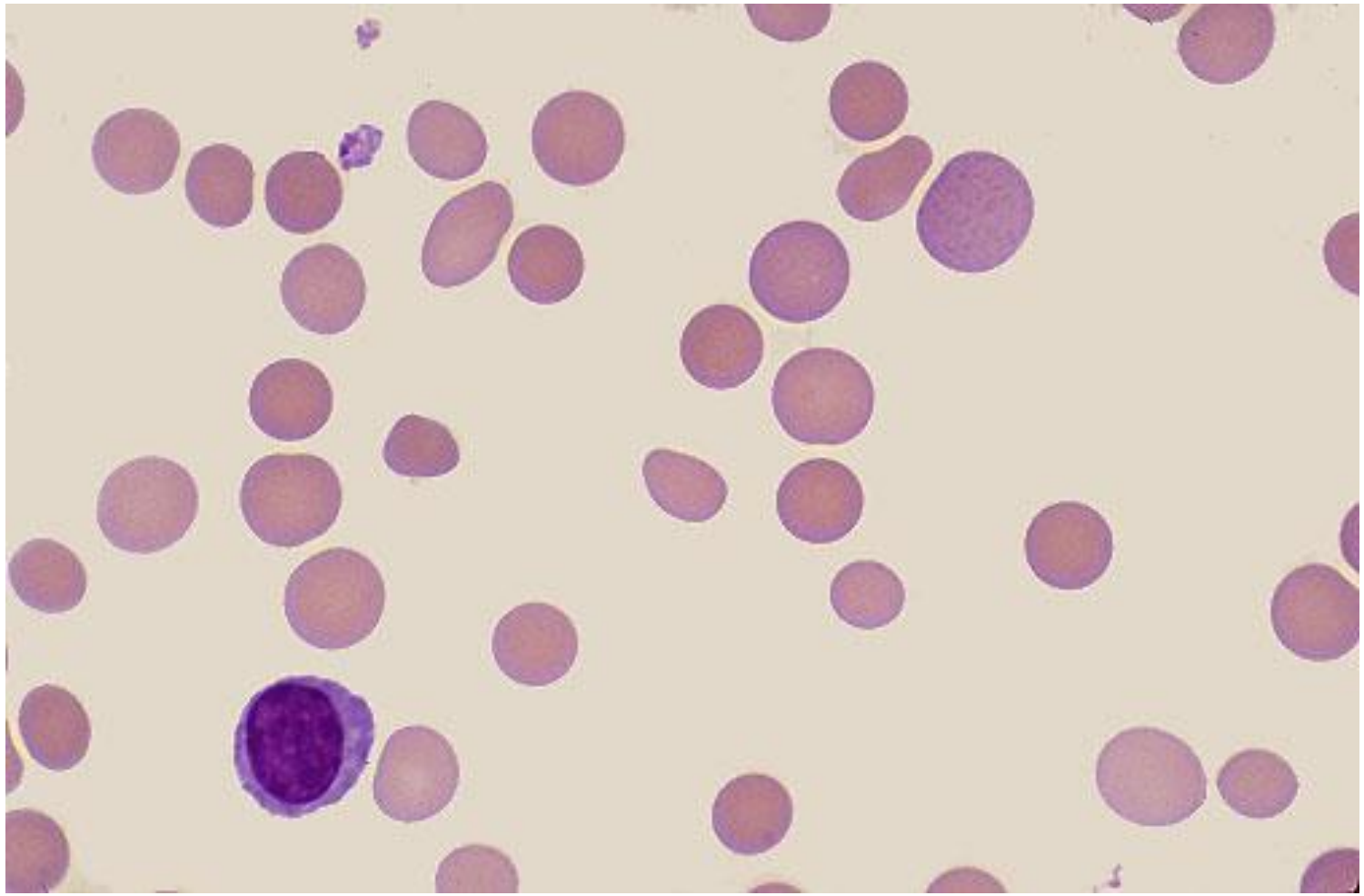
Sickle cell disease



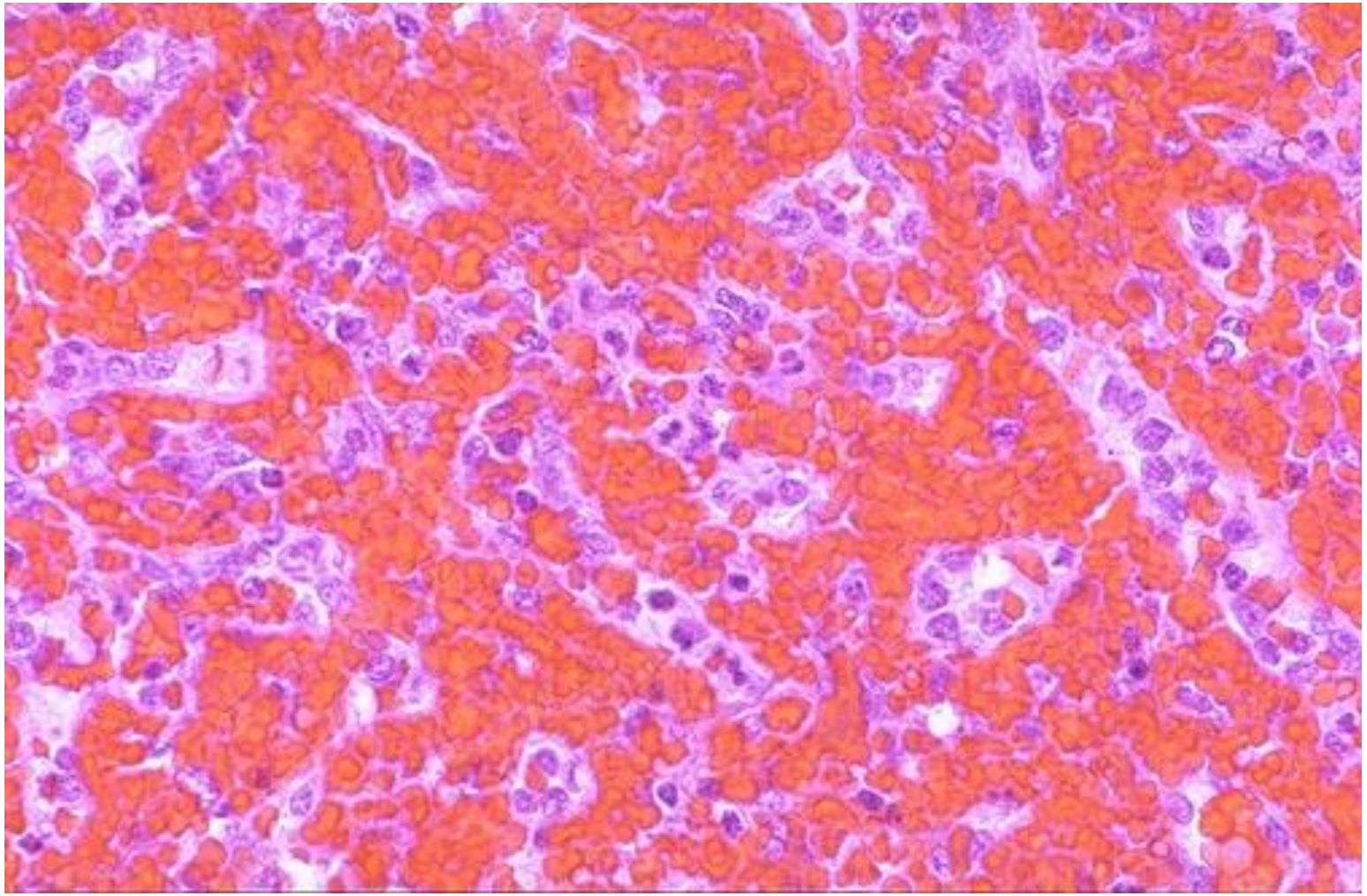


Though in early childhood the spleen may be enlarged with **sickle cell anemia**, continual stasis and trapping of abnormal RBC's leads to infarctions that eventually reduce the size of the spleen tremendously by adolescence. This is sometimes called "**autosplenectomy**". Seen here is the small remnant of spleen in a patient with sickle cell anemia.

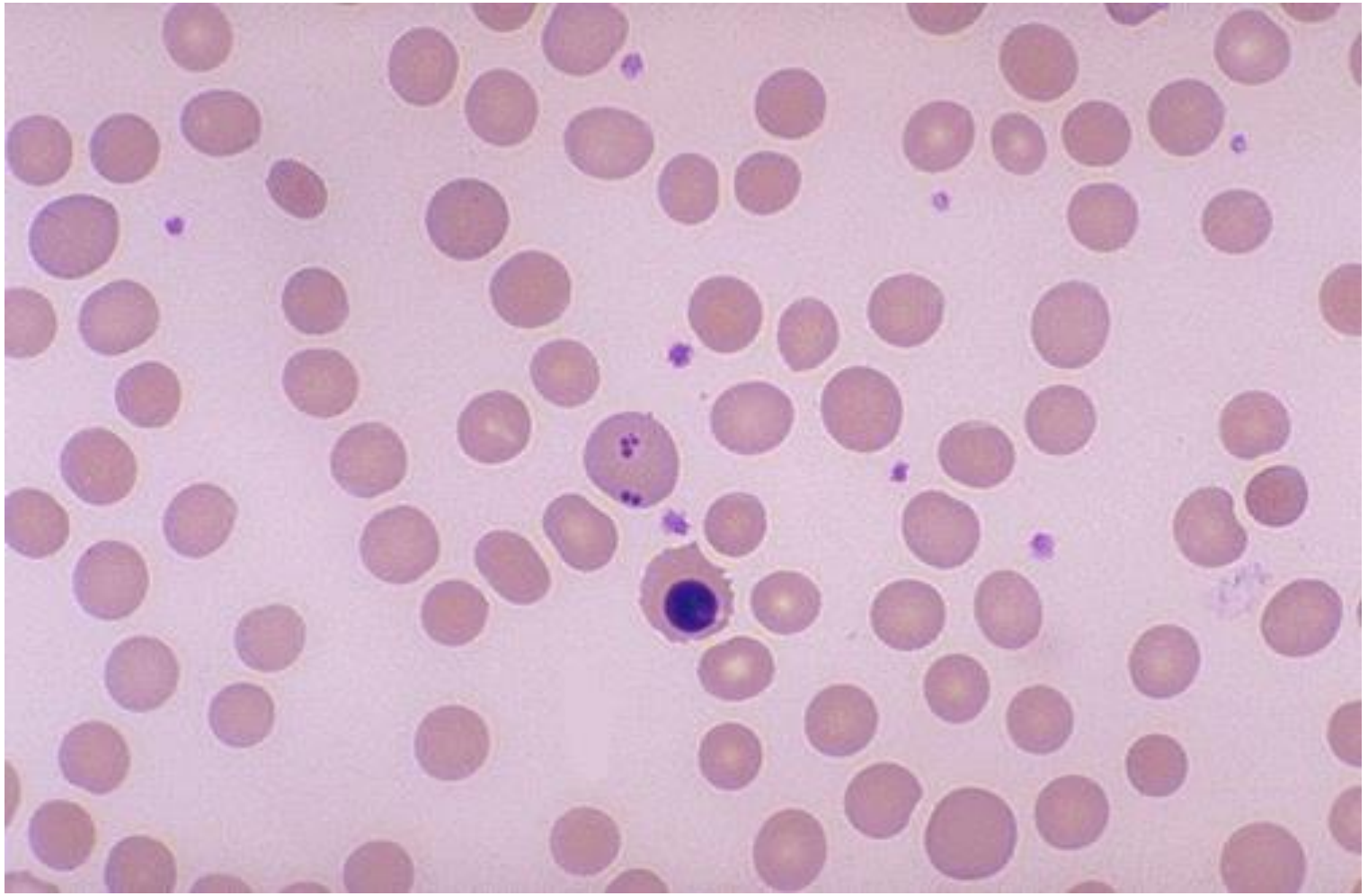
The size of many of these **RBC's is quite small, with lack of the central zone of pallor**. These RBC's are **spherocytes**. In hereditary spherocytosis, there is a lack of spectrin, a key RBC cytoskeletal membrane protein. In the laboratory, this is shown by increased osmotic fragility. The spherocytes do not survive as long as normal RBC's.



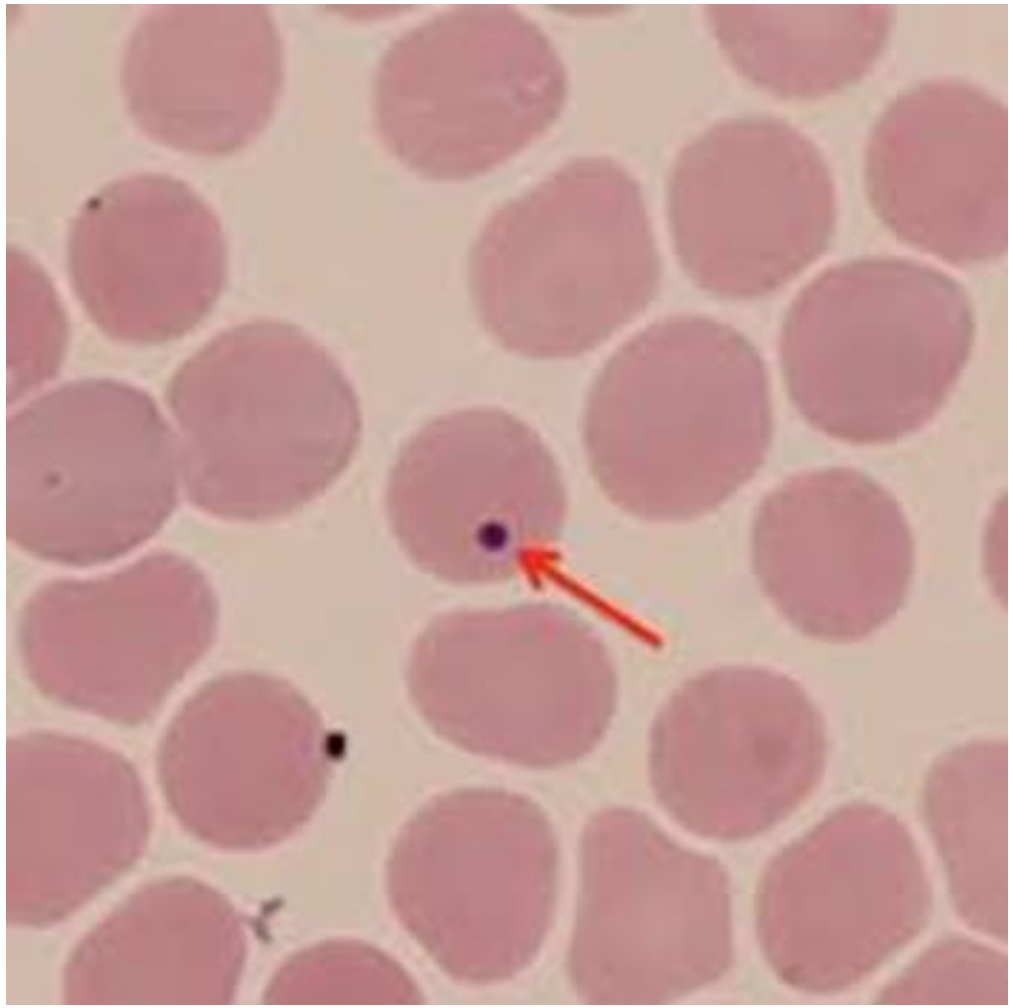
Spleen sinusoids are packed with RBC's in this case of **hereditary spherocytosis**. The osmotic fragility of spherocytes is increased, because the RBC's have decreased surface area per unit volume. The major clinical features are anemia, splenomegaly, and jaundice.



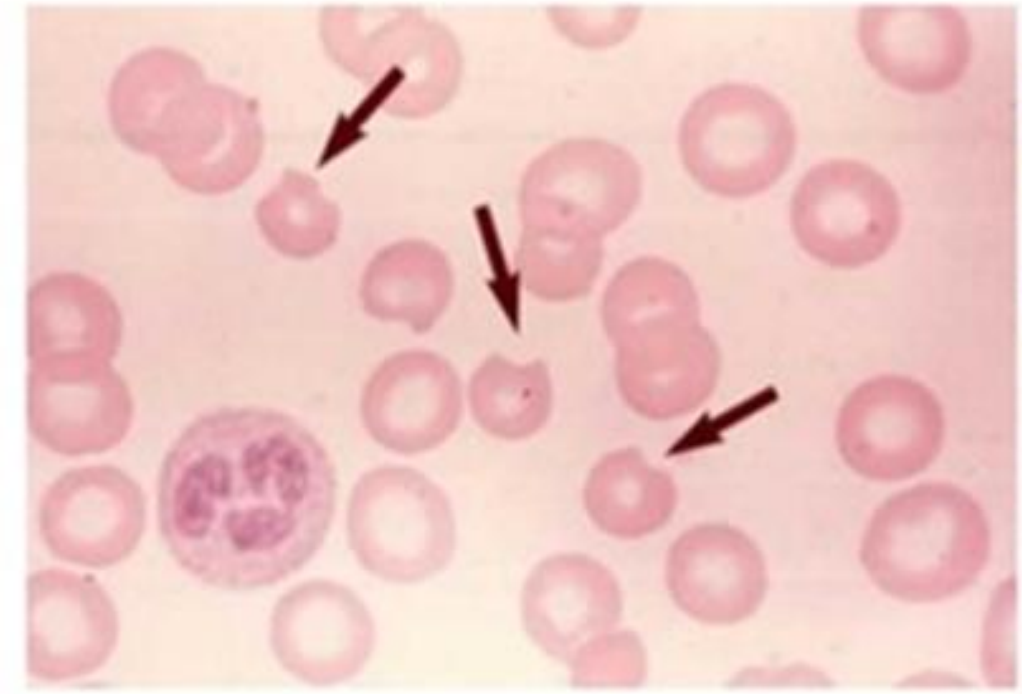
The RBC in the center of the field contains several **Howell-Jolly bodies**, or inclusions of nuclear chromatin remnants. There is also a nucleated RBC just beneath this RBC. Abnormal and aged RBC's are typically removed by the spleen. The appearance of increased poikilocytosis, anisocytosis, and RBC inclusions **suggests that a spleen is not present**.



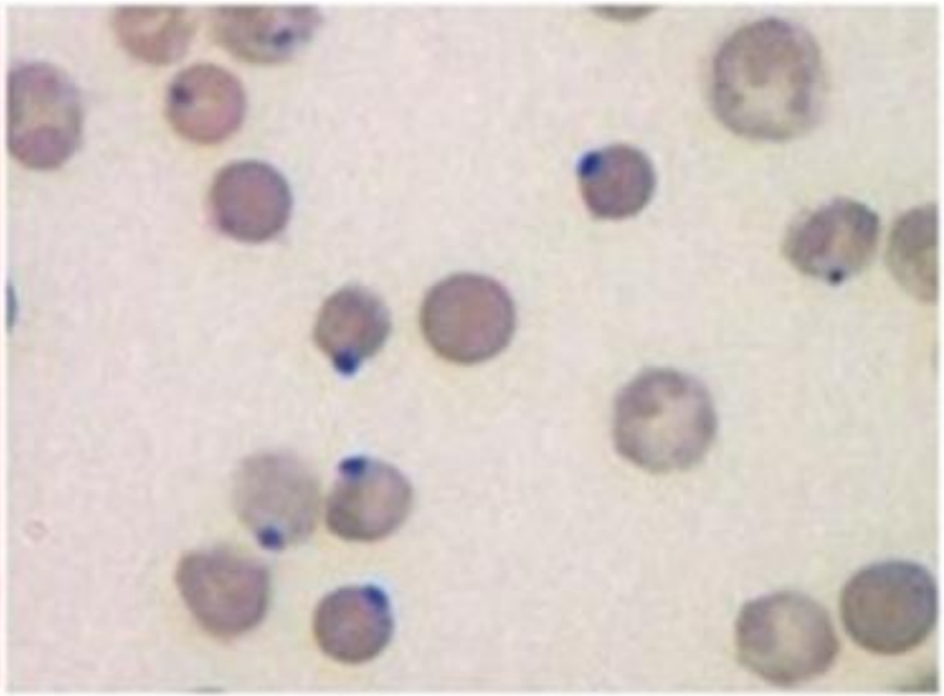
Howell-Jolley body



G6PD Bite cells and Heinz bodies

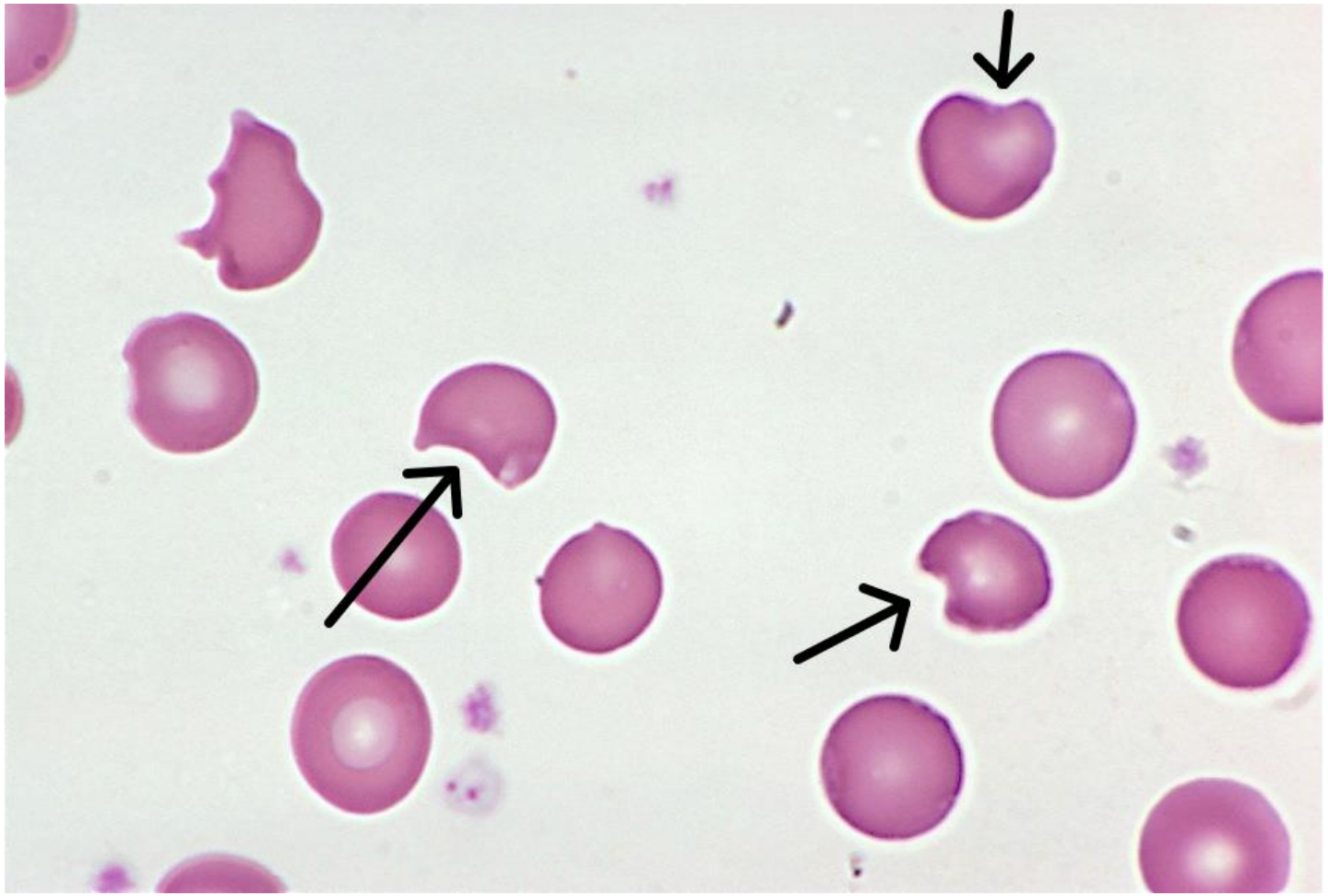


Bite cells

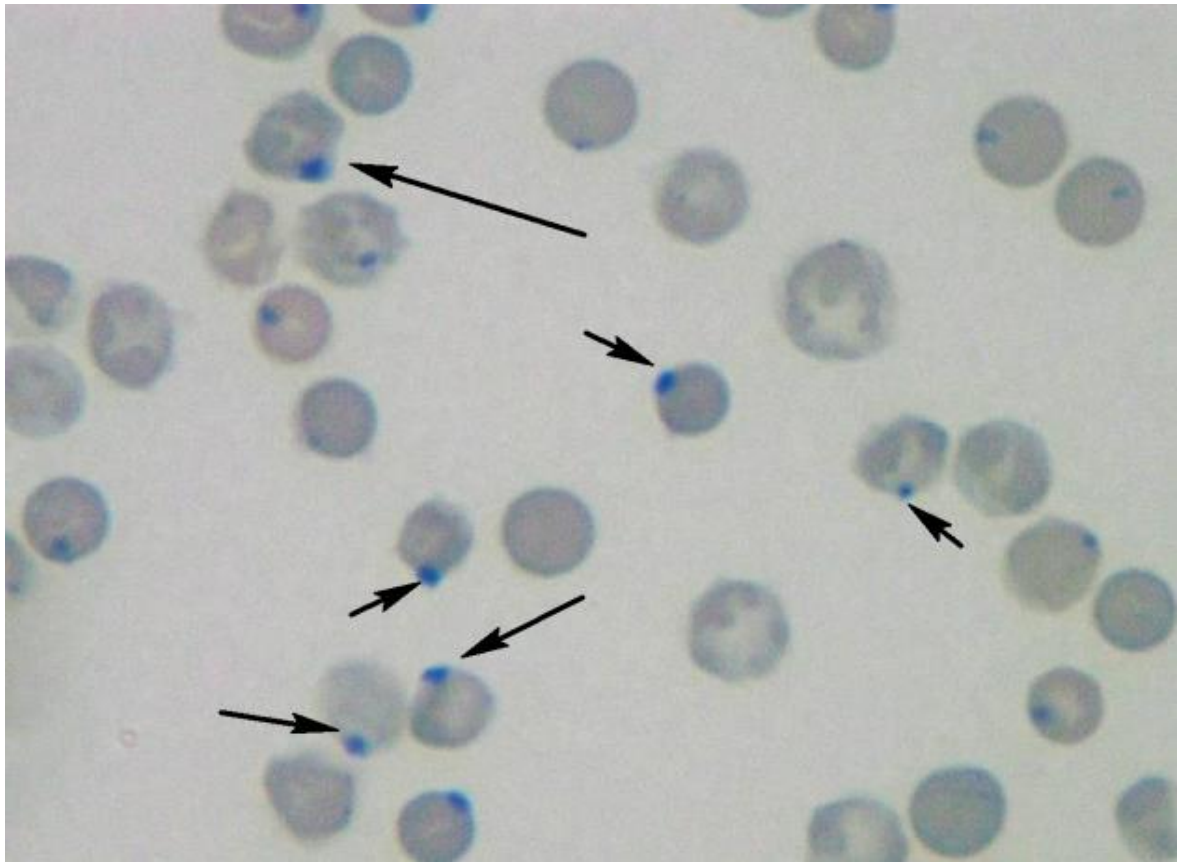


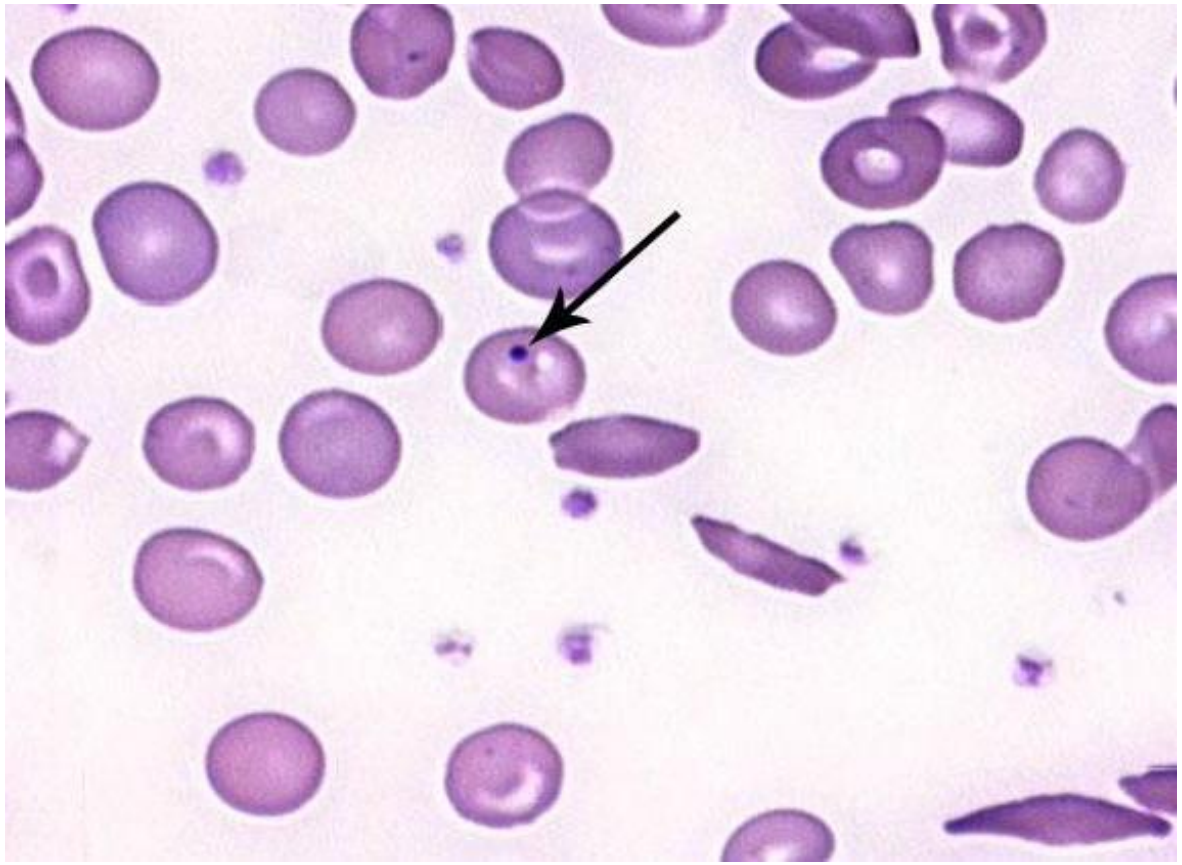
Heinz bodies

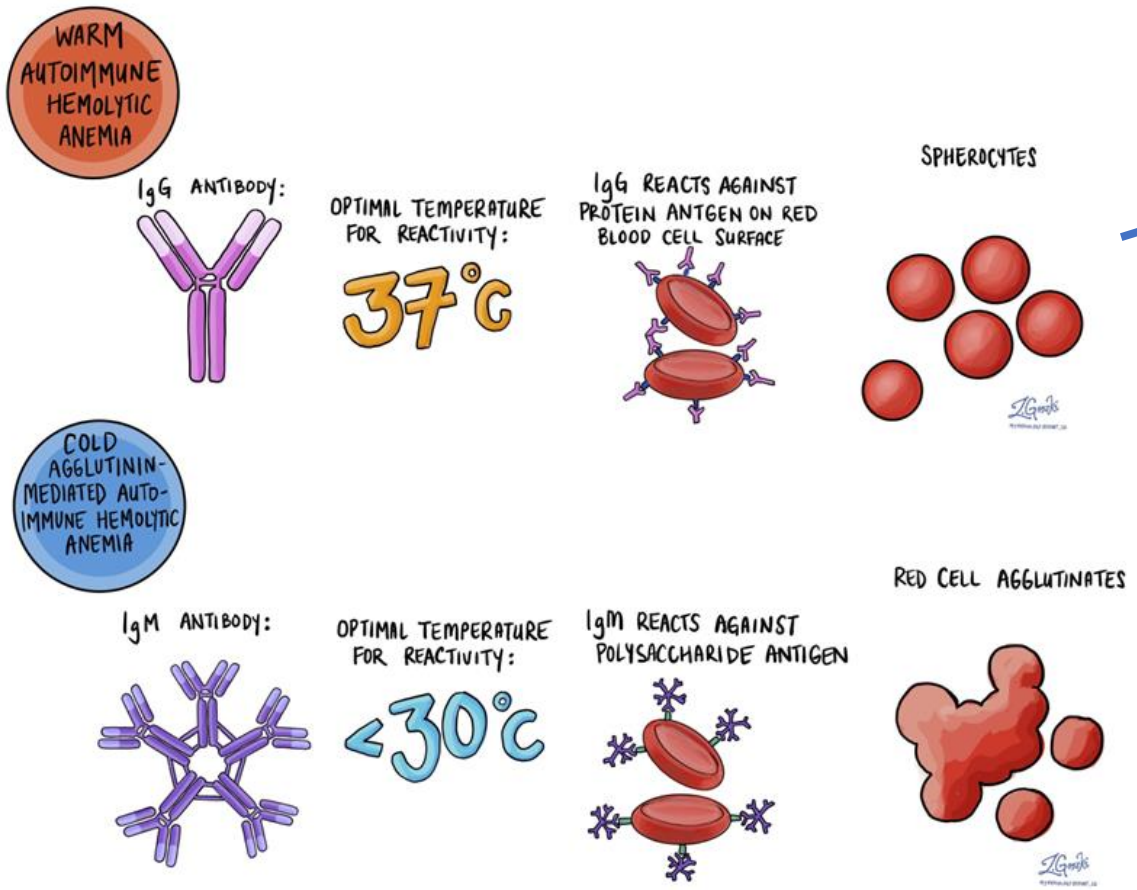
G6PD Bite cells

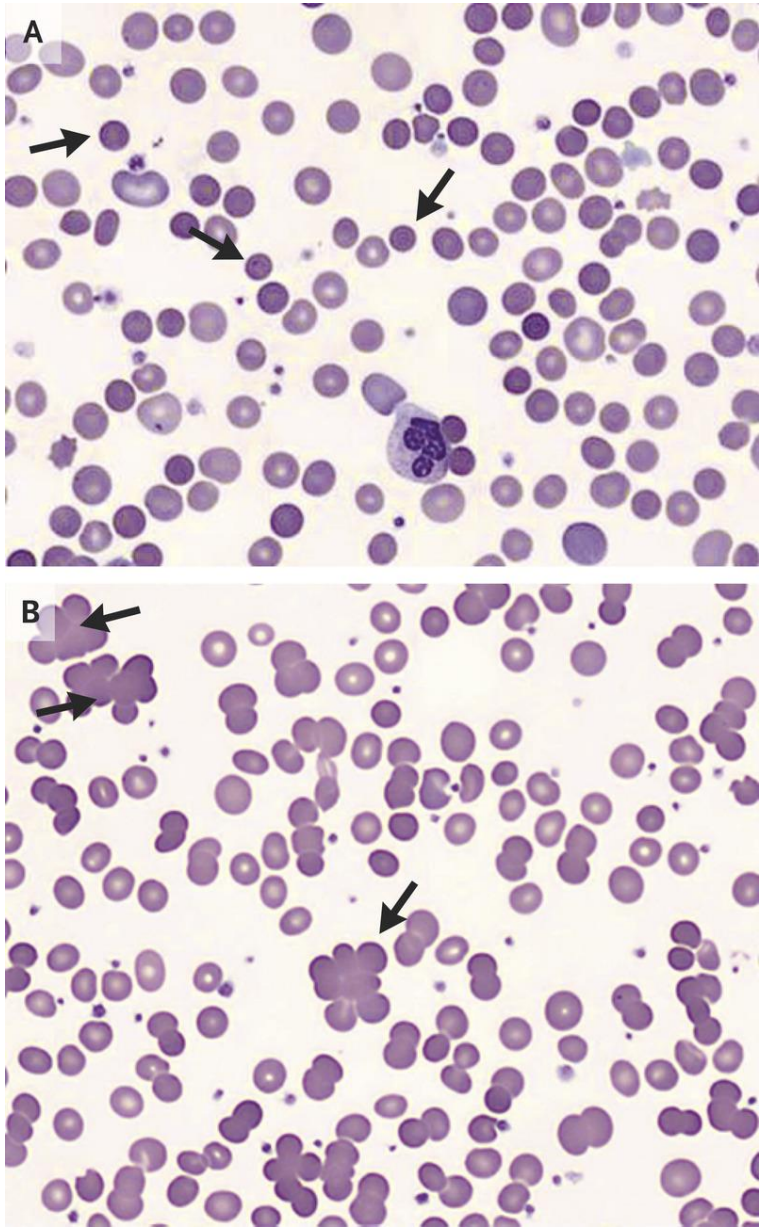


G6PD Heinz bodies

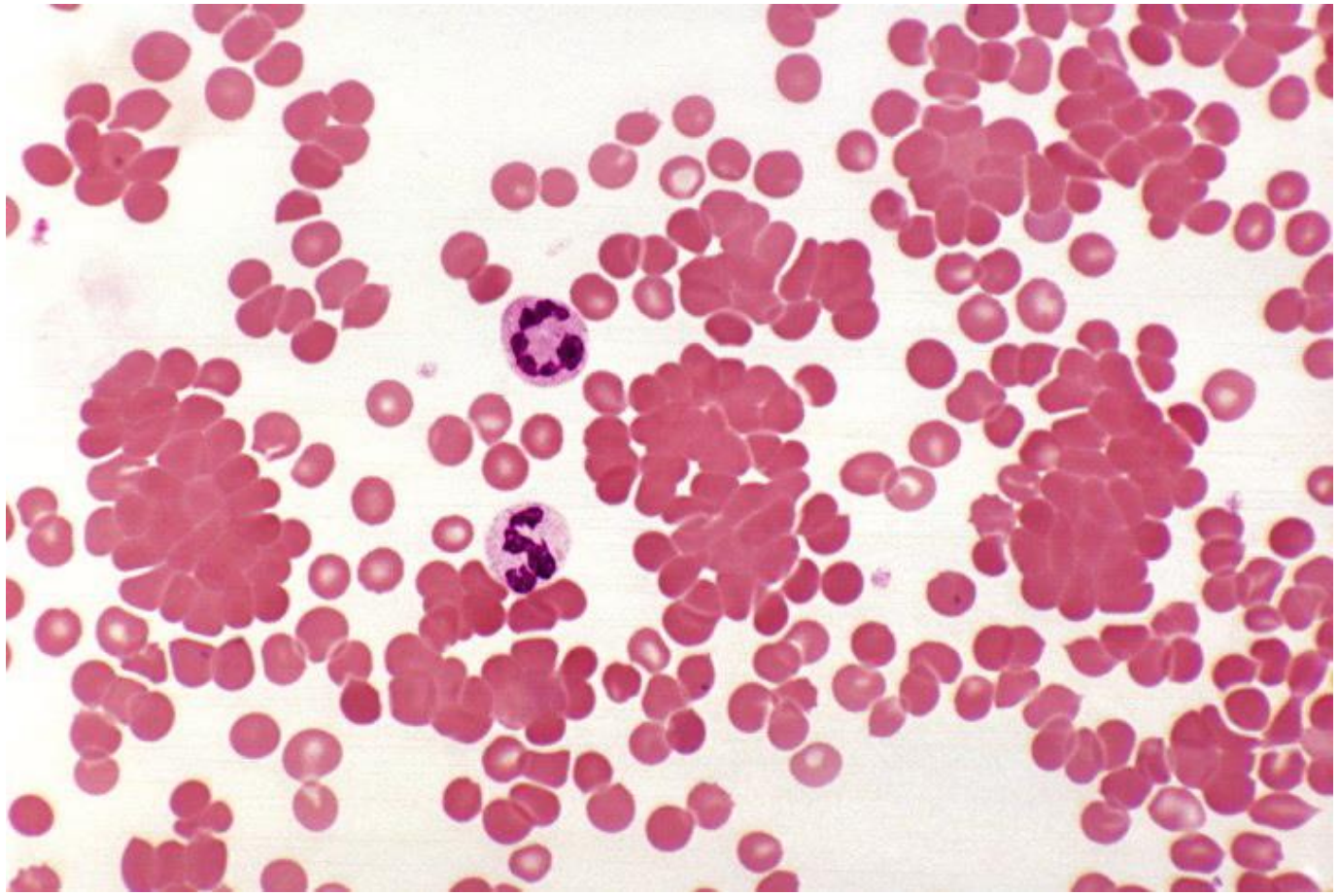




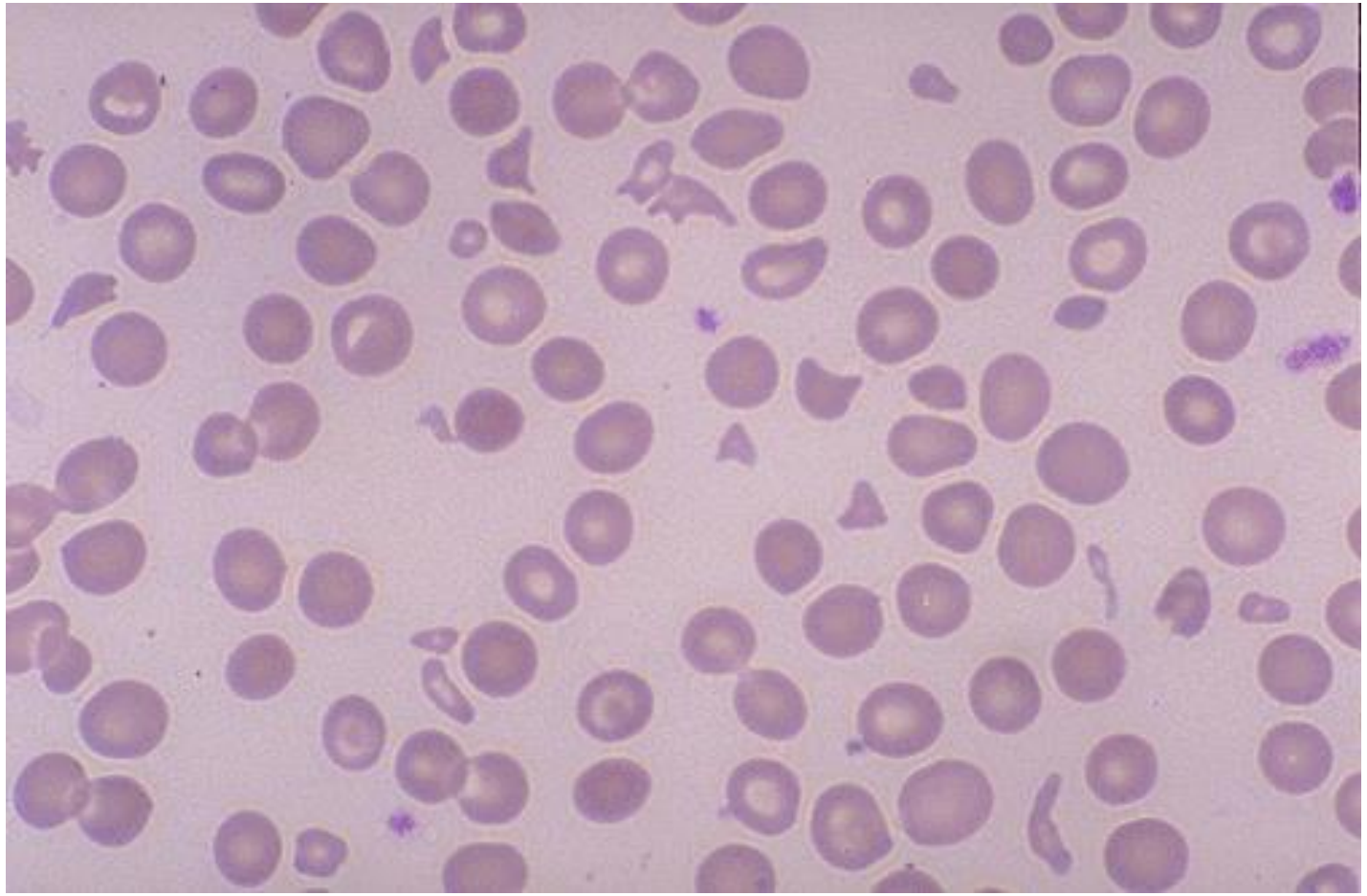

WARM AUTOIMMUNE HEMOLYTIC ANEMIA
IgG ANTIBODY:
OPTIMAL TEMPERATURE FOR REACTIVITY:
37°C
IgG REACTS AGAINST PROTEIN ANTGEN ON RED BLOOD CELL SURFACE
SPHEROCYTES
COLD AGGLUTININ-MEDIATED AUTO-IMMUNE HEMOLYTIC ANEMIA
IgM ANTIBODY:
OPTIMAL TEMPERATURE FOR REACTIVITY:
<30°C
IgM REACTS AGAINST POLYSACCHARIDE ANTIGEN
RED CELL AGGLUTINATES


A
B

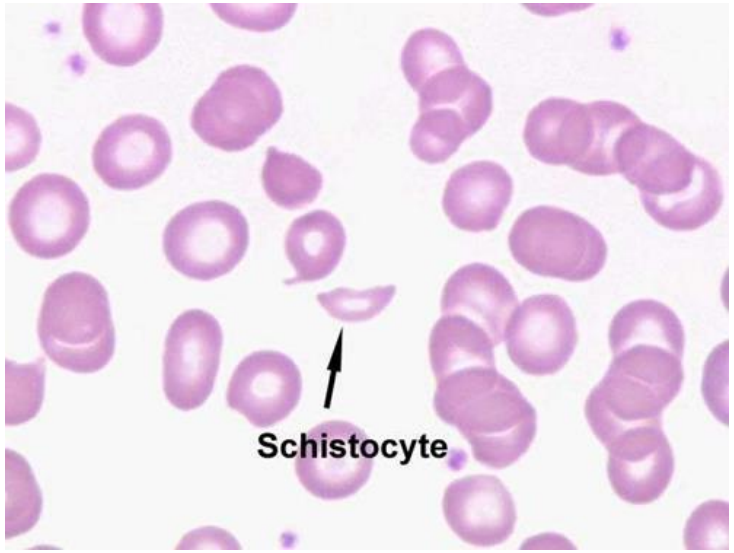
Cold agglutinin disease IgM

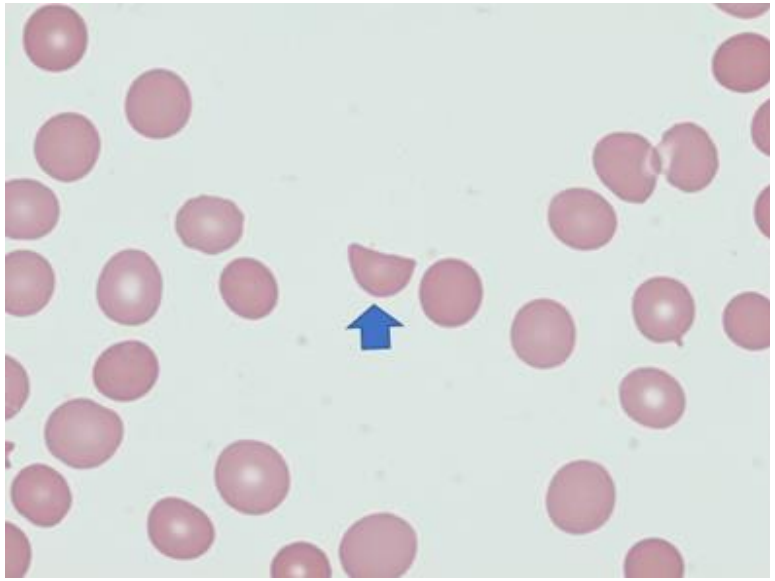


There are numerous fragmented RBC's seen here. Some of the irregular shapes appear as "helmet" cells. Such fragmented RBC's are known as "schistocytes" and they are indicative of a microangiopathic hemolytic anemia (MAHA) or other cause for intravascular hemolysis.



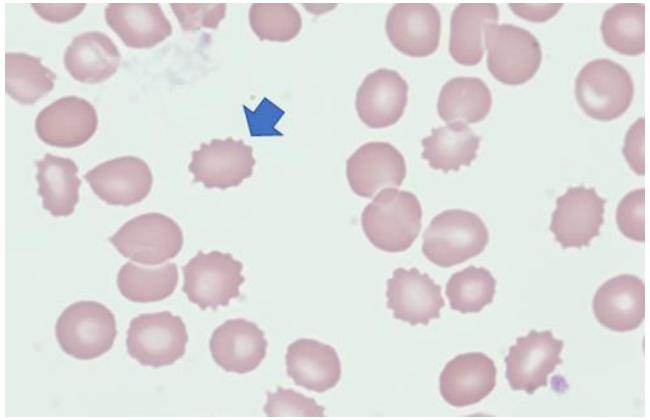
Fragmented RBCs in MAHA



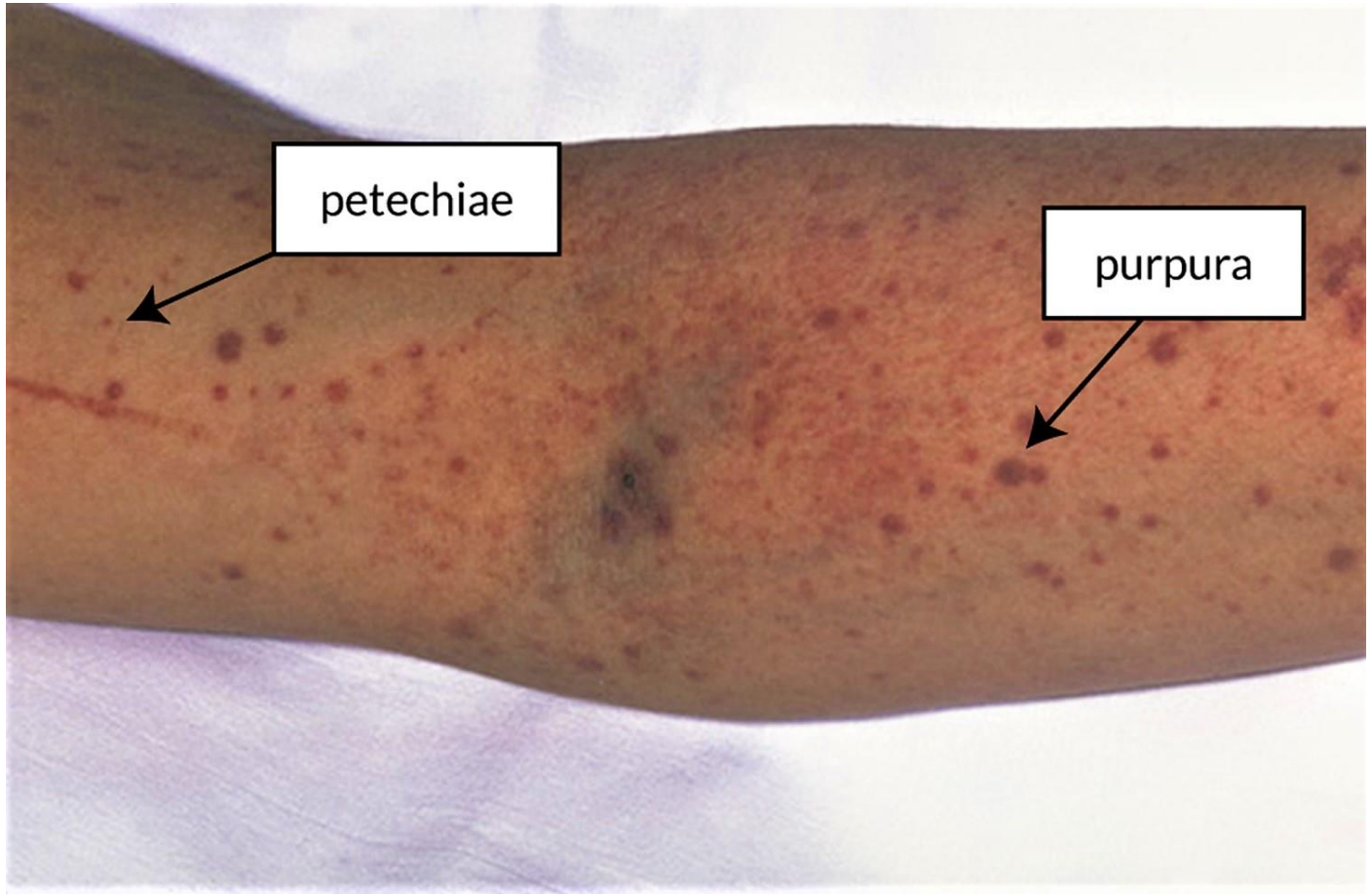


Helmet cells

Burr cells



Primary hemostasis abnormalities



Hyaline thrombi (platelet rich) in HUS and TTP