



LUCRAREA PRACTICA NR 10

**Sangele. Tehnica frotiului sanguin. Morfologia
elementelor figurate. Formula leucocitara.
Hematopoieza**

Tehnica frotiului sanguin

Frotiul de sange periferic este un preparat microscopic care reprezinta o picatura de sange ce se intinde intr-o pelicula foarte fina pe suprafata unei lame de sticla si care, dupa ce a fost fixat si colorat, se poate examina.

Sangele se recolteaza prin inteparea pulpei degetului inelar la adulti si a pielii calcaiului sau a tegumentului lobului urechii la nou-nascut si copilul mic.

Picatura de sange astfel obtinuta este depusa pe o lama de sticla curata si cu ajutorul altei lame este intinsa in strat subtire si uniform.

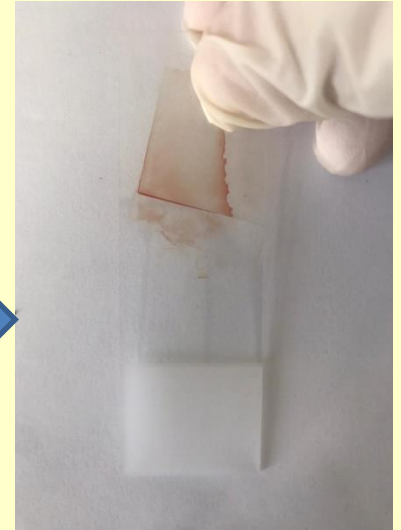
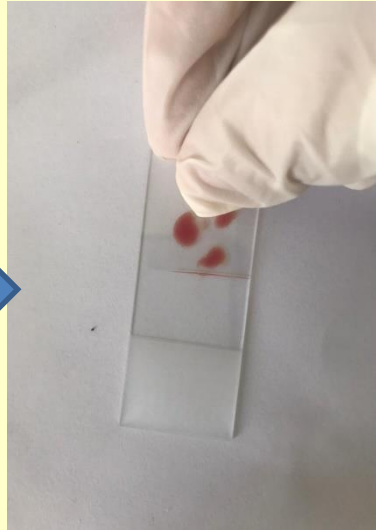
Urmeaza tehnica colorarii frotiului sanguin, in practica medicala cel mai des se utilizeaza tehnica de colorare panoptica May-Grunwald-Giemsa.

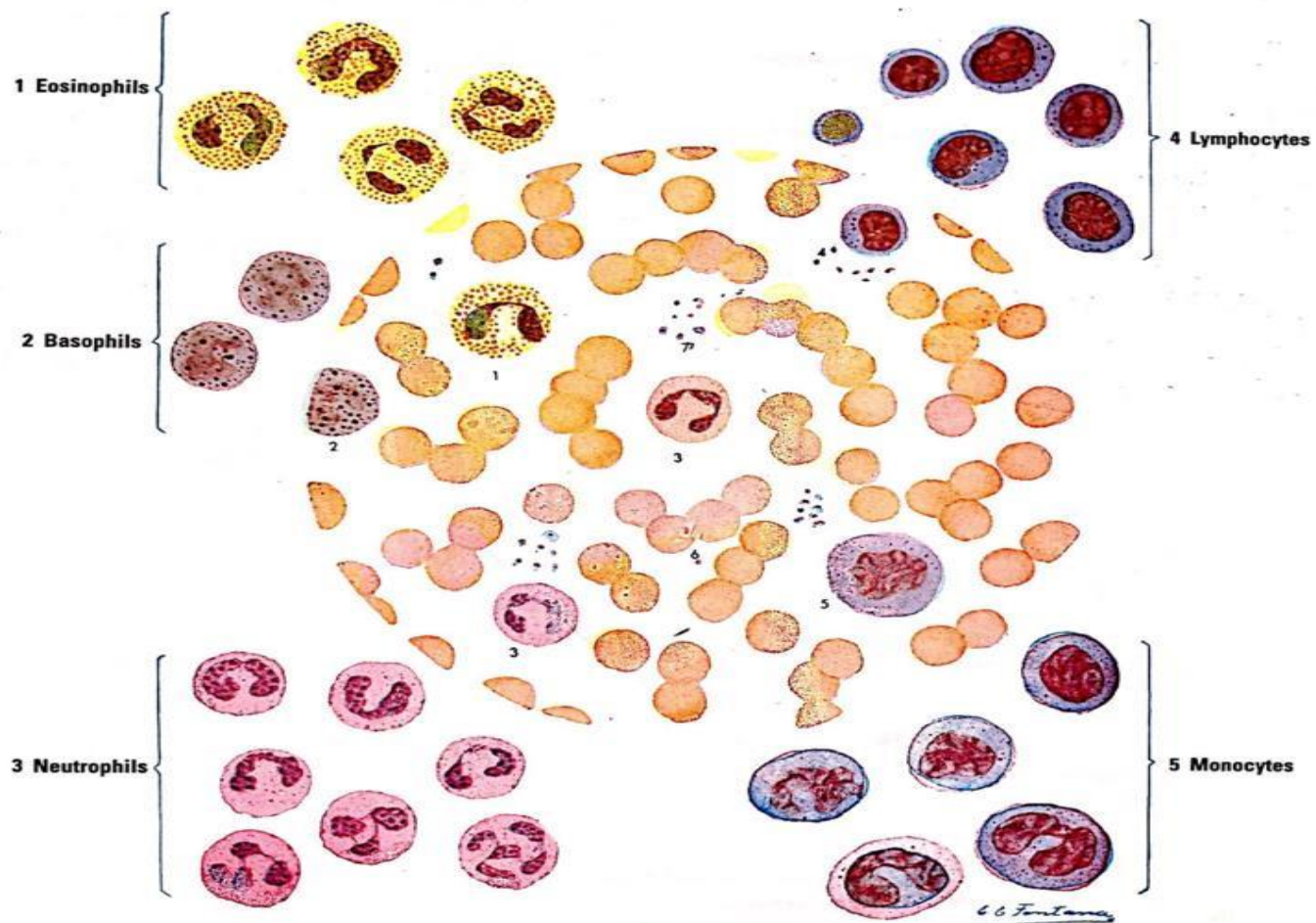
Rezultatele coloratiei:

Citoplasma: - la **granulocyte** apare colorata in **roz-caramiziu**;
- la **agranulocyte** in **diferite nuante de albastru**.

Granulatiile: - **neutrofilele** apar colorate **violet**;
- **acidofilele** apar colorate in **rosu**;
- **bazofilele** sunt **albastre**;
- **azurofilele** apar **rosu-violet**.

Tehnica frotiului sanguin





Stain: May-Grünwald-Giemsa. 1100X.

Schema frotiu de sange periferic. Dupa di Fiore's

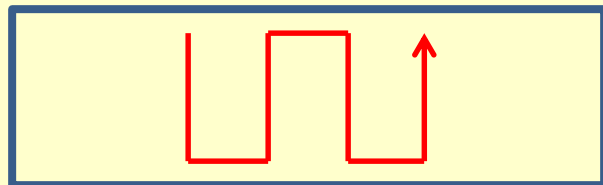
Formula leucocitara

Formula leucocitara este un examen cantitativ al frotiului de sange. Reprezinta raportarea procentuala a fiecarui tip de leucocite.

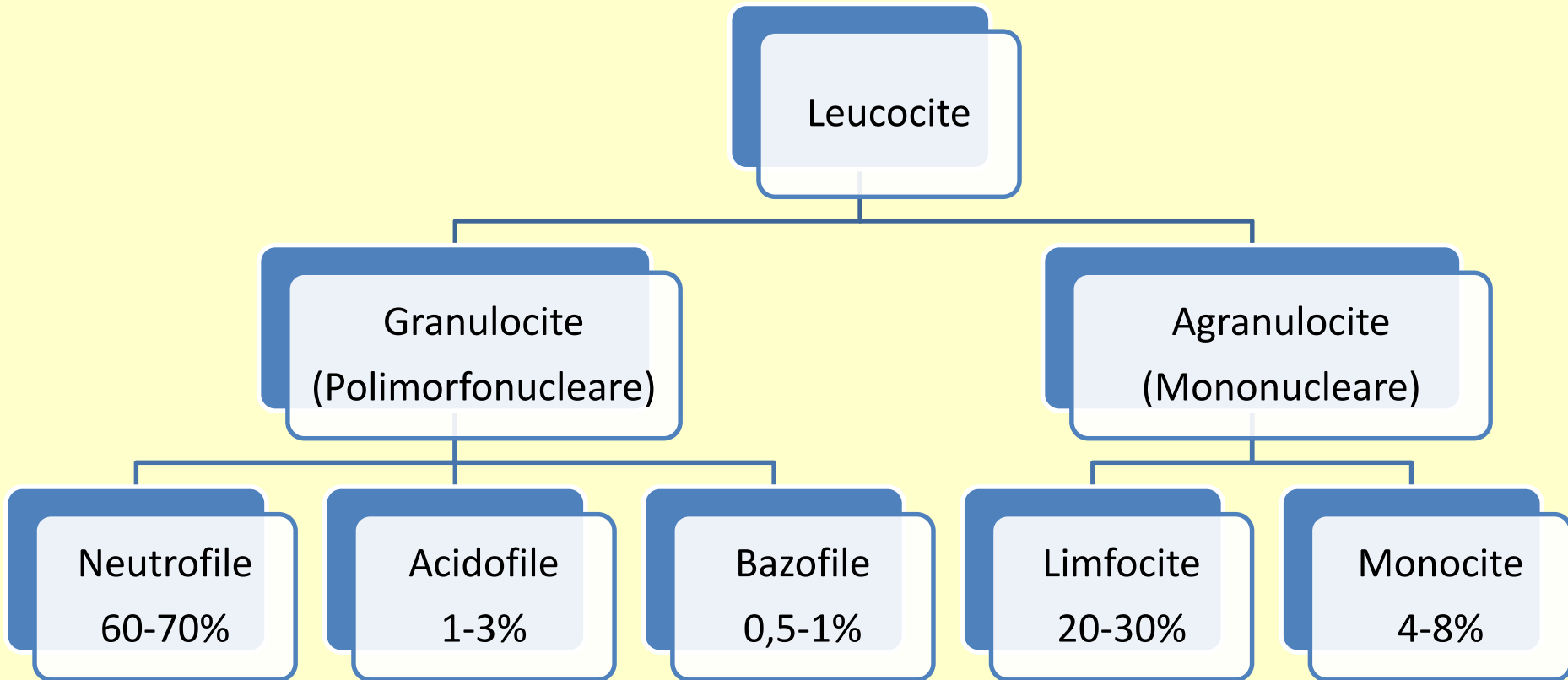
Examinarea frotiului de sange se face la microscop cu obiectivul cu imersie. Datorita tendintei de fuga spre periferie a leucocitelor ce duce la o densitate mai mare a lor la periferia frotiului comparativ cu zona centrala, este indicata citirea acestora atat in zona centrala cat si la periferie.

Formula de calcul :
$$\frac{\text{nr total leucocite dintr-un grup}}{\text{nr total leucocite numarate}} * 100$$

polimorfonucleare			mononucleare	
neutrofile	acidofile	bazofile	limfocite	monocite
				



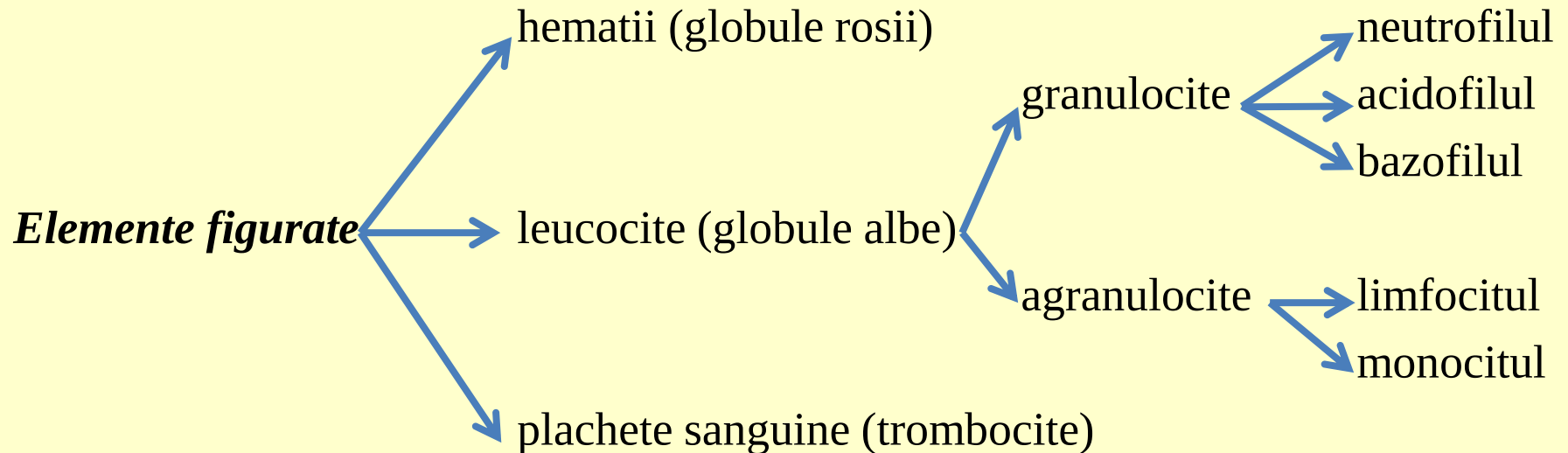
Formula leucocitaria



Sangele-caracteristici

Sangele este o varietate de tesut conjunctiv cu substanta fundamentala lichida, de origine mezenchimatoasa, adaptat functiei de transport.

Este alcatuit din: **elemente figurate** si **plasma sanguina**.



Plasma sanguina este **partea lichida** a sangelui care mentine in suspensie elementele celulare sanguine. Din punct de vedere biochimic este formata din **apa** (90%), **substante organice** (9%) si **substante anorganice** (1%).

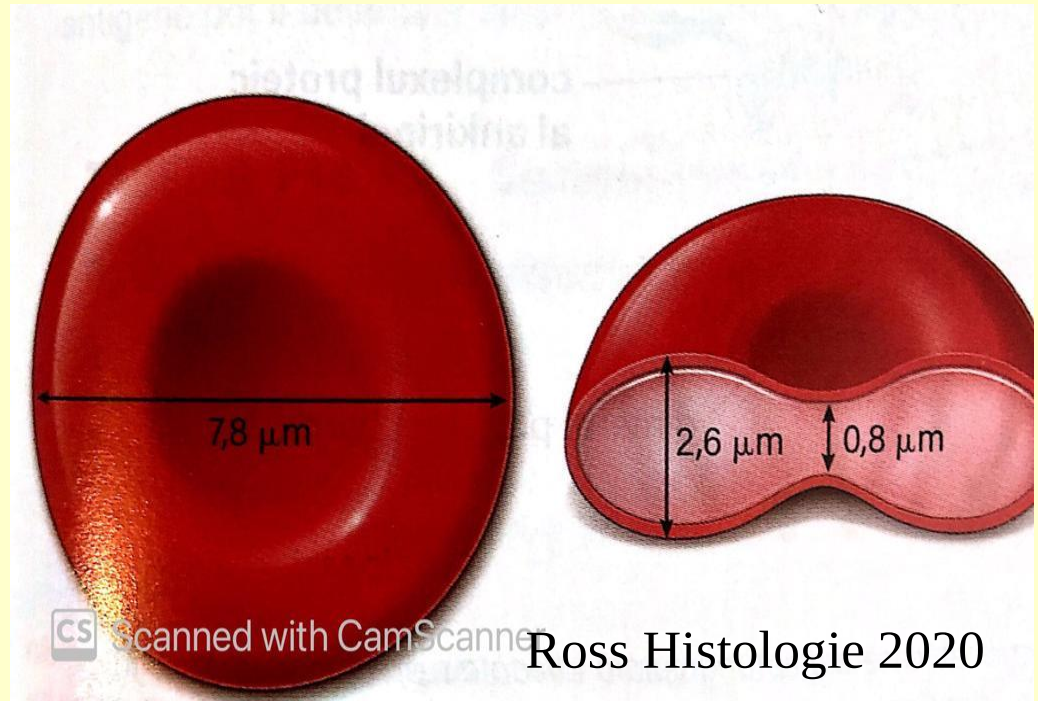
Hematiile

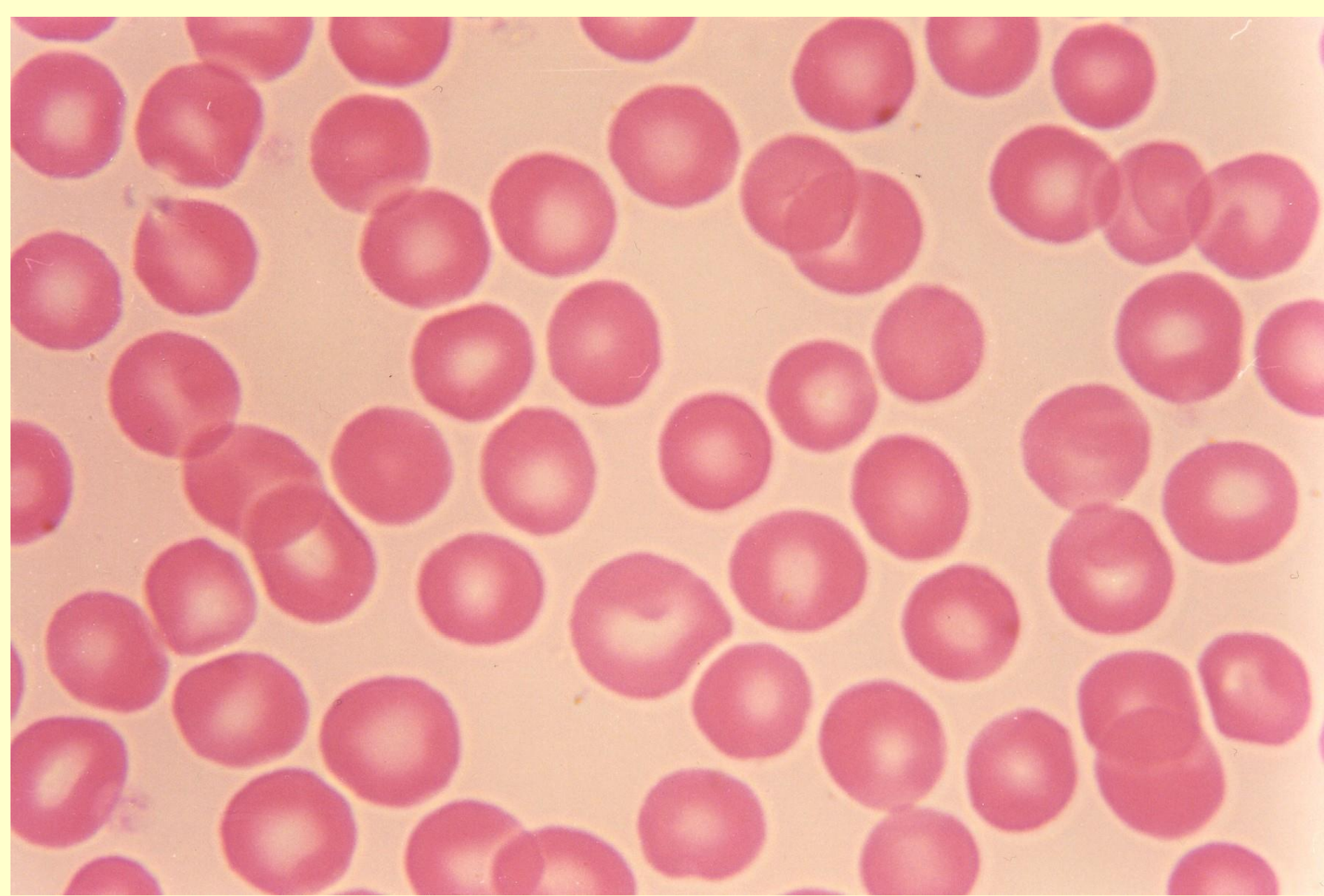
Numar → 4,5-5,5 milioane/mm³ la barbati
→ 4-5 milioane/mm³ la femei

Forma → disc biconcav din profil
→ rotunda din fata

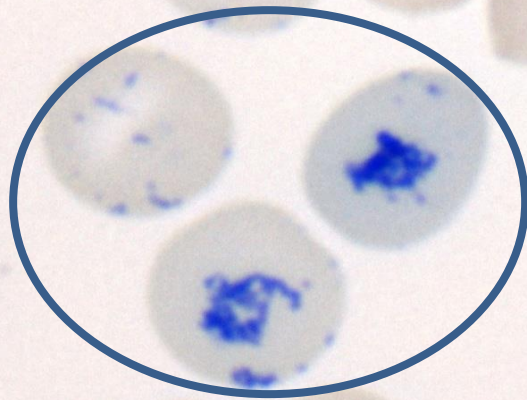
Diametru → 7-7,5 μm

Culoare → rosie





Frotiu de sange periferic. Hematii. Coloratie May-Grunwald-Giemsa



Reticulocyte . Coloratie Violet cresyl

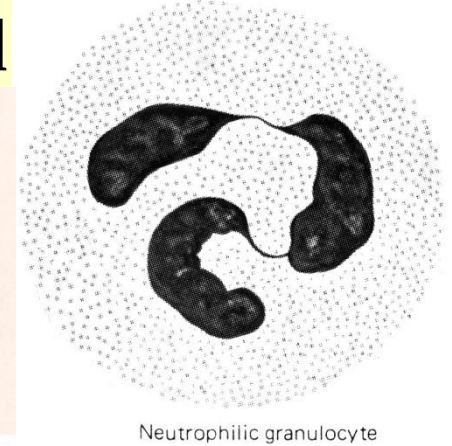
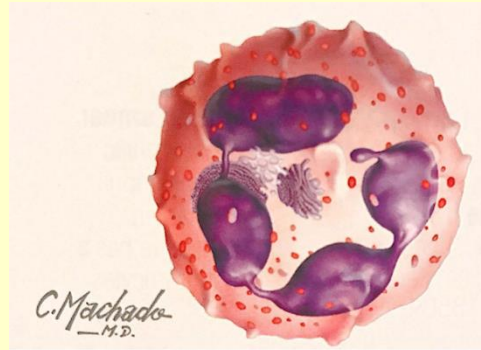
Polimorfonuclearul neutrofil

Forma → sferica

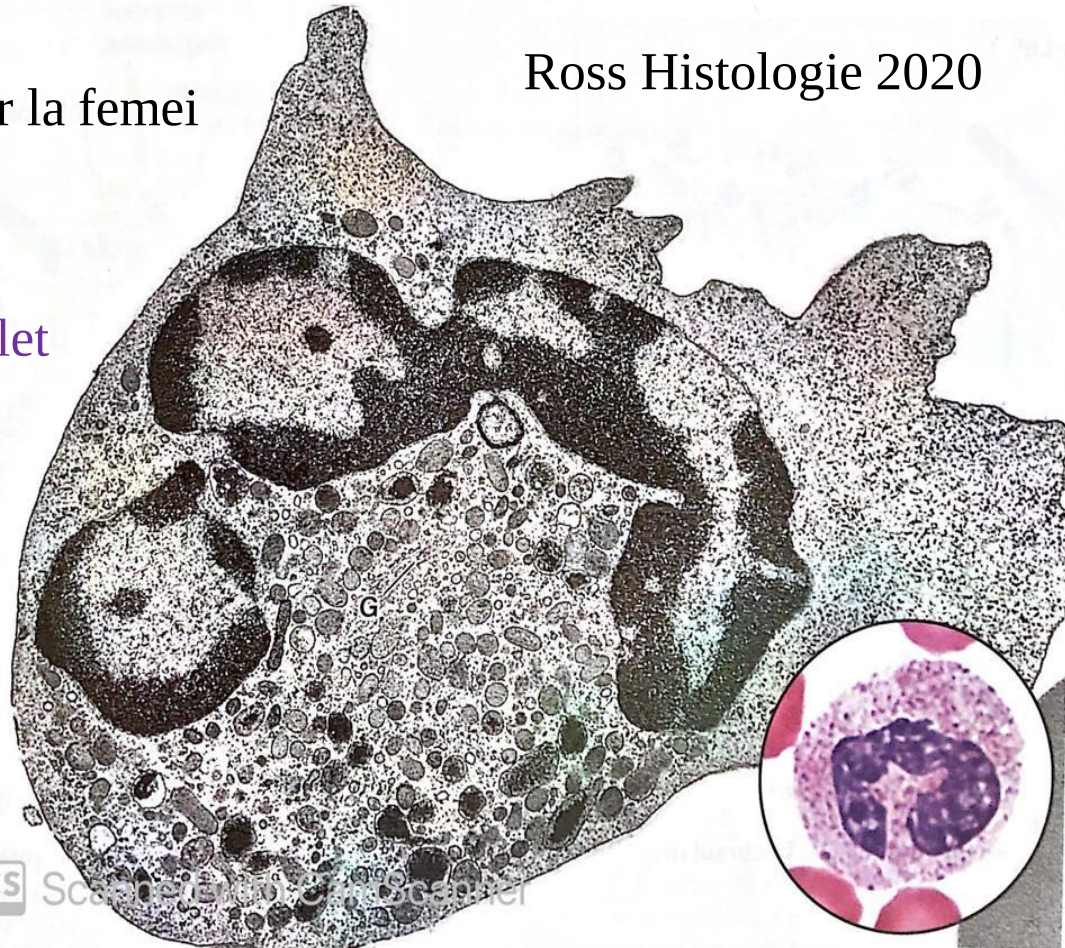
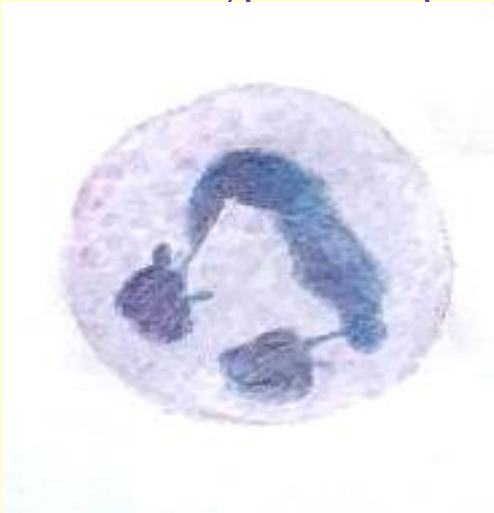
Diametrul → 10-12 μm

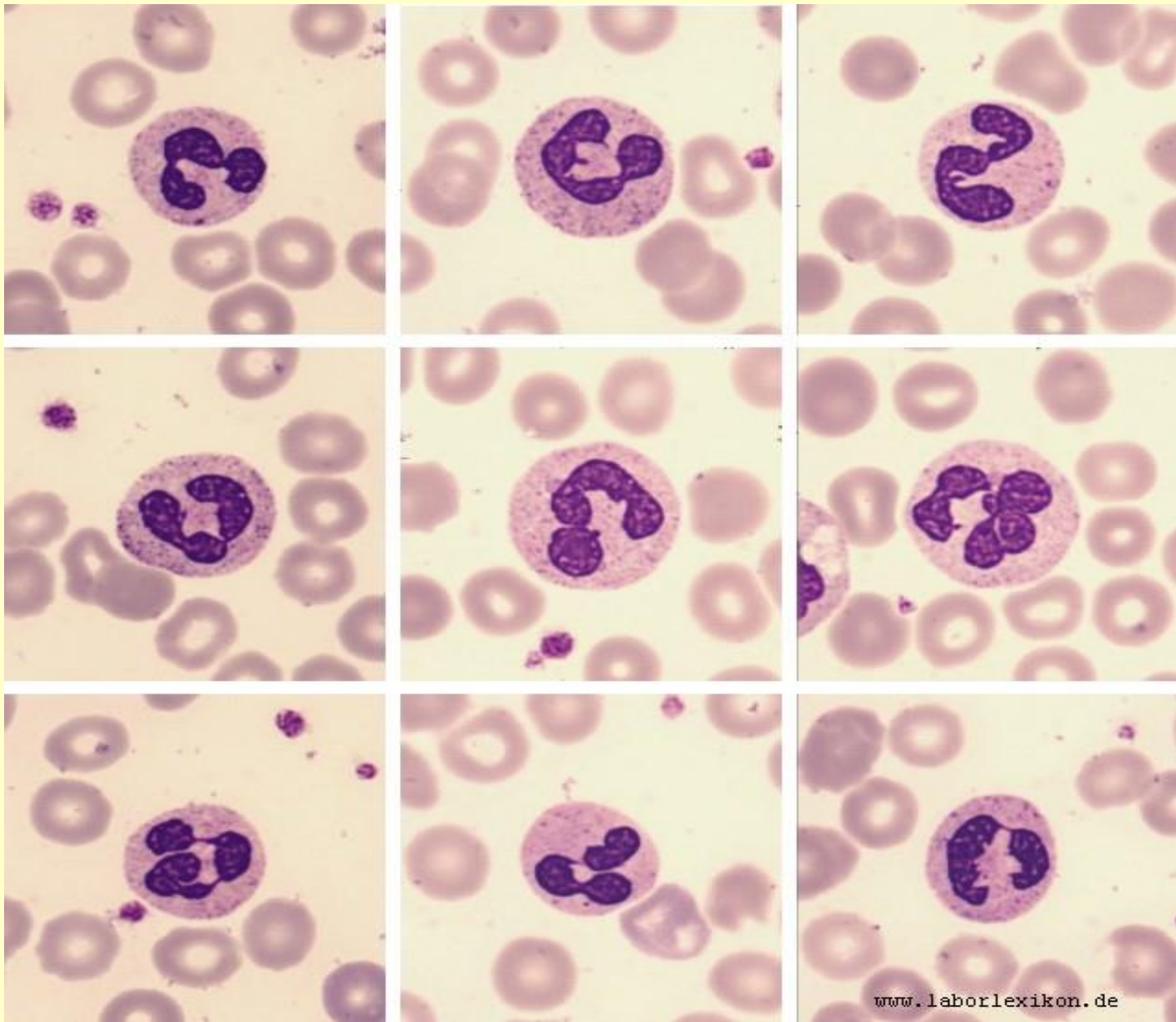
Nucleul → 3-4 lobi
→ corpusculul sexual Barr la femei

Citoplasma → acidofila
→ granule epsilon → violet

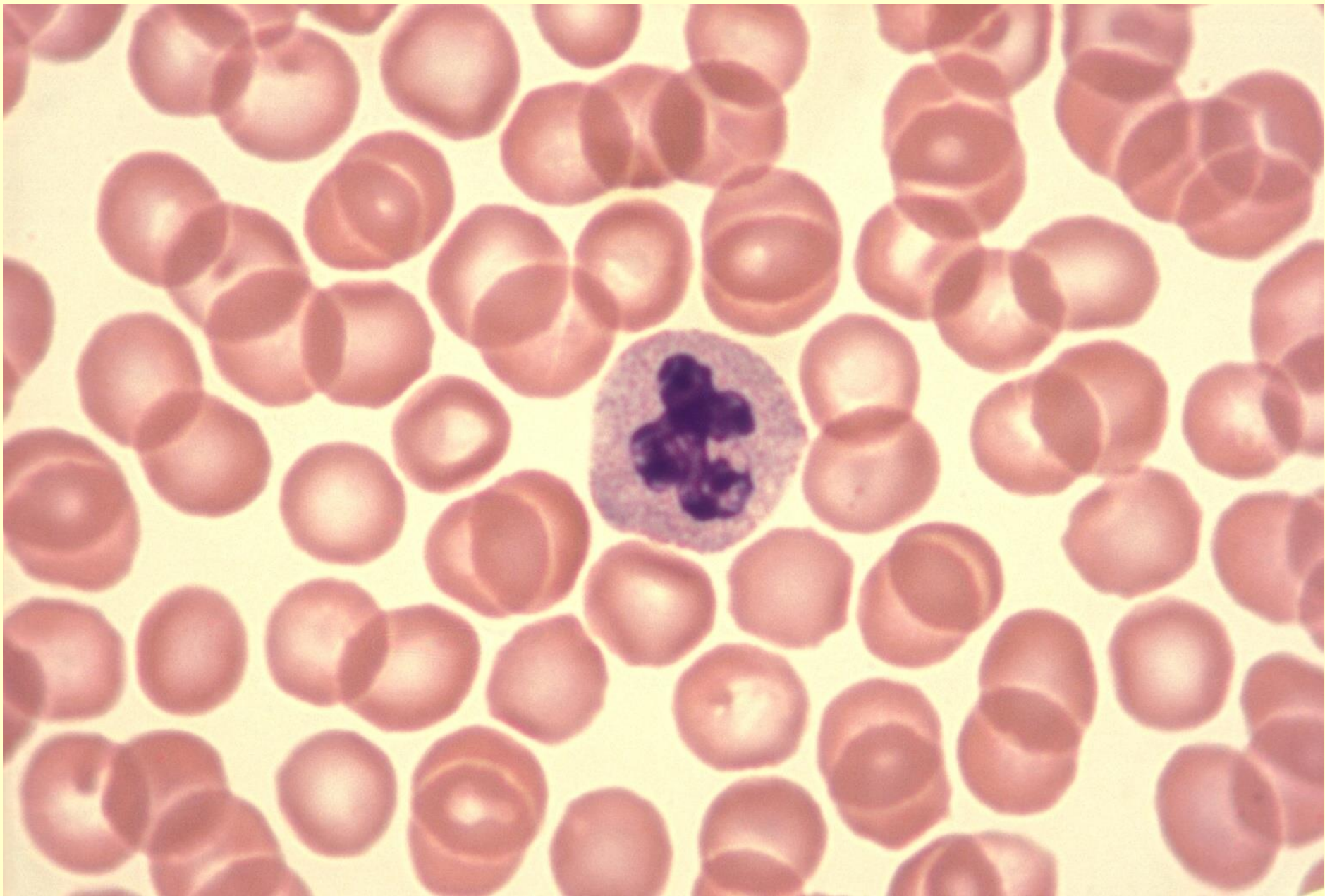


Ross Histologie 2020

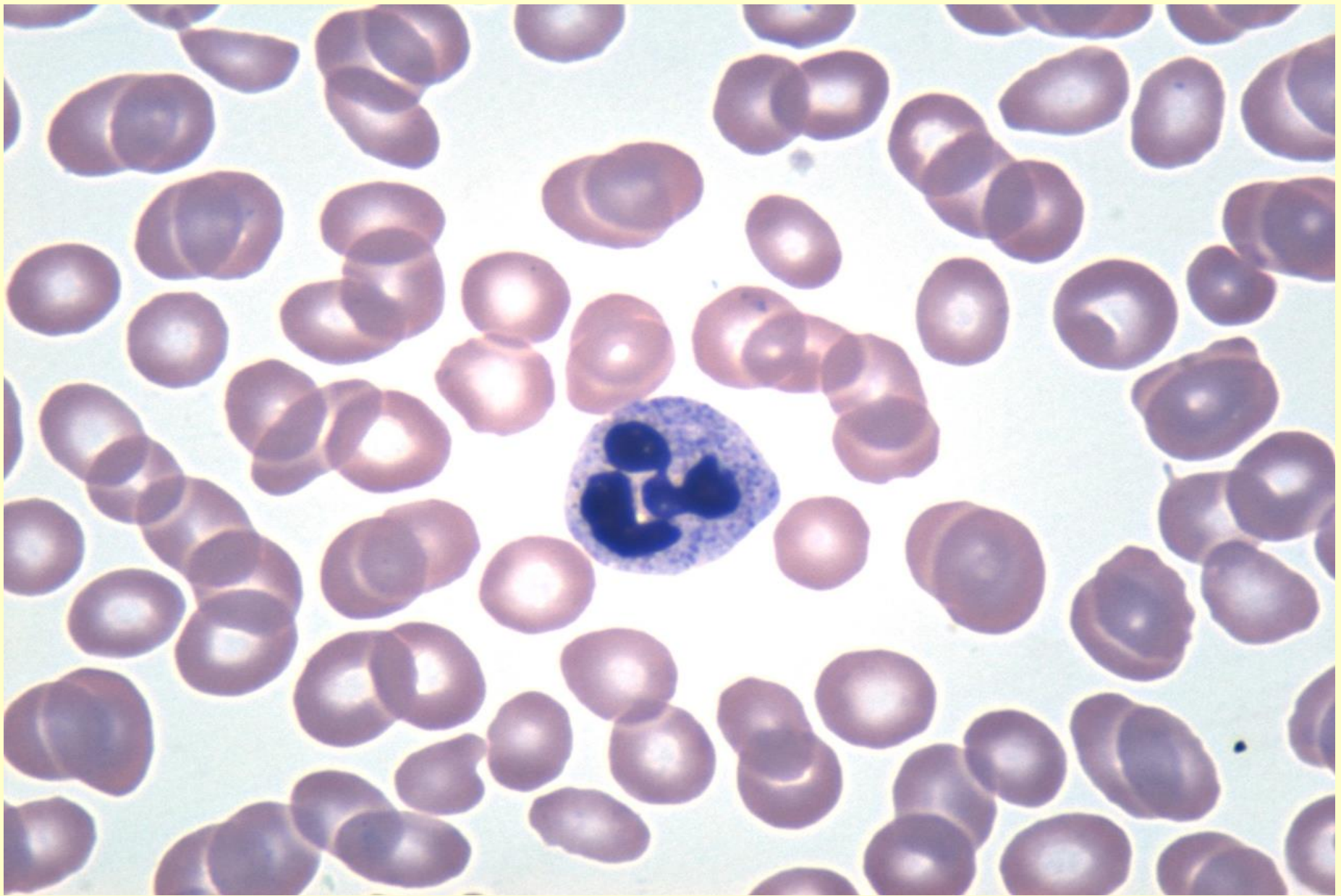




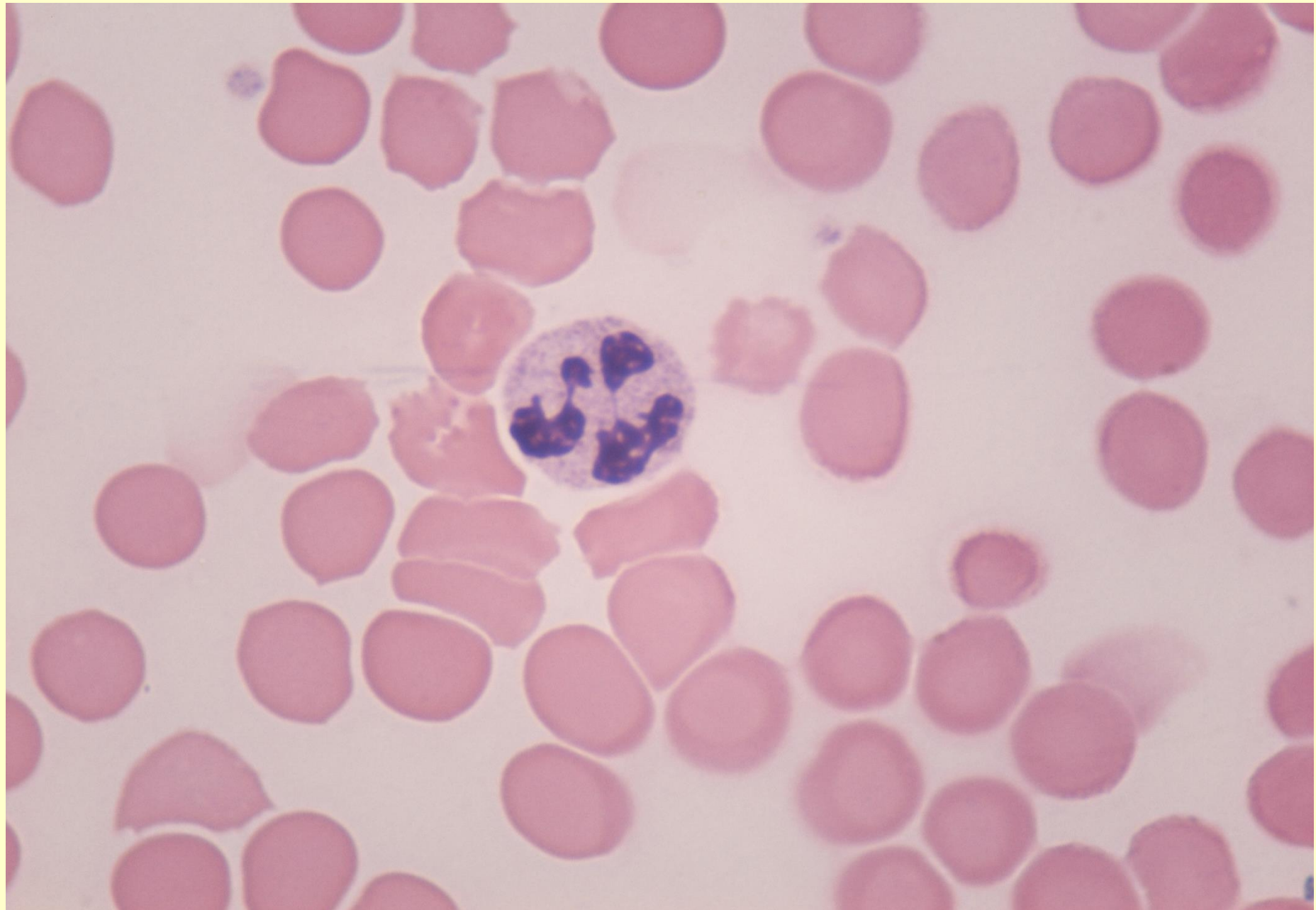
Neutrofile. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Neutrofil. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Neutrofil. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Neutrofil. Coloratie May-Grunwald-Giemsa

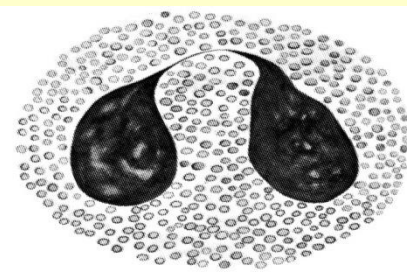
Polimorfonuclearul acidofil

Forma → sferica

Diametrul → 12-15 μm

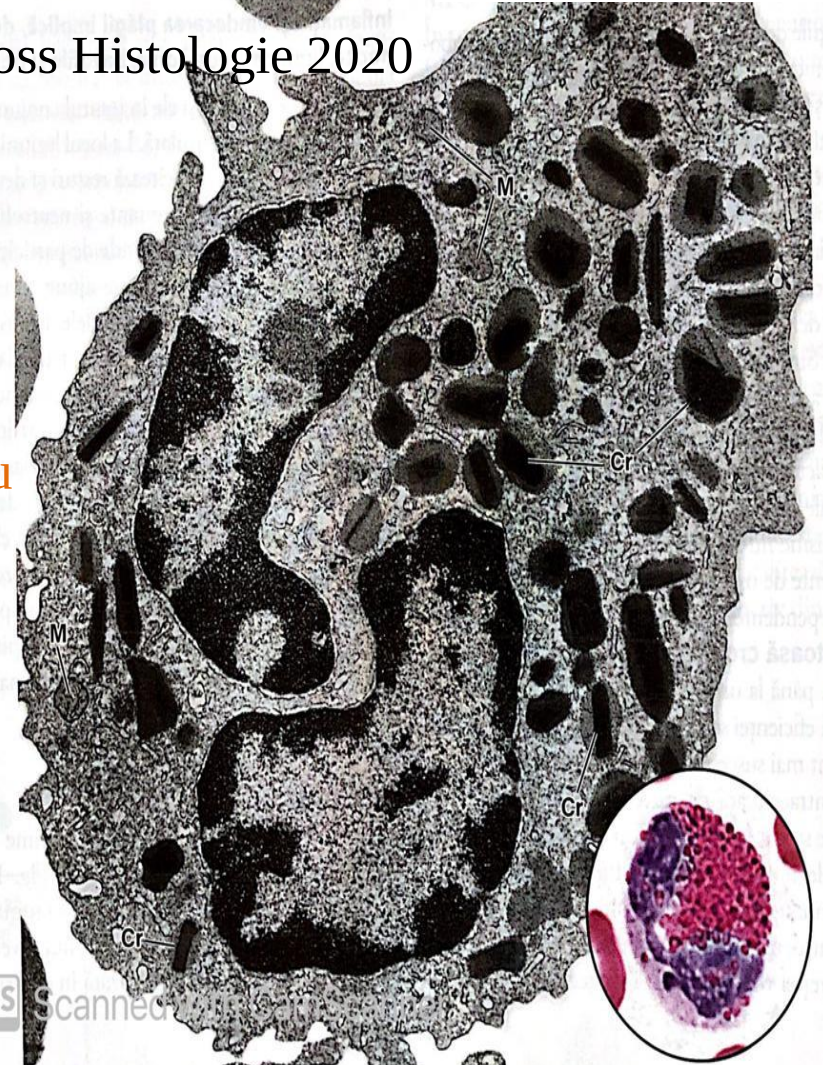
Nucleul → 2 lobi
→ “aspect de desaga”

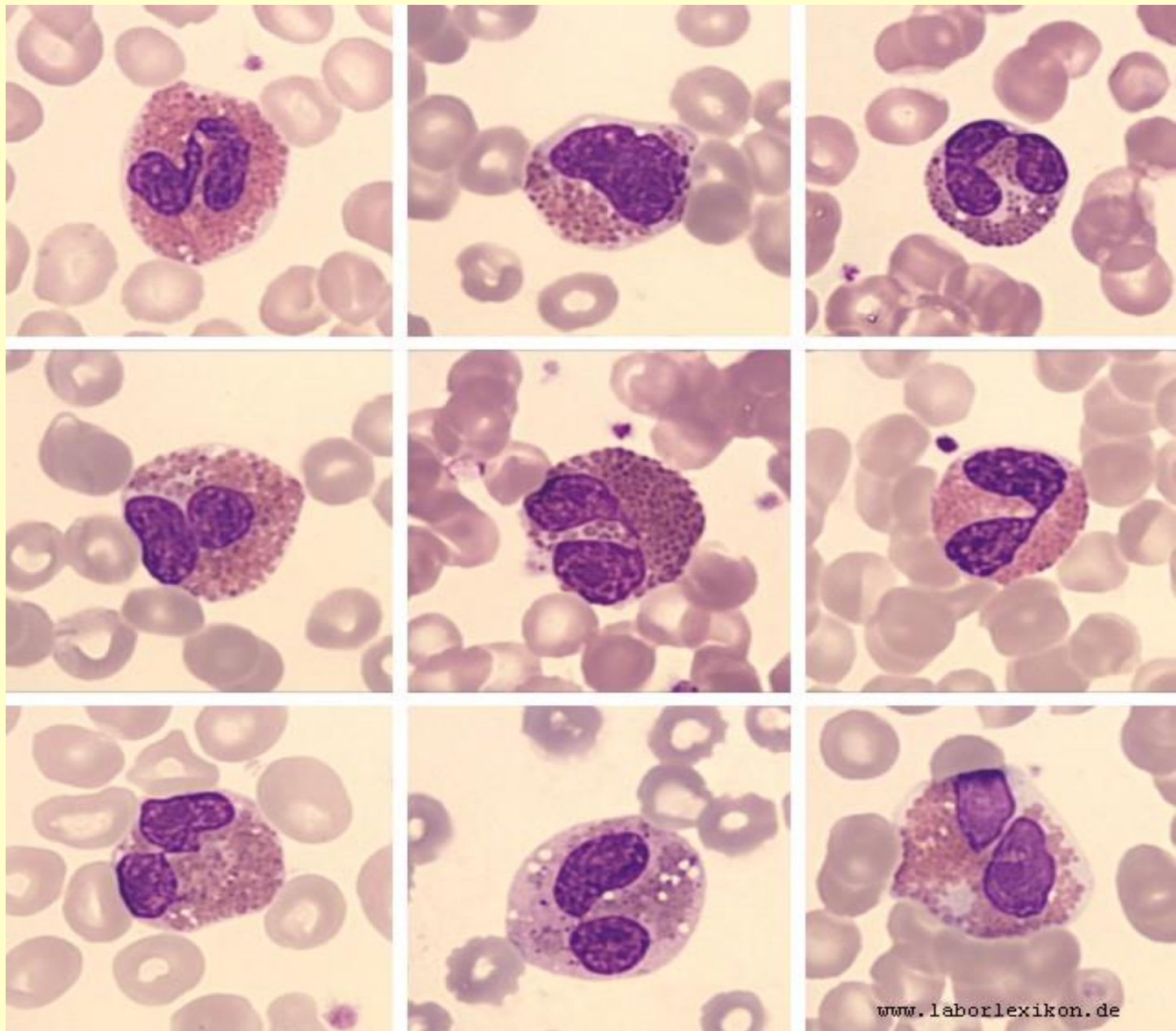
Citoplasma → acidofila
→ granule alfa → roșu-portocaliu



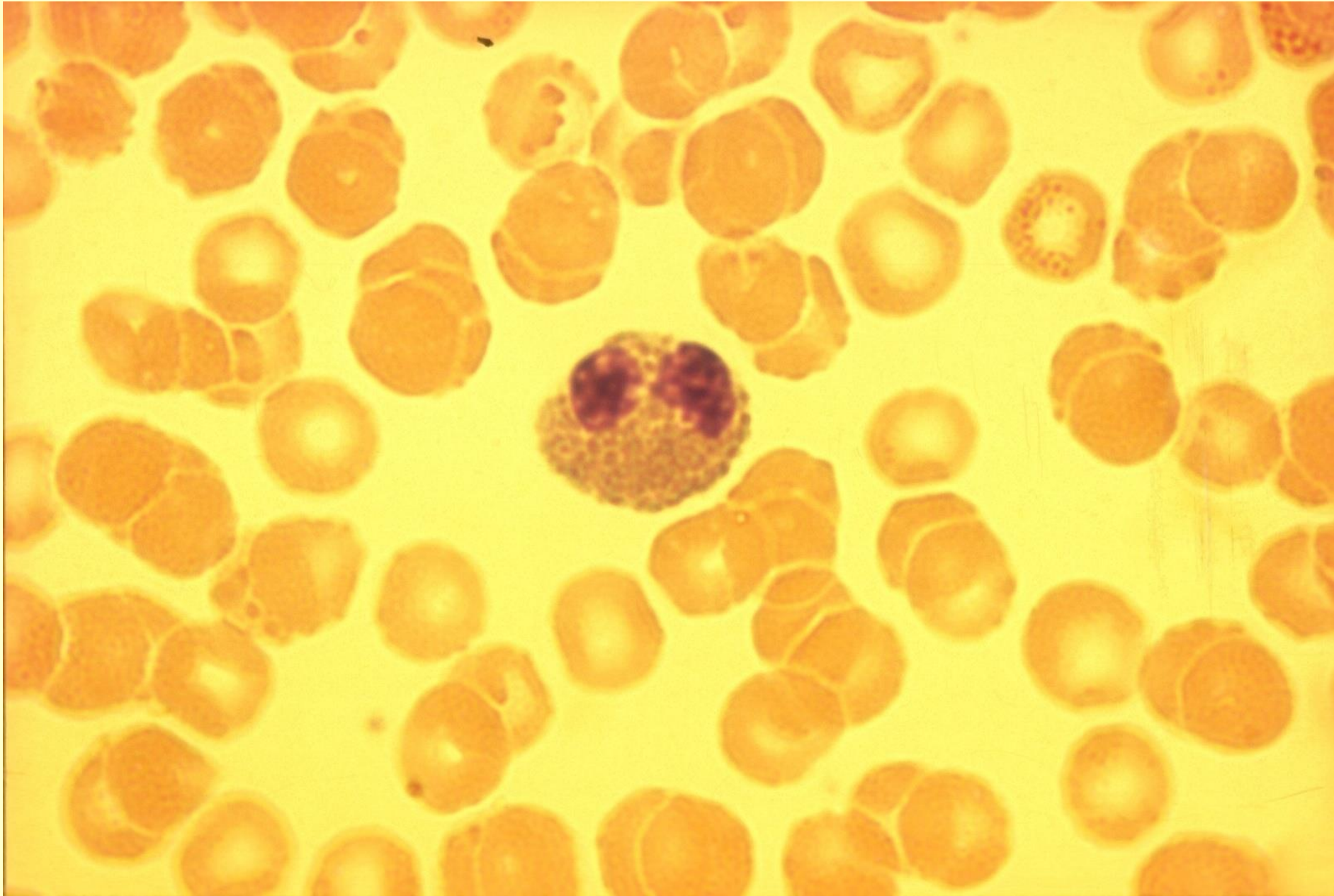
Eosinophilic granulocyte

Ross Histologie 2020

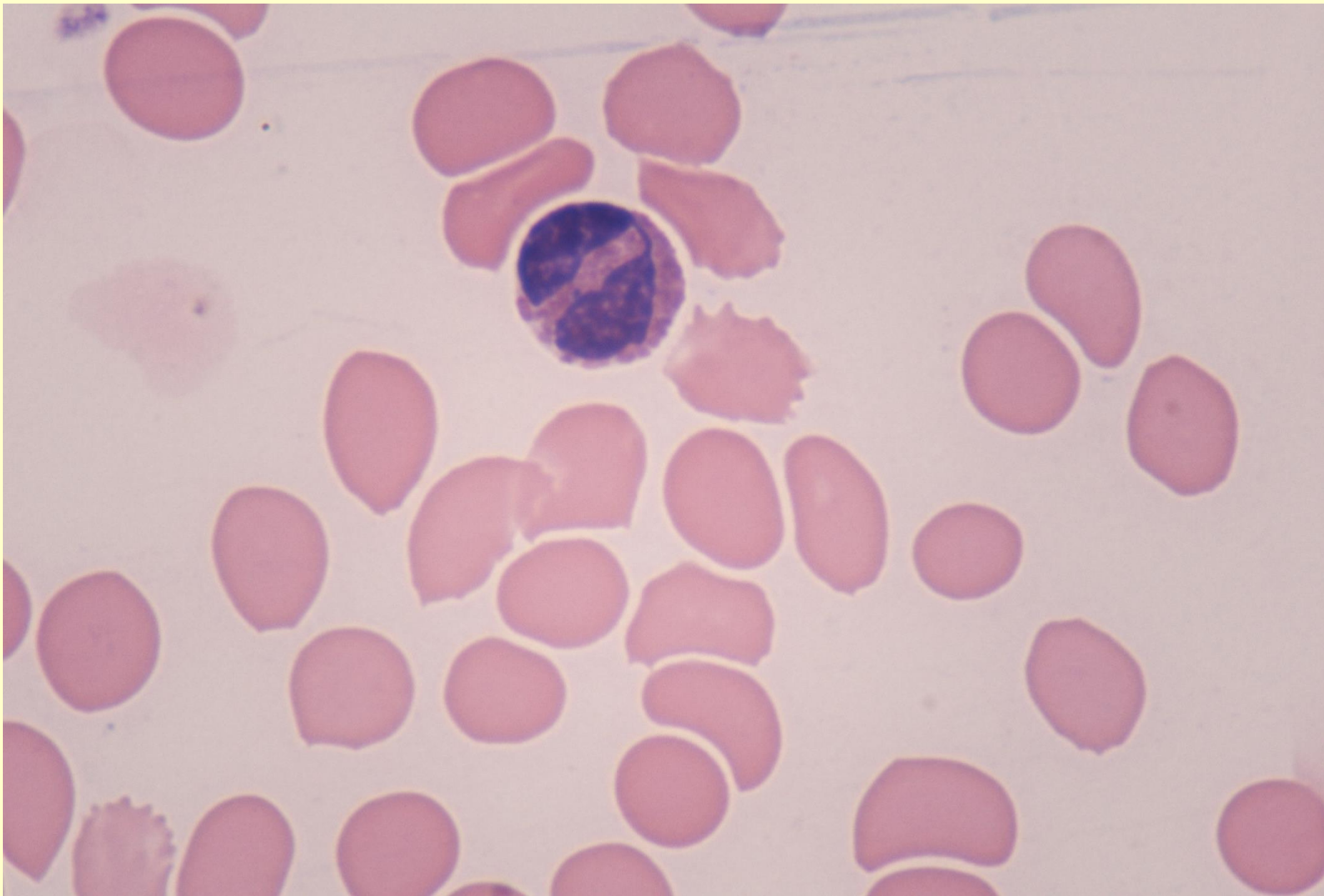




Acidofile. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Acidofil. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Acidofil. Coloratie May-Grunwald-Giemsa

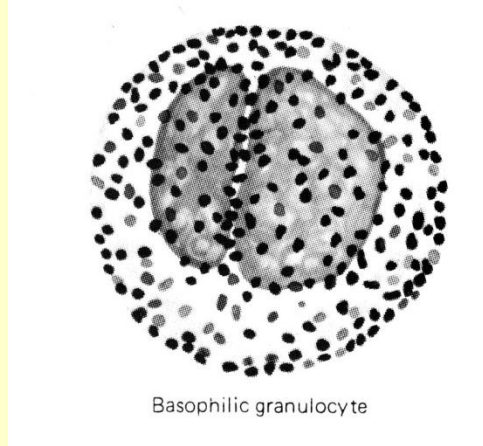
Polimorfonuclearul bazofil

Forma → sferica

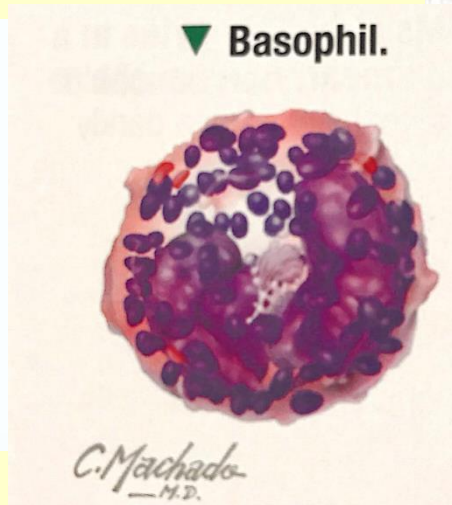
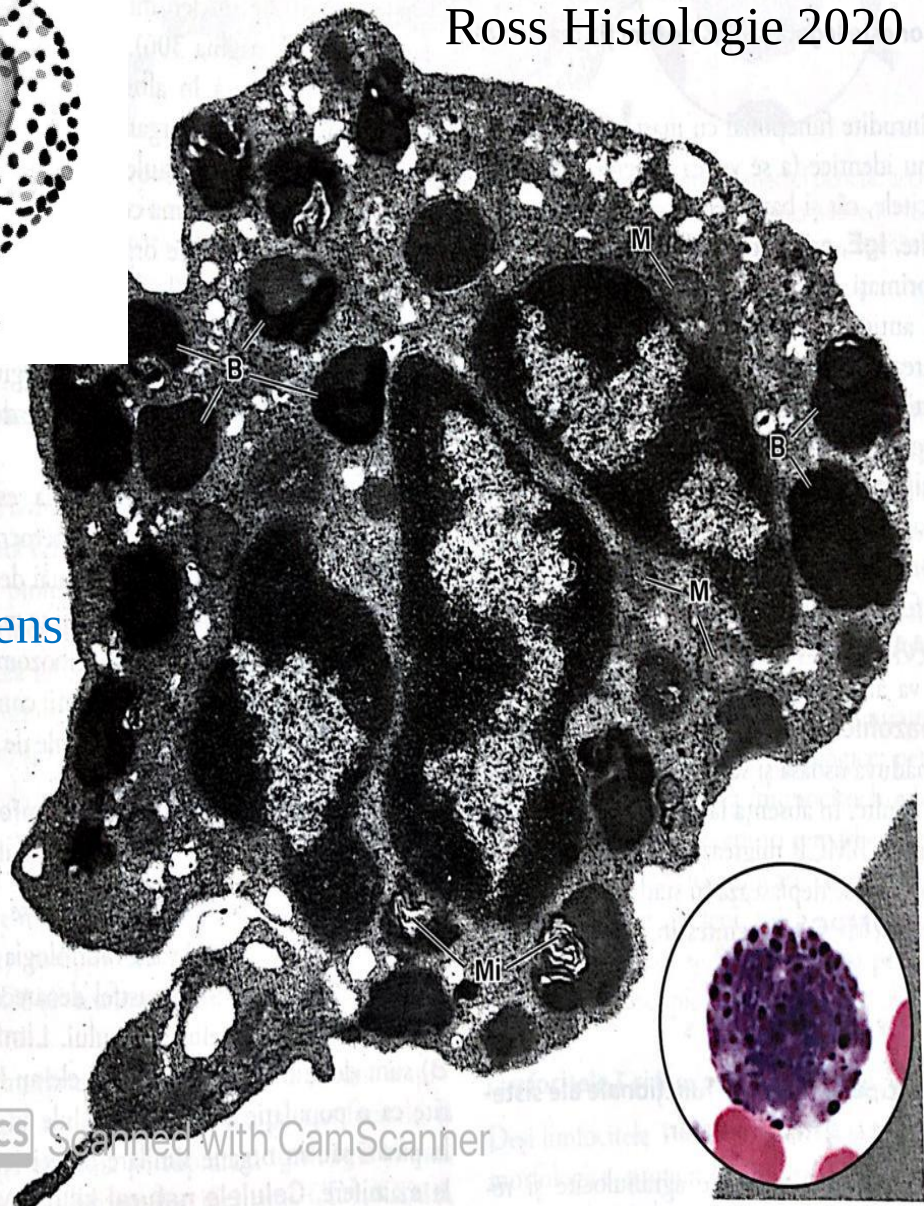
Diametrul → 10-12 μm

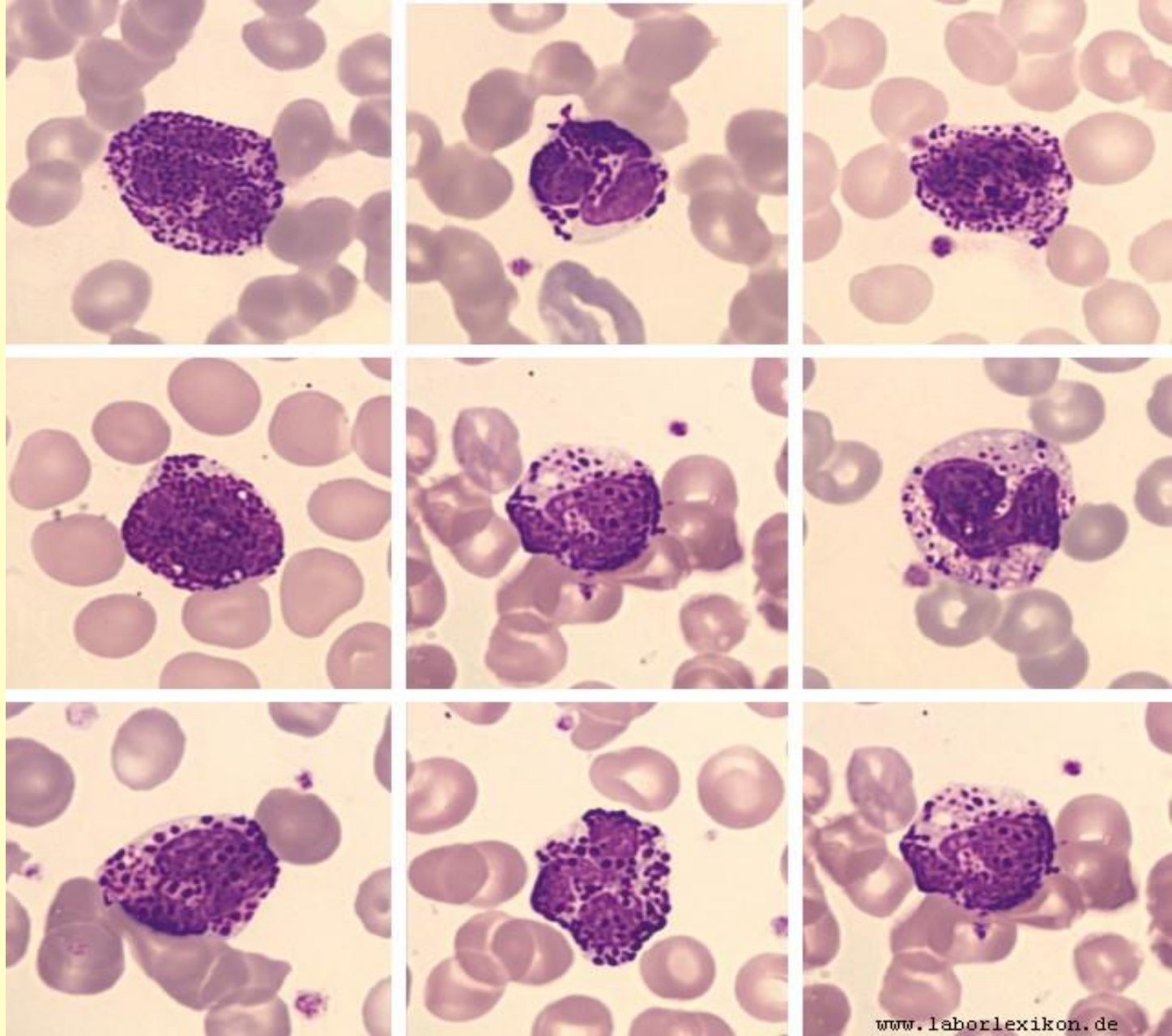
Nucleul → ovalar
→ forma literei S

Citoplasma → slab acidofila
→ granule beta → albastru intens

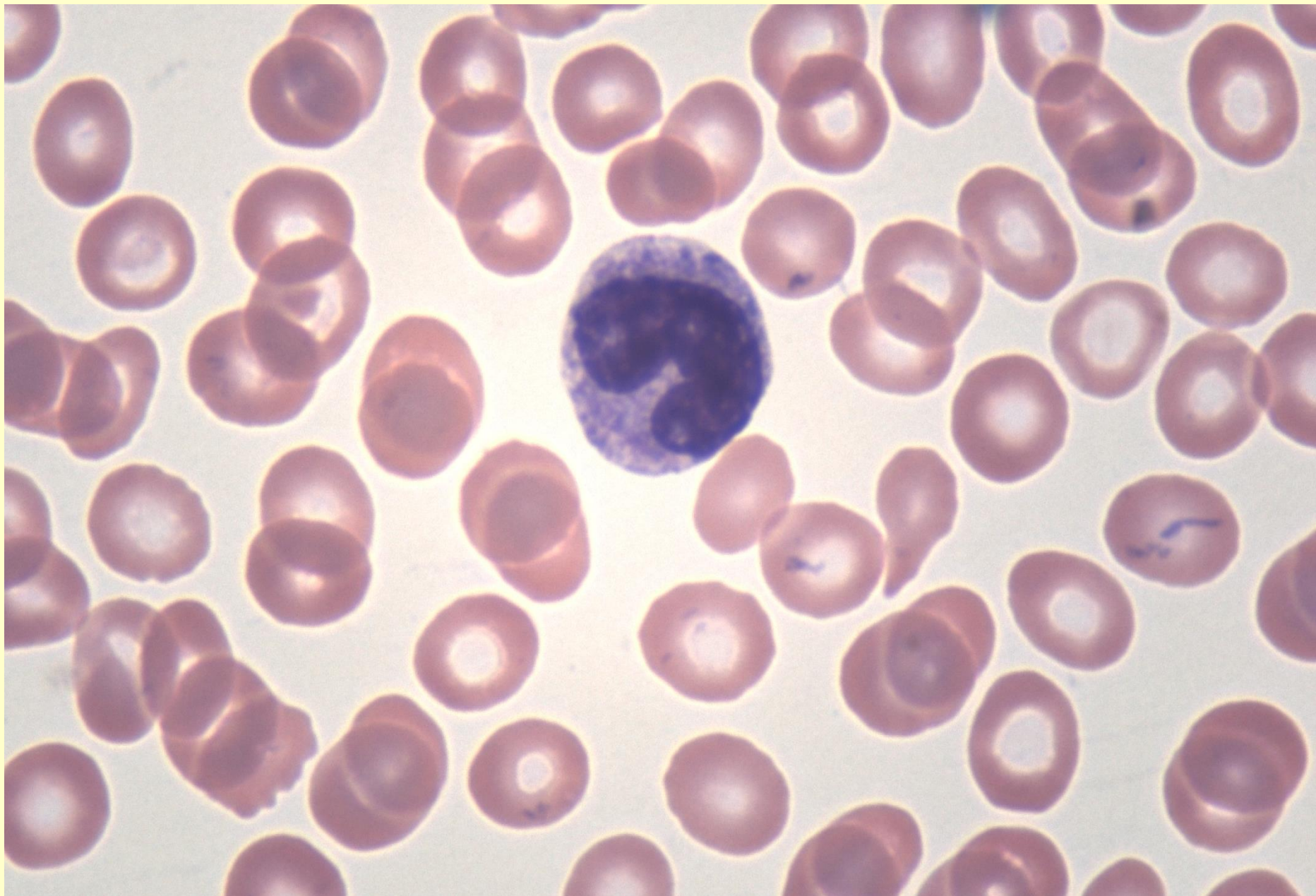


Ross Histologie 2020





Bazofile. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Bazofil. Coloratie May-Grunwald-Giemsa

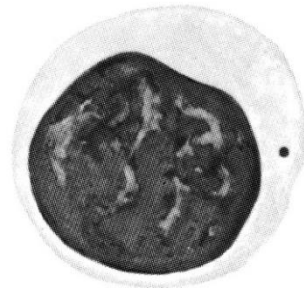
Limfocitul

Forma → sferică

Diametrul → 6-9 μm
→ 10-12 μm
→ 13-18 μm

Nucleul → ovalar, voluminos
→ forma literei S

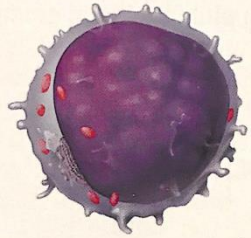
Citoplasma → intens bazofilă
→ granule azurofile



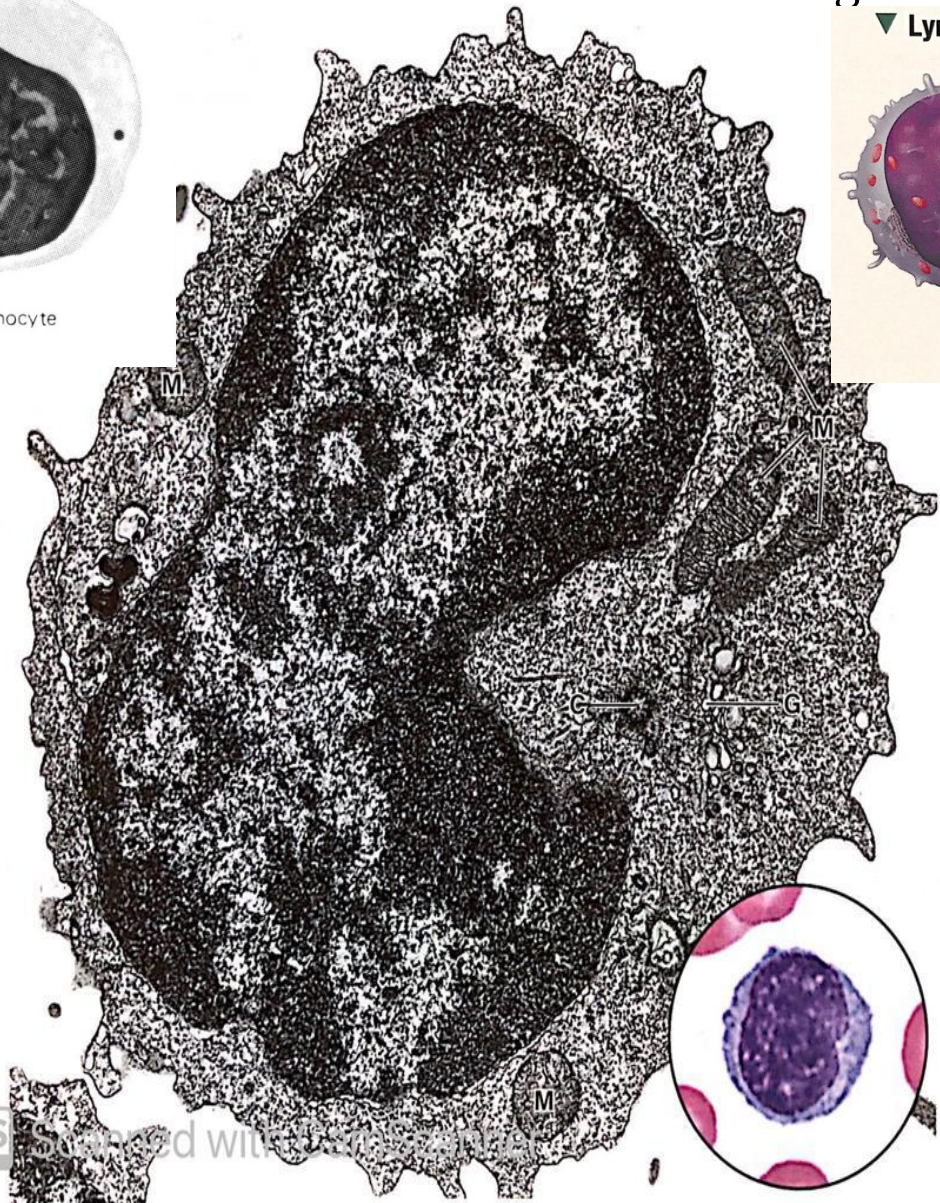
Lymphocyte

Ross Histologie 2020

▼ Lymphocyte.

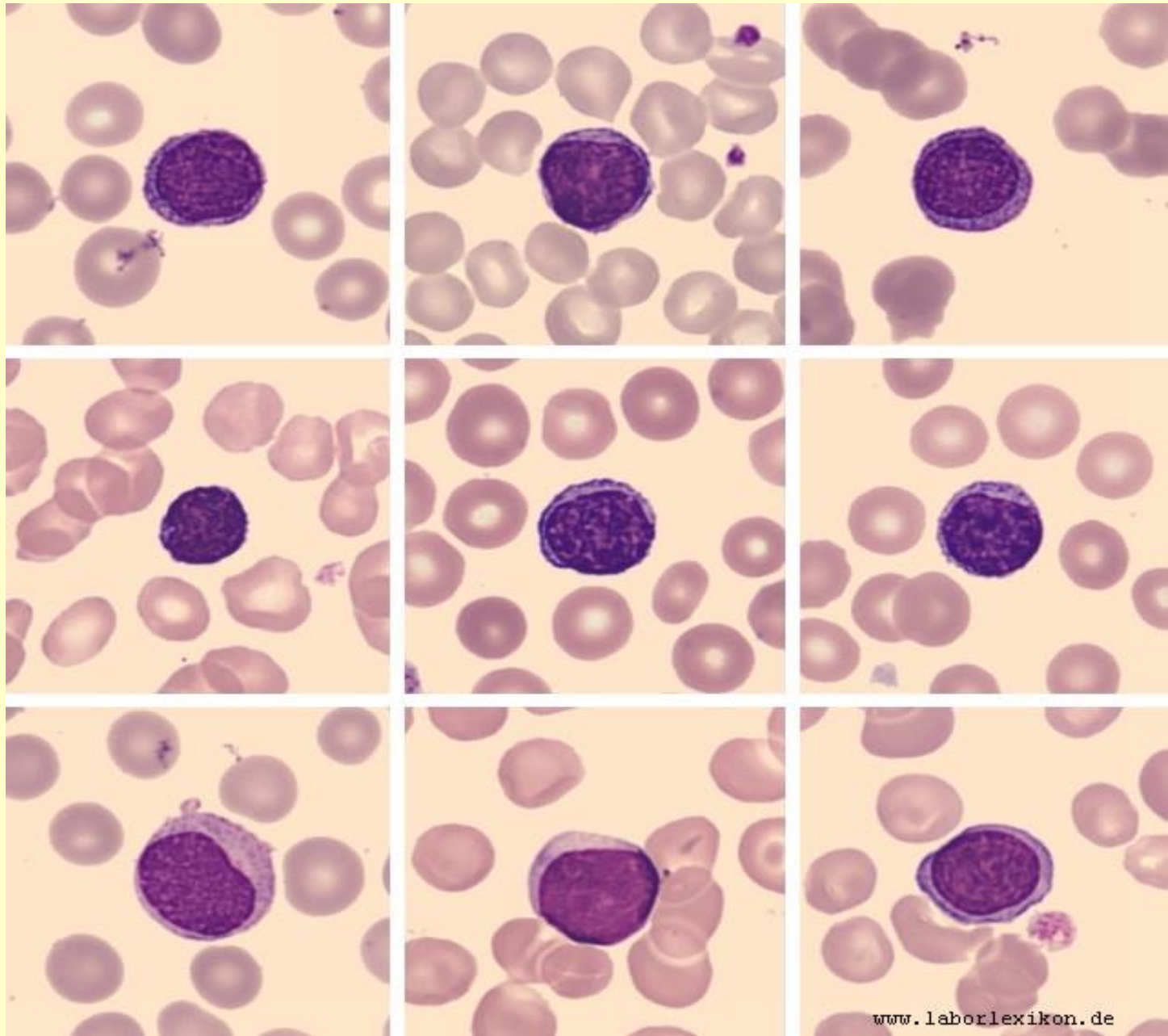


C. Machado
— M.D.

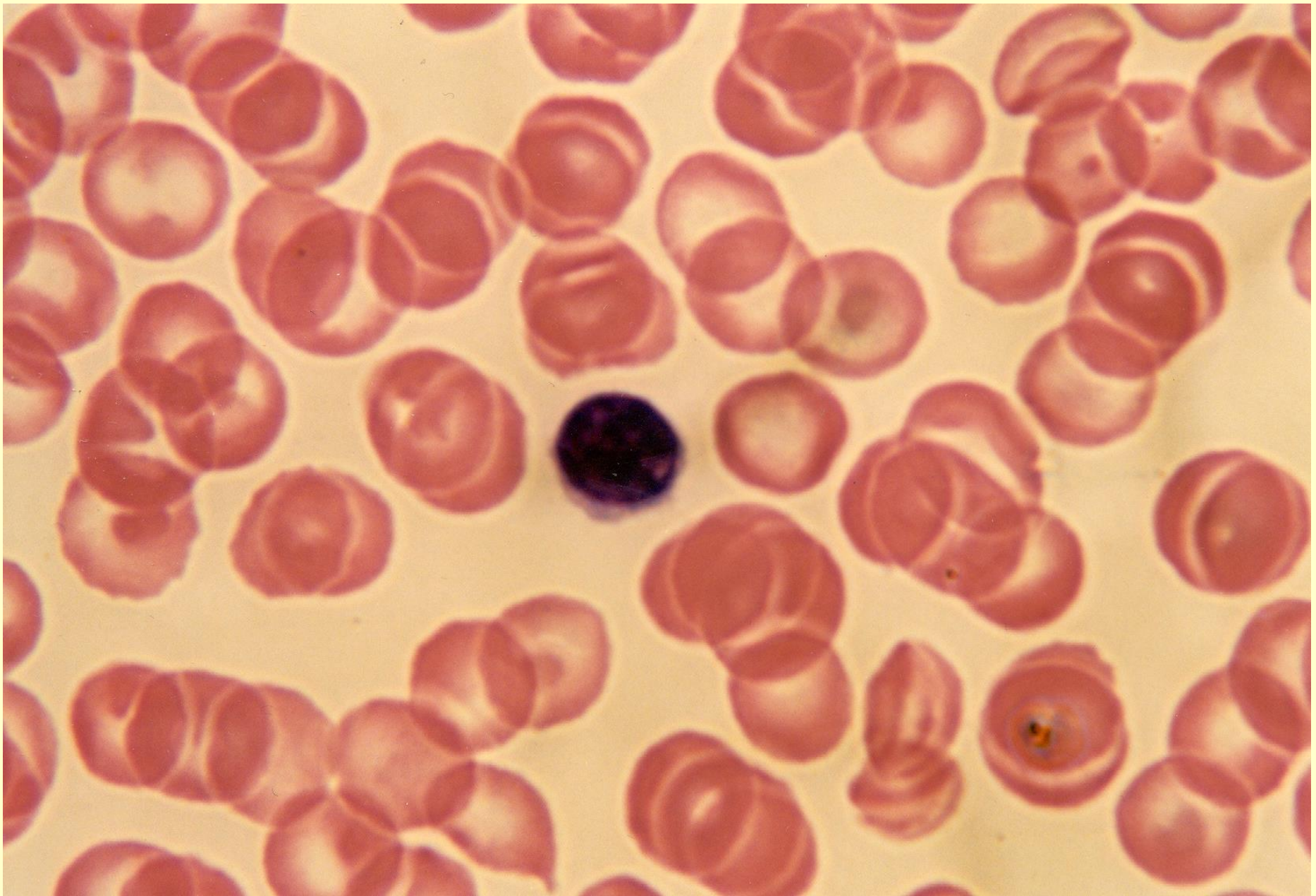


CS

Supported with...



Limfocite. Coloratie May-Grunwald-Giemsa



Frotiu de sange periferic. Hematii si Limfocit. Coloratie May-Grunwald-Giemsa

Monocitul

Forma → ovalara

Diametrul → 20-30 μm

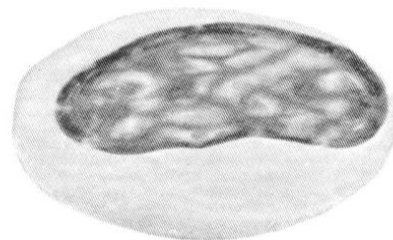
Nucleul → ovalar/ reniform
→ forma literei S

Citoplasma → usor bazofila
→ granule azurofile

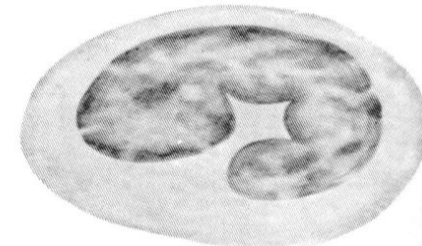


Schiță realizată de Dr. Istrate-Ofițeru Anca-Maria

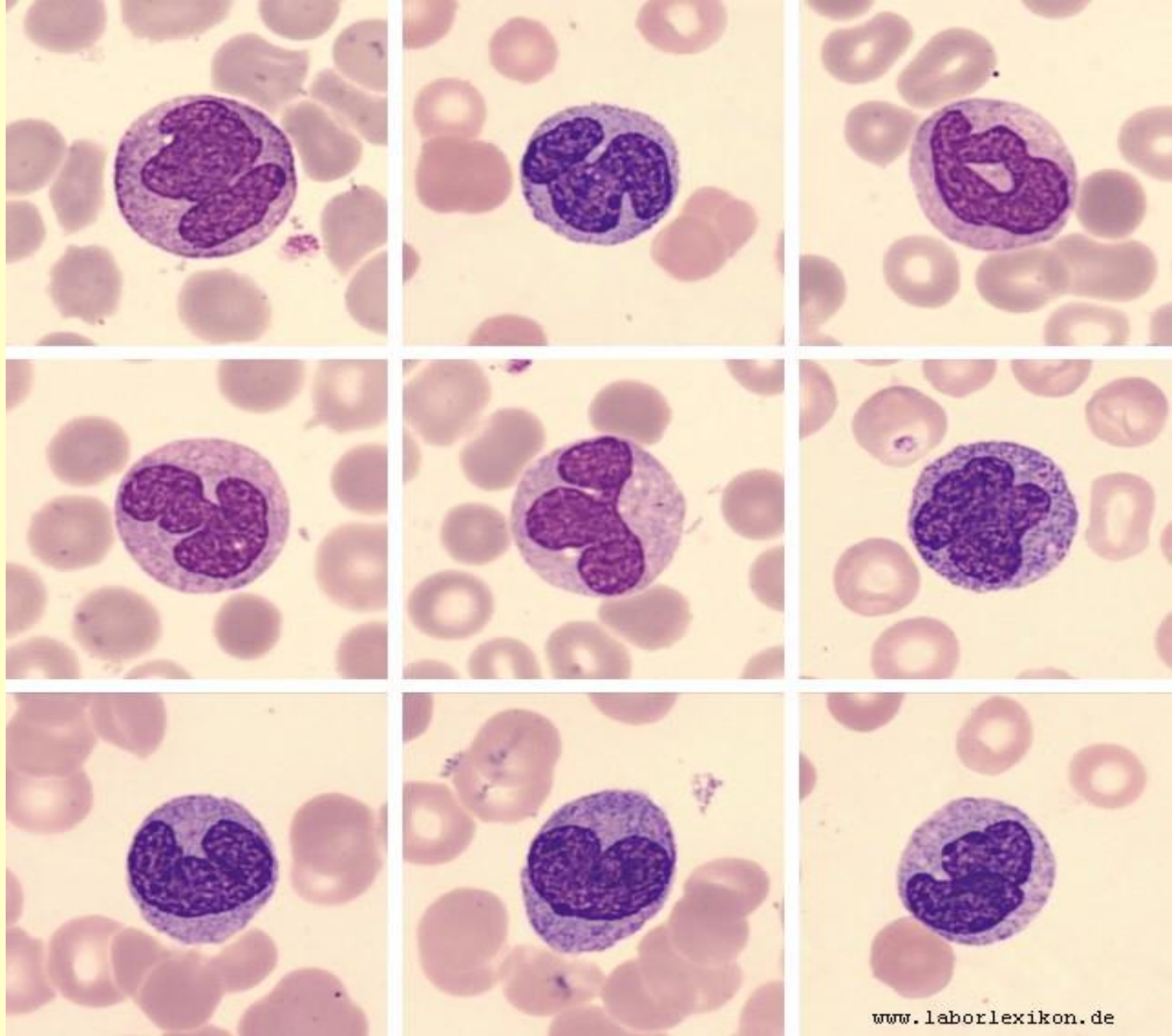
Ross Histologie 2020



Monocyte

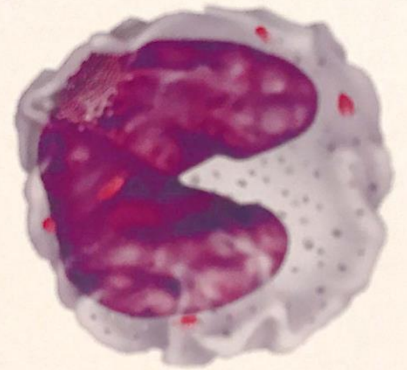


Monocyte



Monocyte. Coloratie May-Grunwald-Giemsa

▼ Monocyte.



C. Machado
—H.D.

Frotiu de sange periferic. Hematii si Monocit. Coloratie May-Grunwald-Giemsa

Trombocitele

Trombocitele sunt denumite si **plachete sanguine**, sunt cele mai mici elemente figurate ale sangelui si reprezinta fragmente din citoplasma megacariocitului trombocitogen din hemomedula. **Nu au nucleu** si pe frotiul de sange periferic apar izolate sau grupate.

Forma → elipsoidala in vasele de sange
→ pe frotiul fixat au forme diferite

Diametrul → 3-5 μm

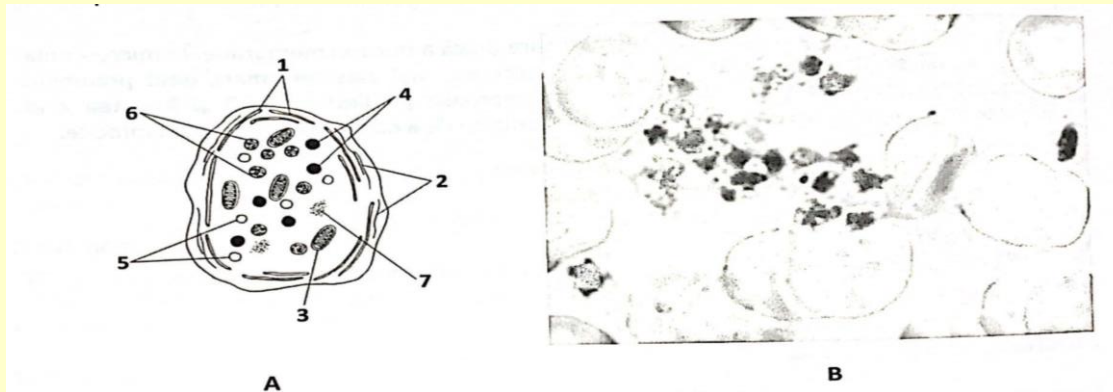
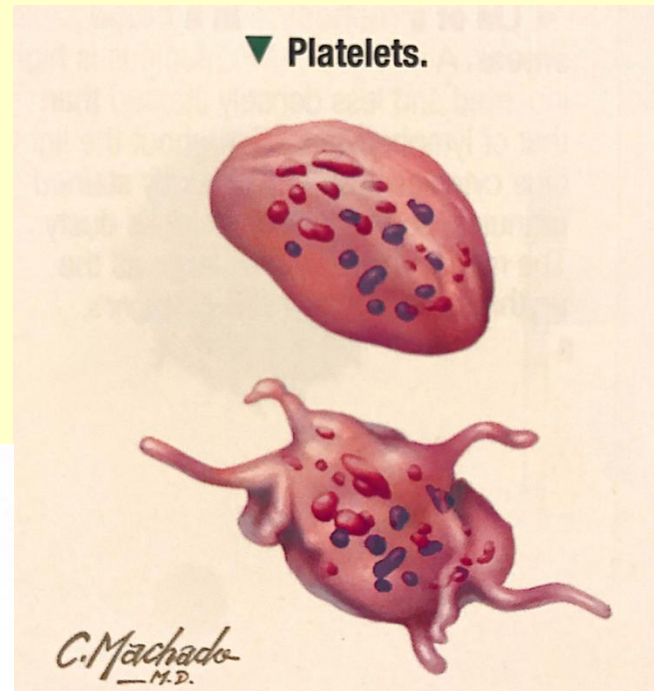
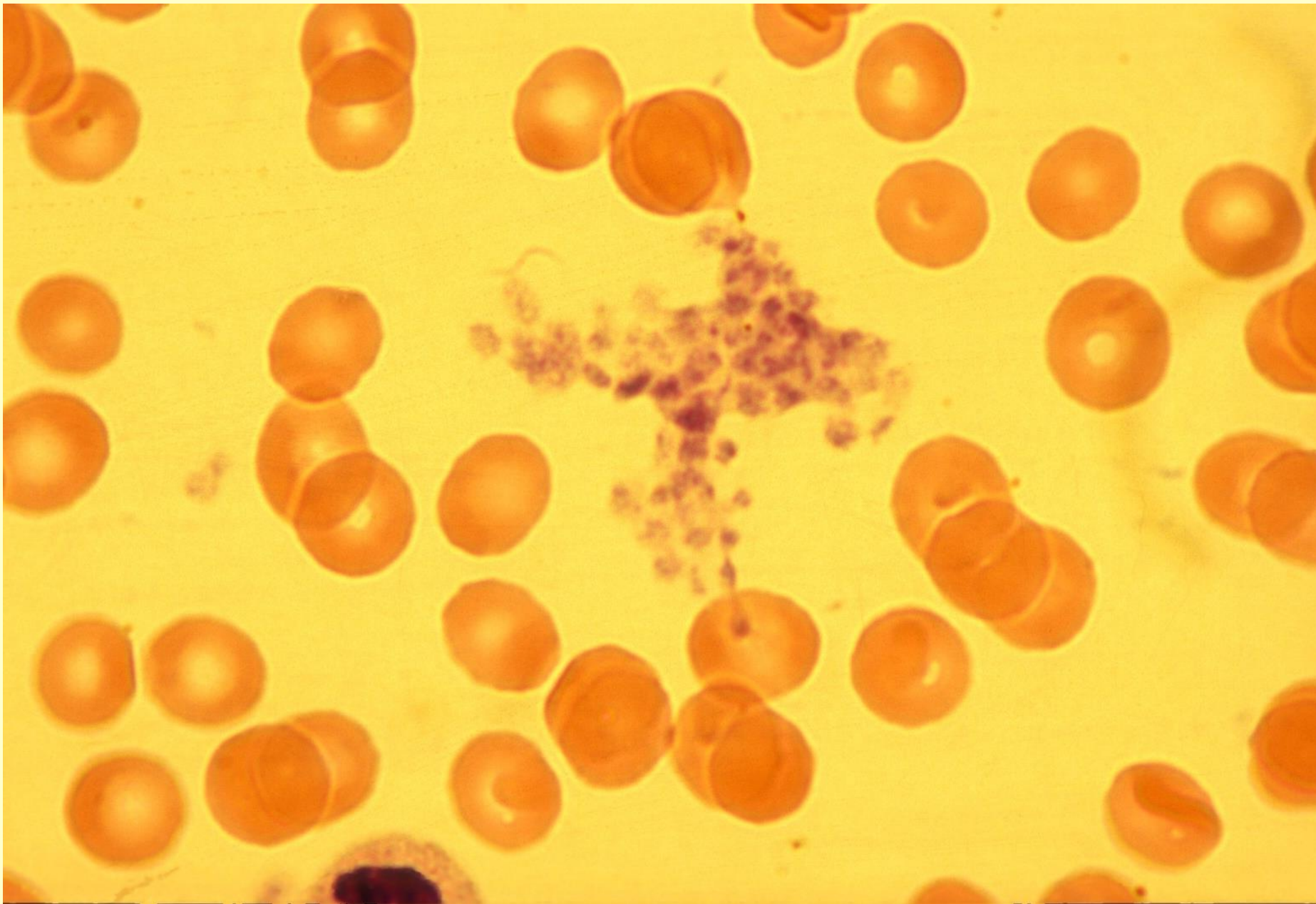


Figura 85. Frotiu periferic. Trombocite.

A: Reprezentare schematică: 1 – microtubuli, 2 – microfilamente de actină și miozină, 3 – mitocondrie, 4 – granulații dense, 5 – granule α , 6 – granulații azurofile, 7 – glicogen (modificat după Poirier, 2002);
B: Imagine histologică, frotiu periferic.

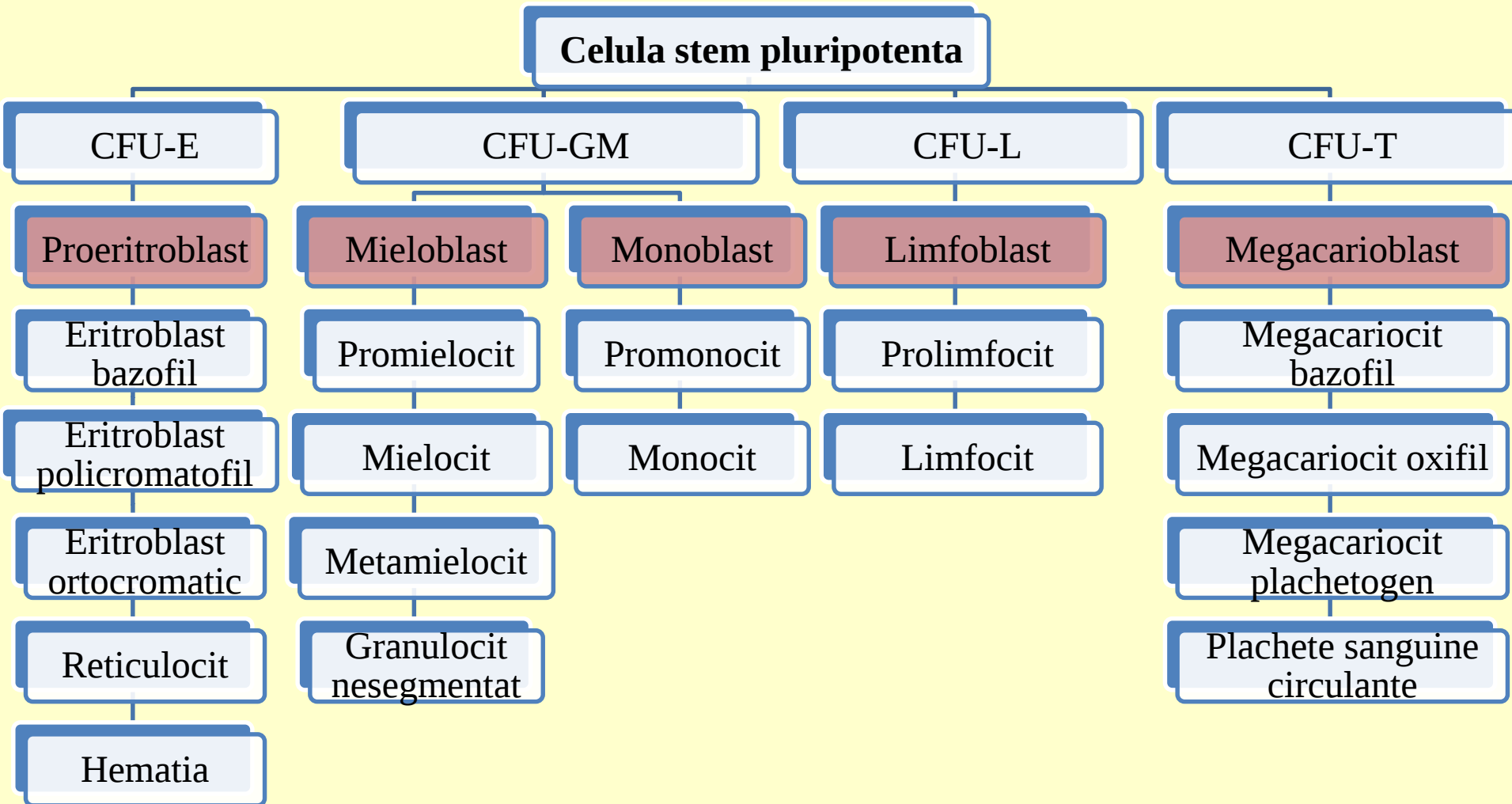


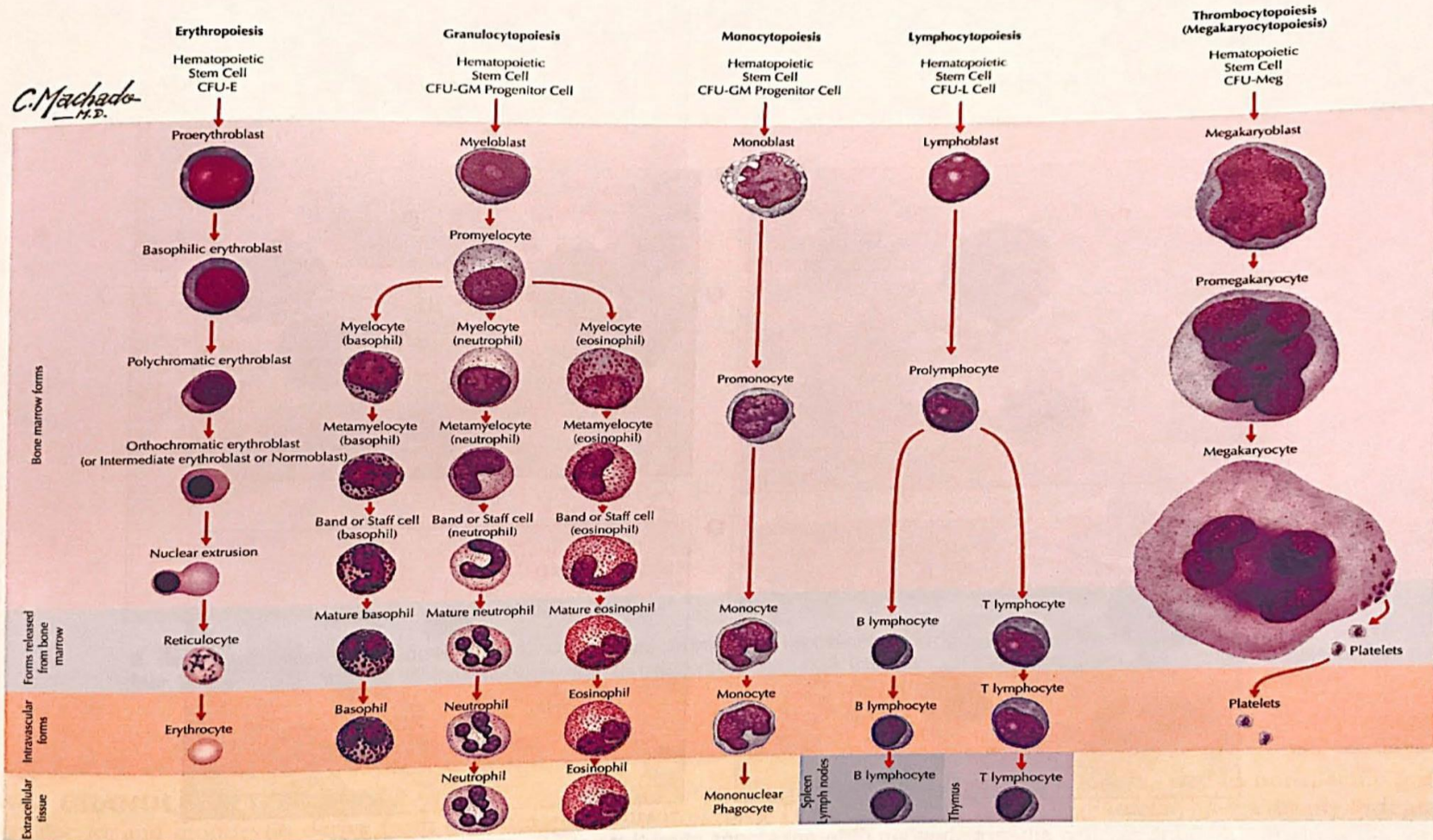


Frotiu de sange periferic. Hematii si Trombocite. Coloratie May-Grunwald-Giemsa

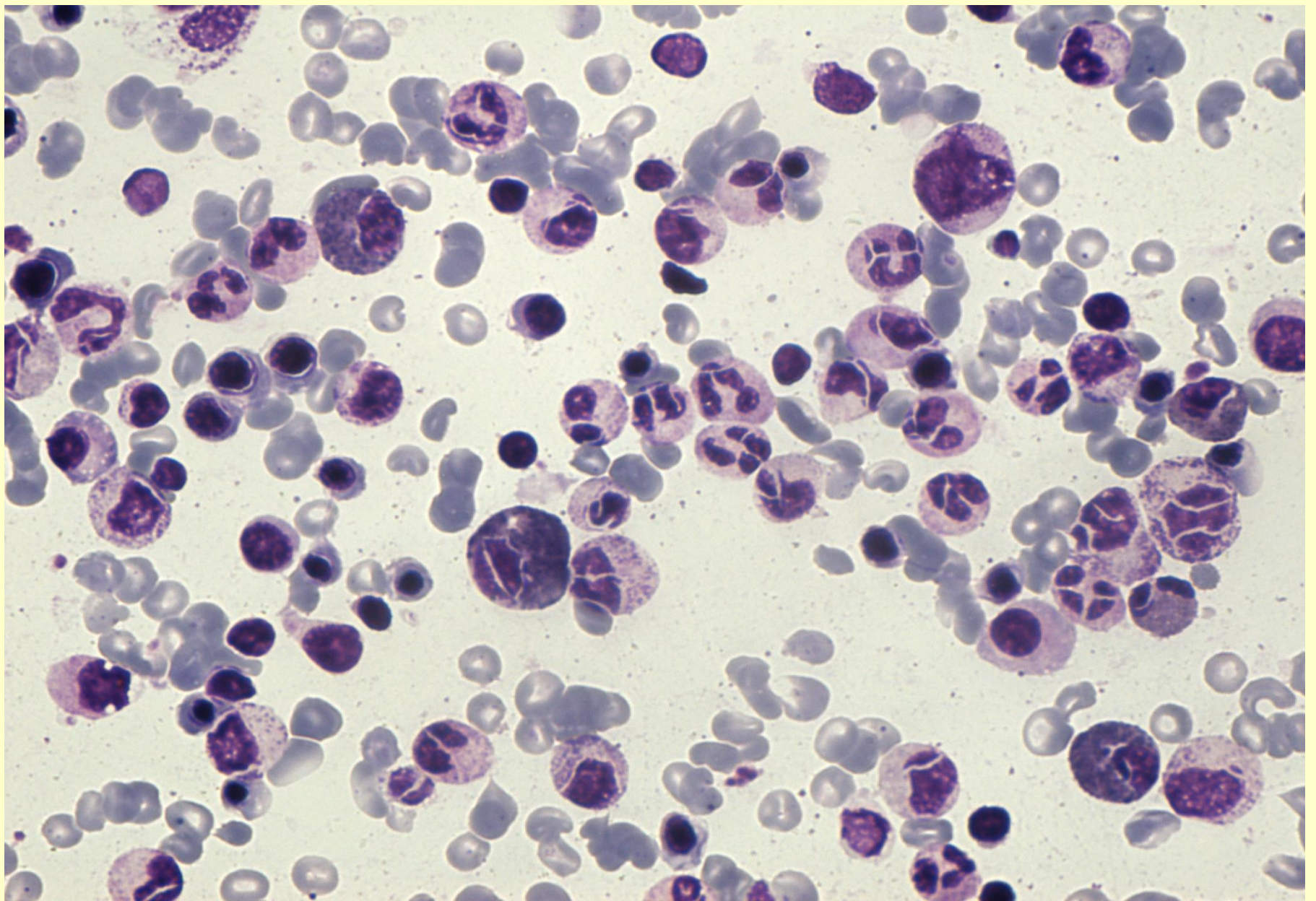
Hematopoieza

Hematopoieza reprezinta procesul de formare a elementelor figurate ale sangelui. Acest proces se desfasoara in tesutul hematopoietic (tesutul mieloid si tesutul limfoid).

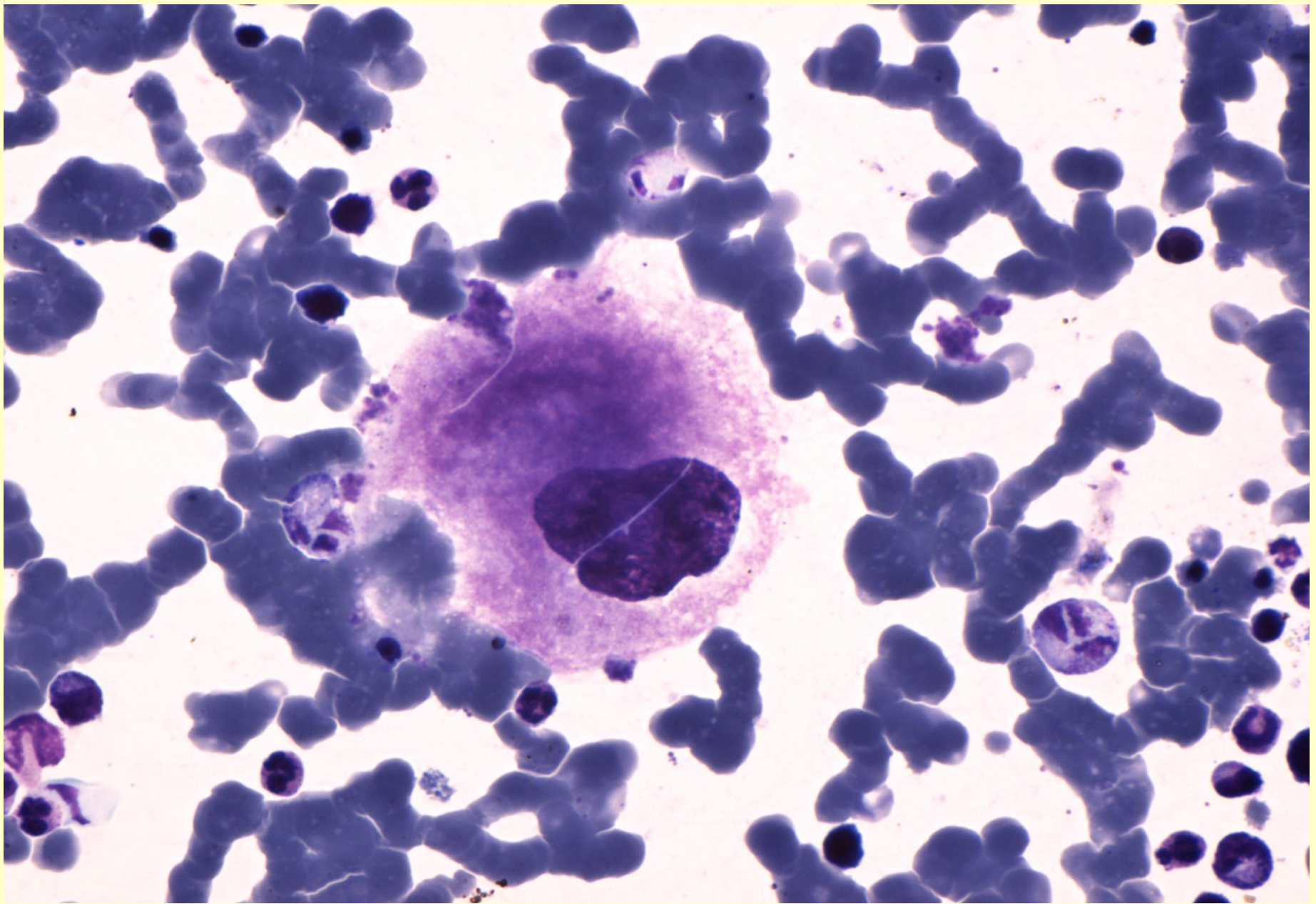




▲ **Schematic showing stages of hematopoiesis.** Although not all cells are included in each sequence, main cell types seen in bone marrow smears are shown in erythropoiesis (**Left**), granulocytopoiesis (**Center, Left**), monocytopoiesis (**Center**), lymphocytopoiesis (**Center, Right**), and megakaryocytopoiesis (**Right**). The various CFU cells that arise from the hematopoietic stem cell (not shown) closely resemble lymphocytes. Except for megakaryocytes, cells in erythroid and myeloid series as a rule get smaller during differentiation. Also, nuclear size declines, nuclear density increases, and special features related to cell lineage—such as hemoglobin production and nuclear extrusion in erythropoiesis, and specific granules (eosinophilic, basophilic, or neutrophilic) in granulocytopoiesis—appear. Various growth factors and cytokines mediate cell proliferation rate and survival and maturation of progenitor cells. Some of these are colony-stimulating factors, erythropoietin, thrombopoietin, interleukins (IL-1, IL-3, IL-6, IL-11), and stem cell factors.



Hemomedula. Coloratie May-Grunwald-Giemsa



Megacariocit trombocitogen. Coloratie May-Grunwald-Giemsa

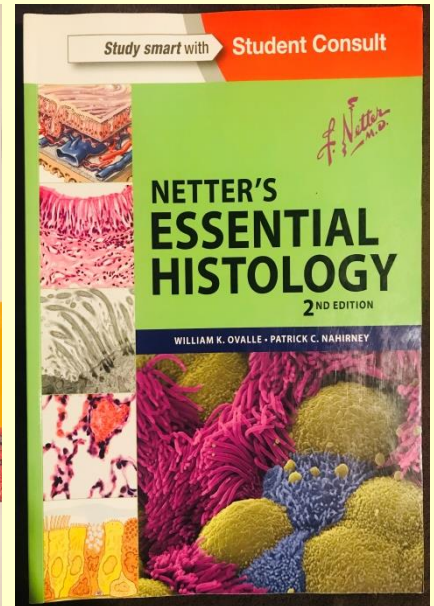
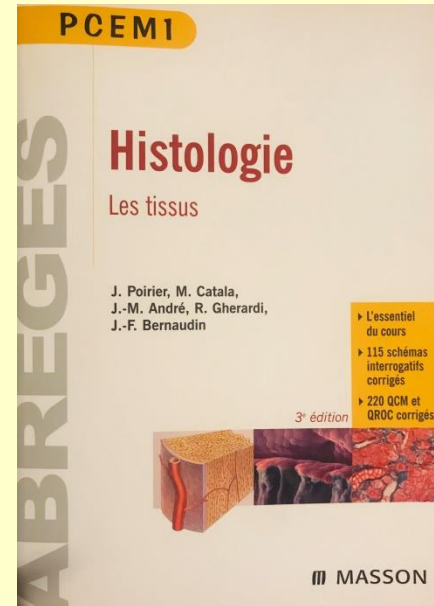
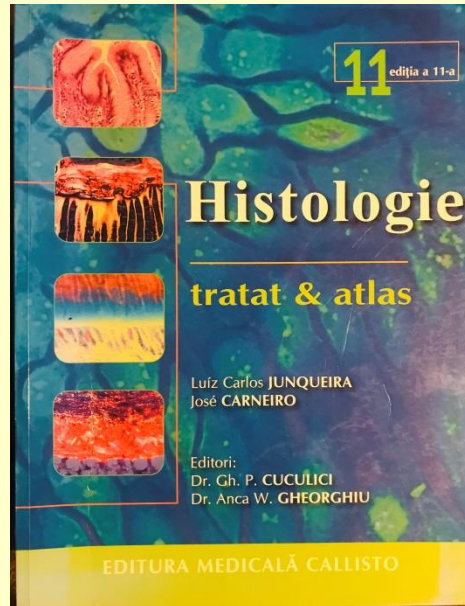
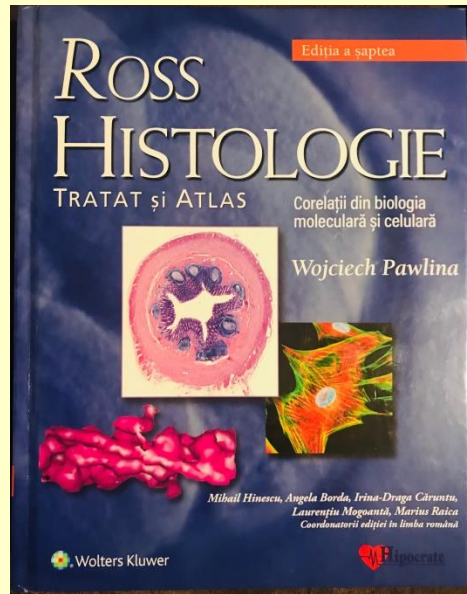
Preparate demonstrative

- 1. Hematii. Col MGG;**
- 2. Plachetele sanguine. Col MGG;**
- 3. Granulocit neutrofil. Col MGG;**
- 4. Granulocit acidofil. Col MGG;**
- 5. Granulocit bazofil. Col MGG;**
- 6. Limfocit. Col MGG;**
- 7. Monocit. Col MGG.**

Preparate de desenat

- 1. Frotiu de sange periferic. Col MGG;**
- 2. Filiatia celulara (Schema);**
- 3. Formula leucocitara.**

Bibliografie



<http://86.122.148.72/virtual-histology/html/caskviewer.html>