Hämatopoetisches System

1. Erythrozytopoese

2. Myelozyto- bzw. Granulozytopoese

3. Thrombozytopoese

4. Monozyten- Makrophagensystem

5. Lymphopoese

Definition „Gewebe“ :

Verbände gleichartiger oder verschiedener Zellen mit oder ohne eigene Blutversorgung, deren räumliche Anordnung besonderen funktionellen Gesetzen folgt

Blut ist ein Gewebe mit offenem Zellverband

Allgemeingültige Prinzipien aller Gewebe, Organe und Organsysteme

1. Strukturprinzip

2. Funktionsprinzip

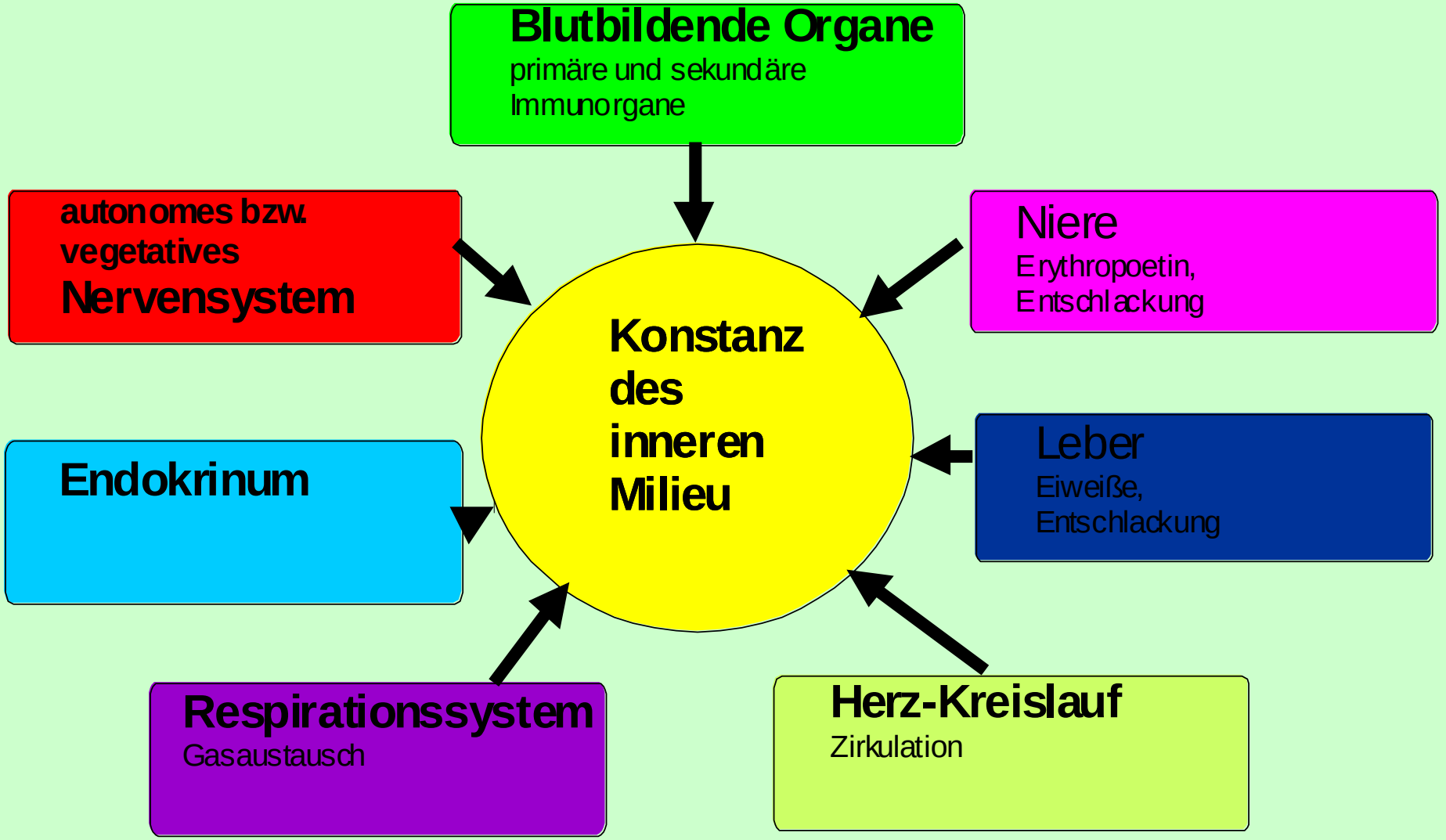
3. Regulationsprinzip

4. krankhafte Zustände

Aufgaben des Blutes :

1. Gasaustausch
   (Kohlendioxid x Sauerstoff)
2. Transportfunktion
3. Entschlackungsfunktion
4. Konstanz des inneren Milieus
   der Gewebe
5. Wärmetransport und -regulation
6. Abwehrfunktion

Regulations- und Integrationssysteme



Immunorgane

1. primäre
   Thymus - Knochenmark - Lymphsystem des Darmes (Bursa Fabricii)

2. sekundäre
   Lymphknoten - Milz

Blut

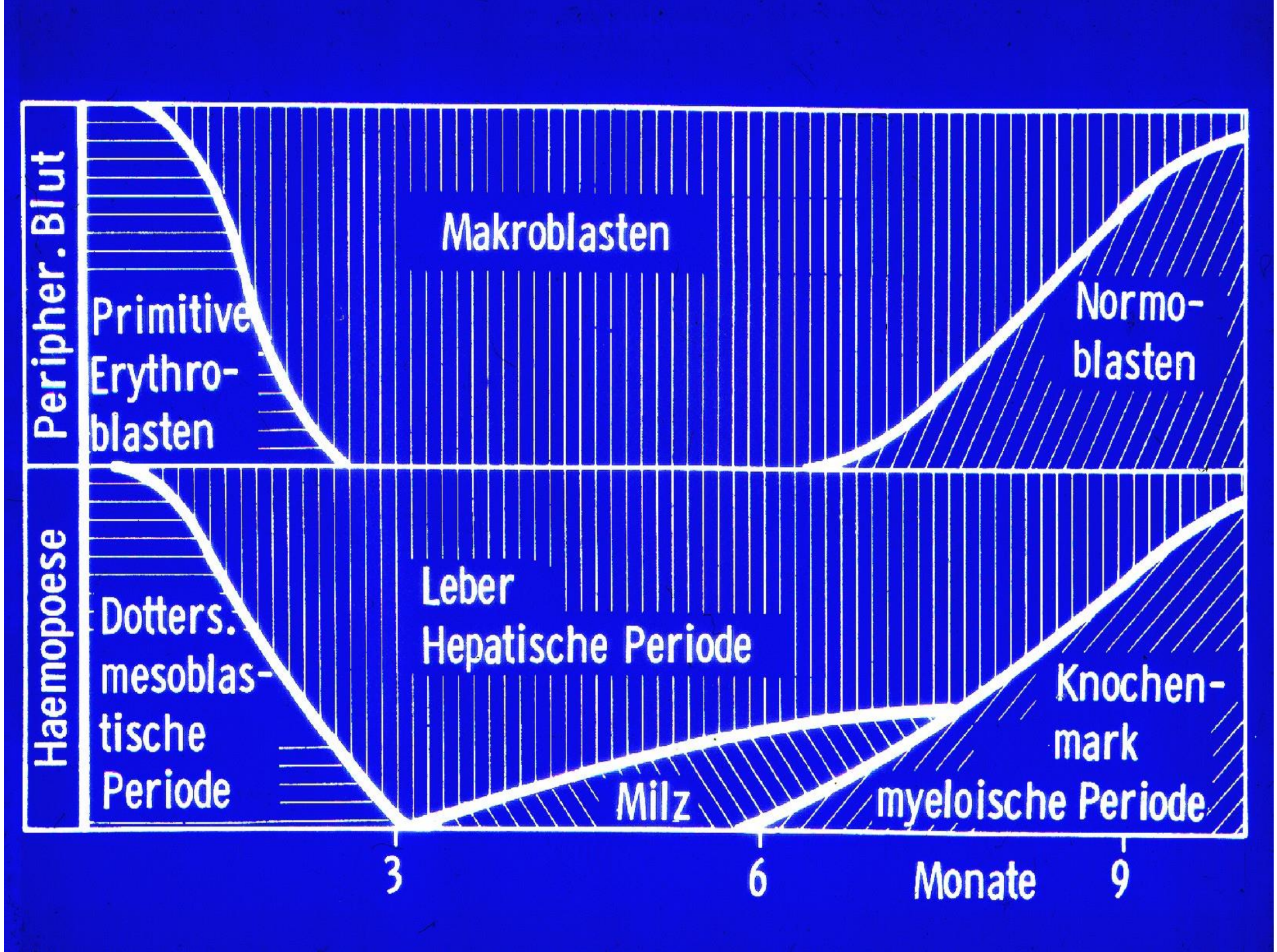
Ein hoch organisiertes und spezialisiertes Gewebe, das funktionellen und strukturellen Gesetzmäßigkeiten unterworfen ist
und

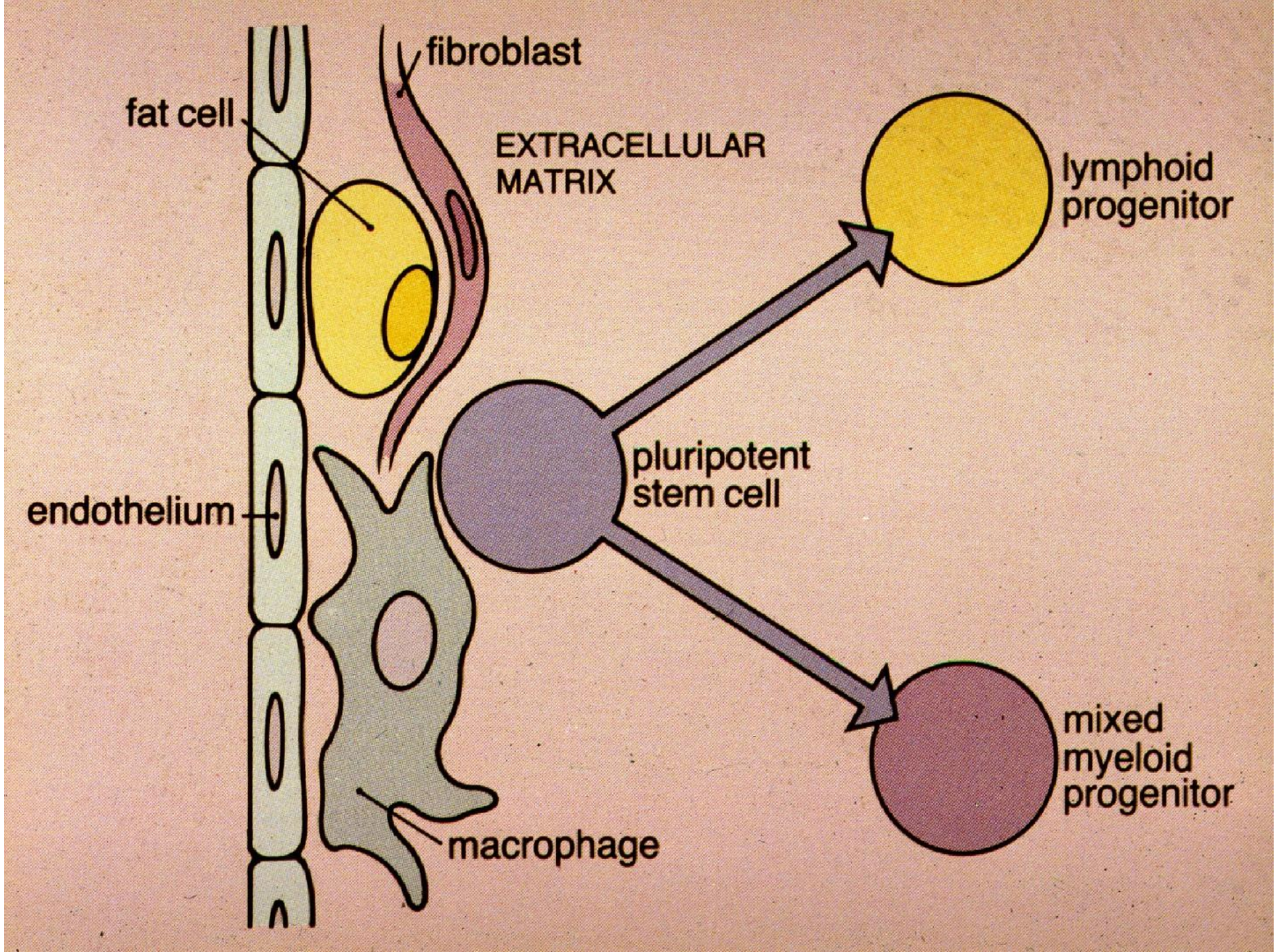
vielfältige Aufgaben zu bewältigen hat
und

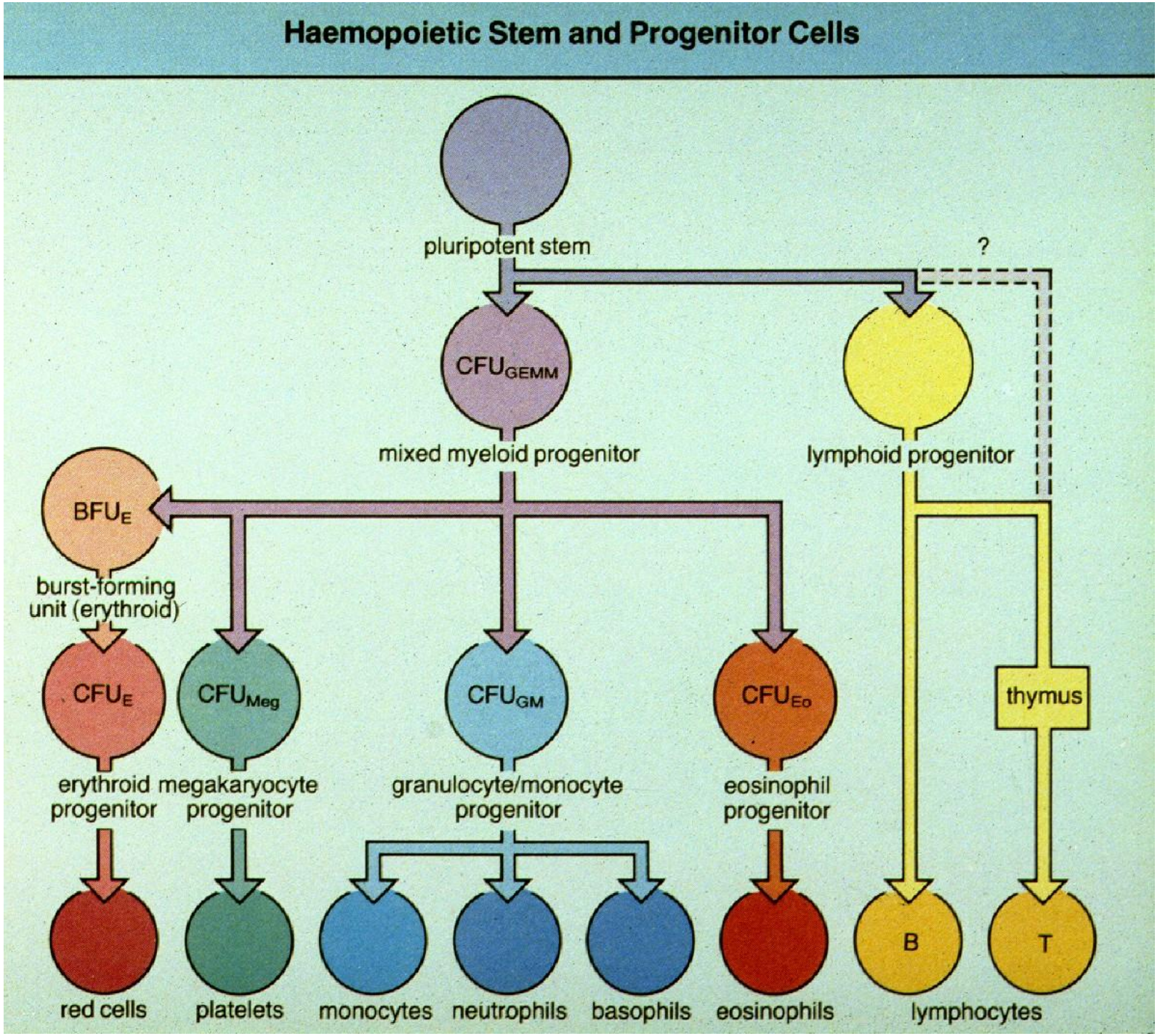
von zahlreichen Stellgliedern (Organen und Organsystemen) abhängig ist sowie beeinflußt wird.

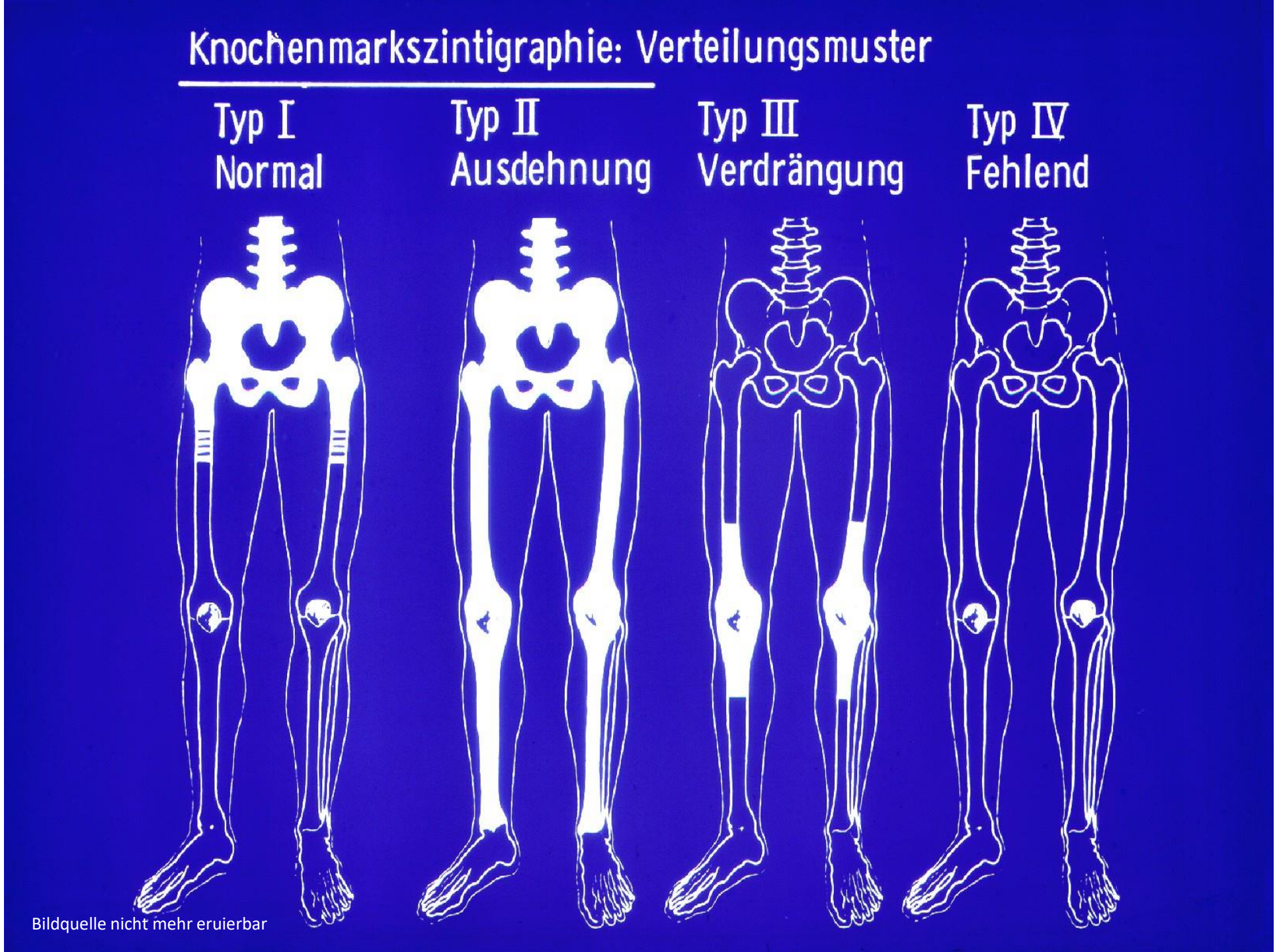
Blut ist nicht nur eine Mischung aus flüssigen bzw. partikulären und apartikulären Bestandteilen

Zahlreiche Bilder der folgenden Bildgalerie stammen großenteils aus
Clinical Hematology Atlas by Jacqueline H. Carr and
Bernadette F. Rodak Saunders Elsevier
(2004, Spiral, Revised)
und
Color Atlas of Clinical Hematology
A. Victor Hoffbrand
ISBN 10: 1563755920 / ISBN 13: 9781563755927
Published by Mosby-Year Book, 1994:
Titel: Color Atlas of Clinical Hematology.
Verlag: London etc. ; Mosby Wolfe,
Erscheinungsdatum: 1994
Auflage: 2nd edition


Periphер. Blut
Haemopoese
Primitive Erythro-blasten
Makroblasten
Normo-blasten
Dotters. mesoblas-tische Periode
Leber
Hepatische Periode
Milz
Knochen-mark
myeloische Periode
3
6
Monate
9

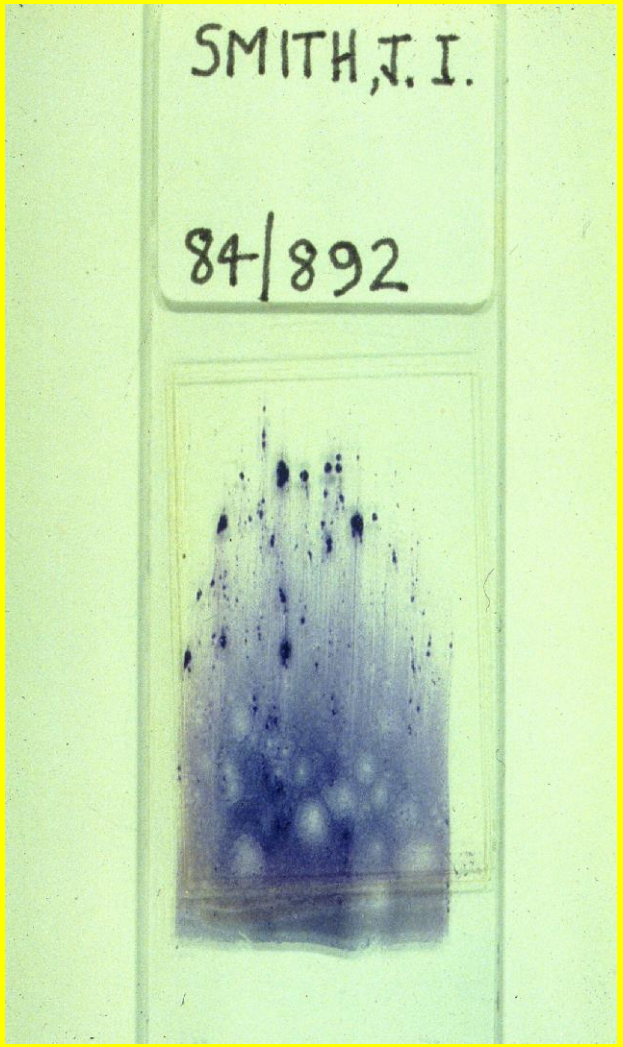

fibroblast
fat cell
EXTRACELLULAR MATRIX
lymphoid progenitor
pluripotent stem cell
endothelium
mixed myeloid progenitor
macrophage

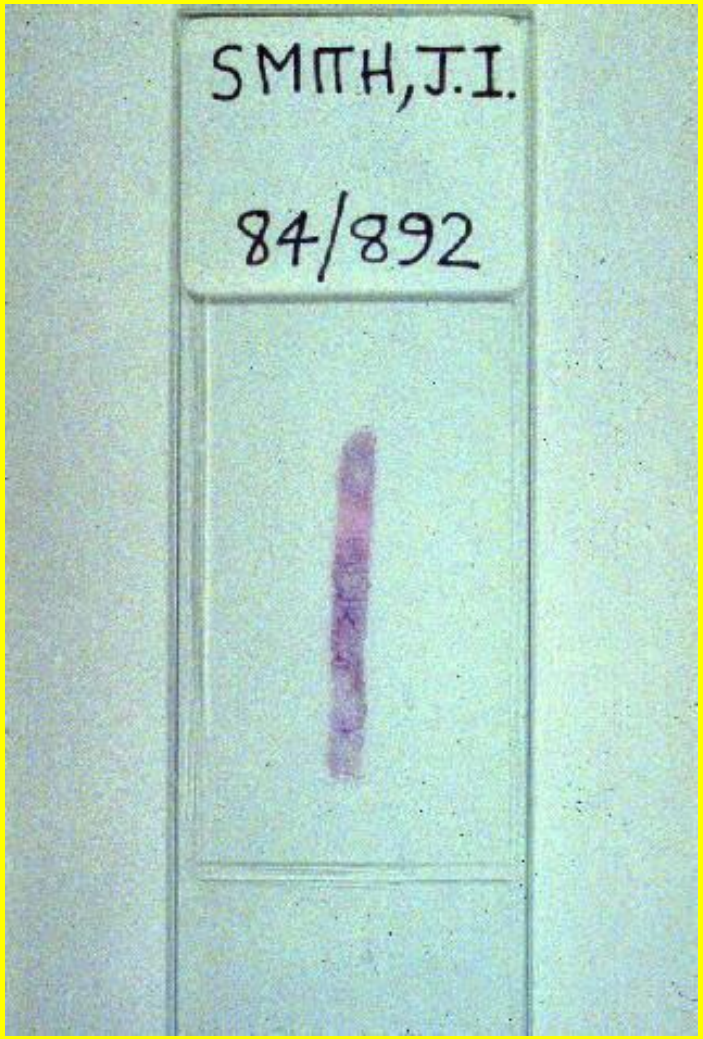

Haemopoietic Stem and Progenitor Cells
pluripotent stem
?
CFU$_{GEMM}$
mixed myeloid progenitor
lymphoid progenitor
BFU$_E$
burst-forming unit (erythroid)
CFU$_E$
CFU$_{Meg}$
CFU$_{GM}$
CFU$_{Eo}$
thymus
erythroid progenitor
megakaryocyte progenitor
granulocyte/monocyte progenitor
eosinophil progenitor
red cells
platelets
monocytes
neutrophils
basophils
eosinophils
B
T
lymphocytes



Bildquelle nicht mehr eruierbar

Technik der Materialgewinnung bei hämatologischen Fragestellungen

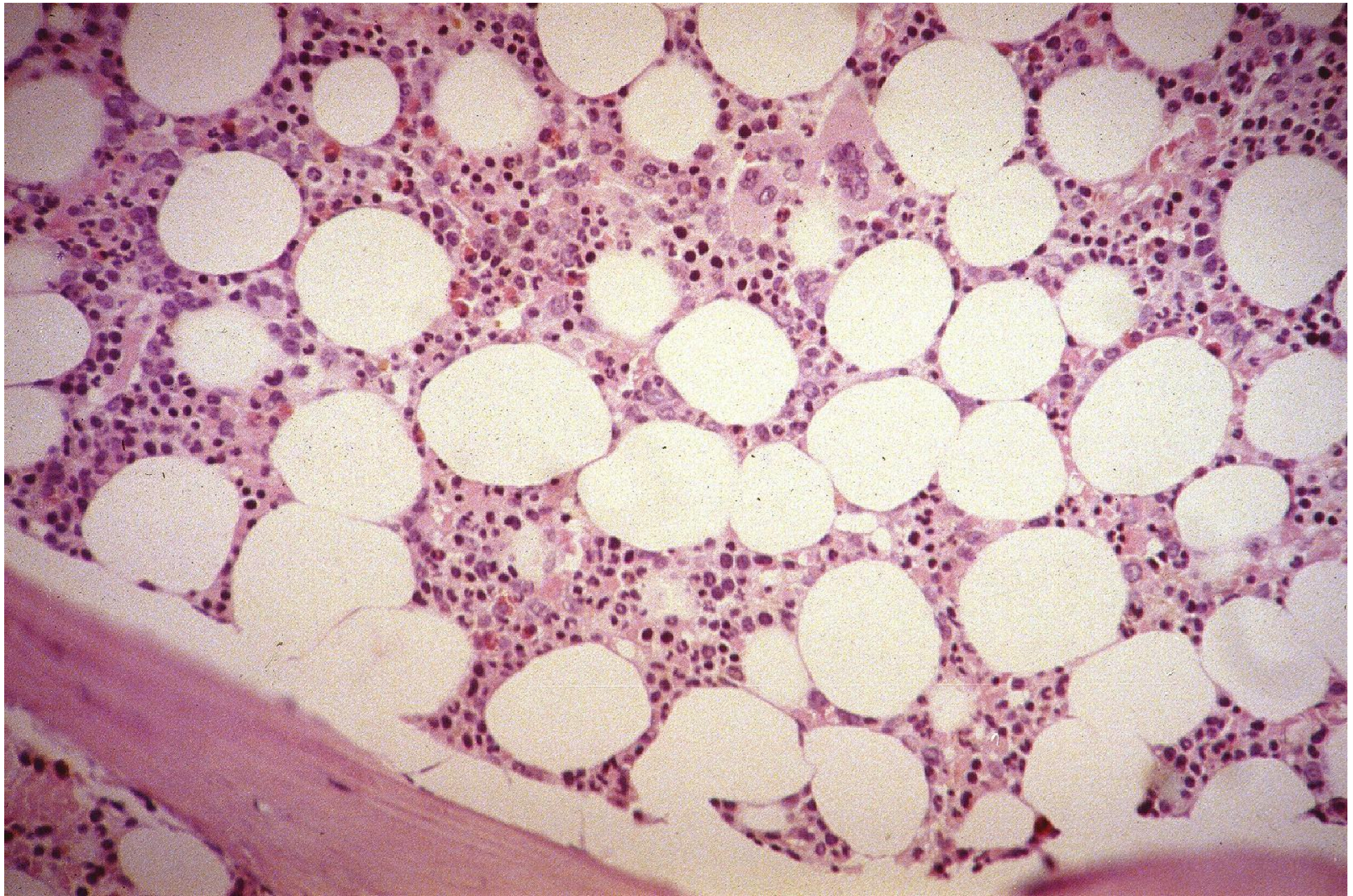




Comparison of the relative advantages and disadvantages of paraffin and plastic embedding of bone marrow trephine biopsies.

	Paraffin embedding	Resin / plastic embedding
Advantages	1 Widespread antigen preservation allows immunohistochemical studies. 2 Pathologists are familiar with sections cut from paraffin embedded material.	1 Superb cytological detail available from the very thin sections obtained by this technique.
Disadvantages	1 Loss of some histochemical reactivity within the granules of the granulocyte and mast cell series, e.g. Leder stain. This loss is directly proportional to the strength of the acid used in decalcification. 2 Some inevitable tissue distortion is produced by decalcification.	1 Loss of some immunoreactivity. 2 A separate technique is required solely for bone marrow biopsies. 3 Pathologists are unfamiliar with resin embedded sections and their associated artefacts, e.g. the basophilic hue indicative of erythroid histogenesis is lost in resin embedded sections.

Normozelluläres blutbildendes Mark



Topography (distribution) of cellular elements

Are all cell types present?

Are any particular cells present in abnormal numbers?

- e.g. increased granulocytes in CGL
- Prominent mast cells in Waldenström's macroglobulinaemia

Normal cellular distribution

- Granulocytes
  - Paratrabecular, peri-arterial
- Erythroid
  - Intertrabecular
- Megakaryocytes
  - Intertrabecular and peri-sinusoidal

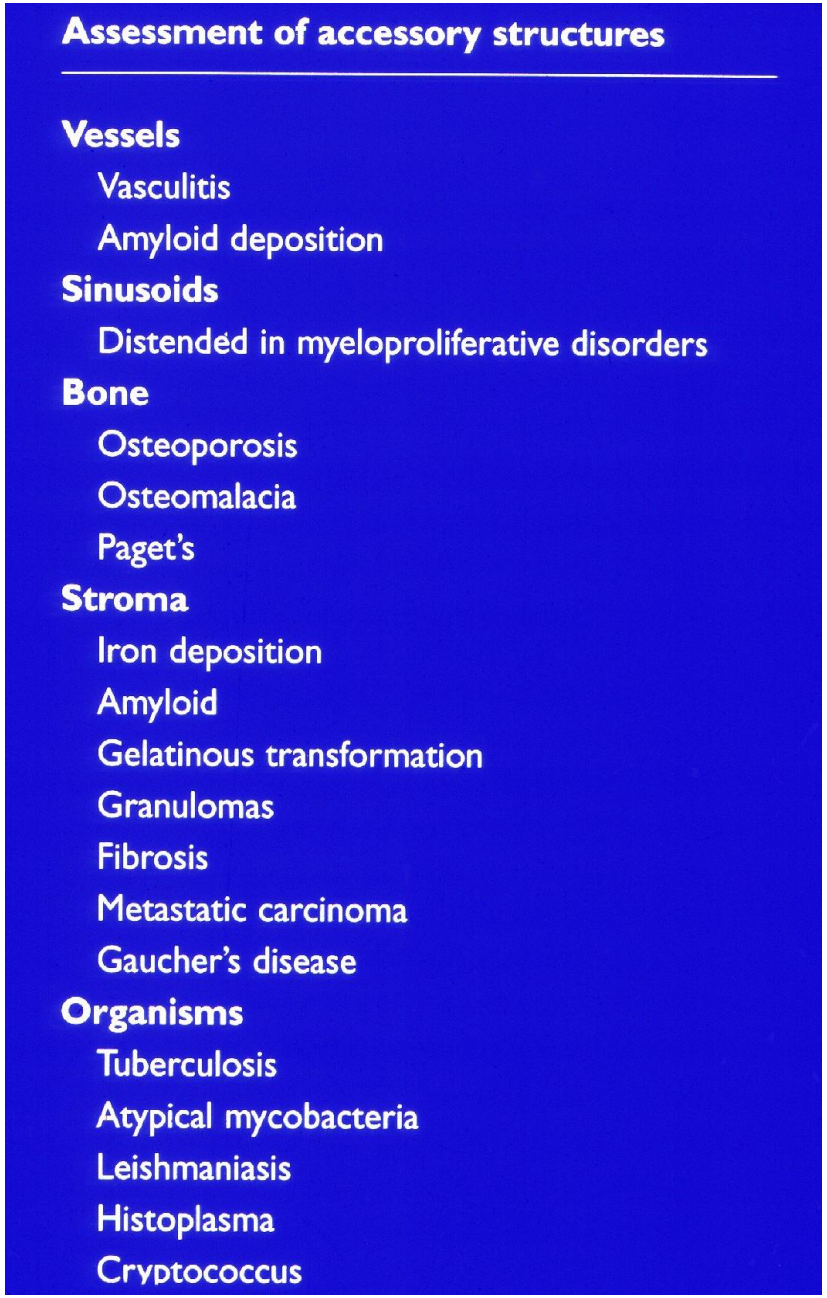
Common abnormal patterns

- Myelodysplasia / myeloproliferation
  - Paratrabecular erythroid and megakaryocytic colonies
  - Megakaryocytic clustering
- Non-Hodgkin's lymphoma
  - Follicle centre cell has a paratrabecular pattern
  - CLL is usually diffuse or nodular

Assessment of cellularity

Hypocellular	Aplastic anaemia
	Hairy cell leukaemia
	Acute myeloid leukaemia
Normocellular	Be aware of subtle infiltrates such as myeloma
Hypercellular	
Homogeneous	Non-Hodgkin's lymphoma
	Acute leukaemias
Heterogeneous	Reactive
	Myeloproliferative syndromes
	Myelodysplasias
	Metastatic cancer

Bildquelle nicht mehr eruierbar



Bildquelle nicht mehr eruierbar

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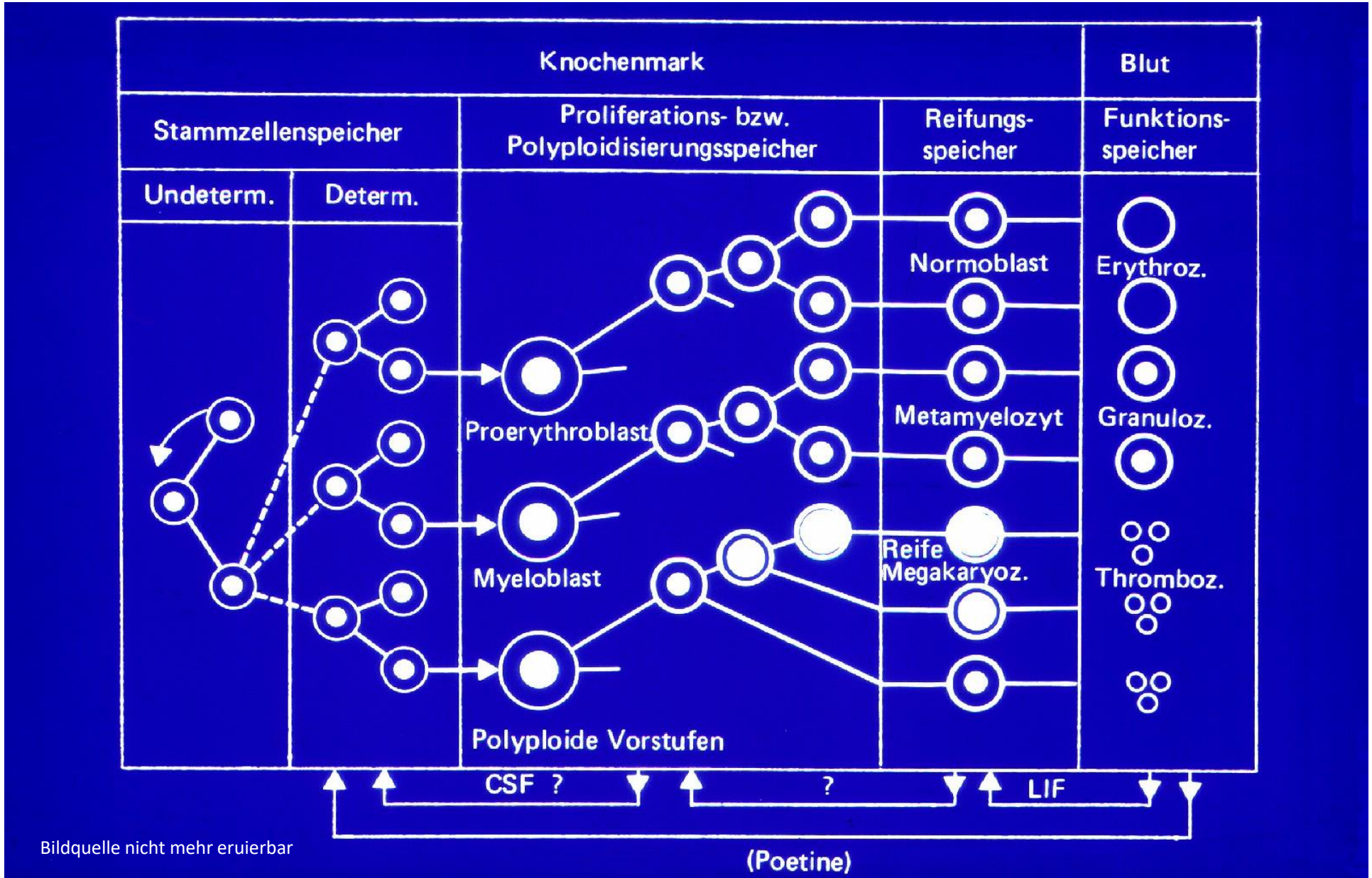
  - CLL is usually diffuse or nodular

Bildquelle nicht mehr eruierbar

Knochenmark : Stammzellspeicher Proliferationsspeicher Reifungsspeicher

Blut : Funktionsspeicher



Bildquelle nicht mehr eruierbar

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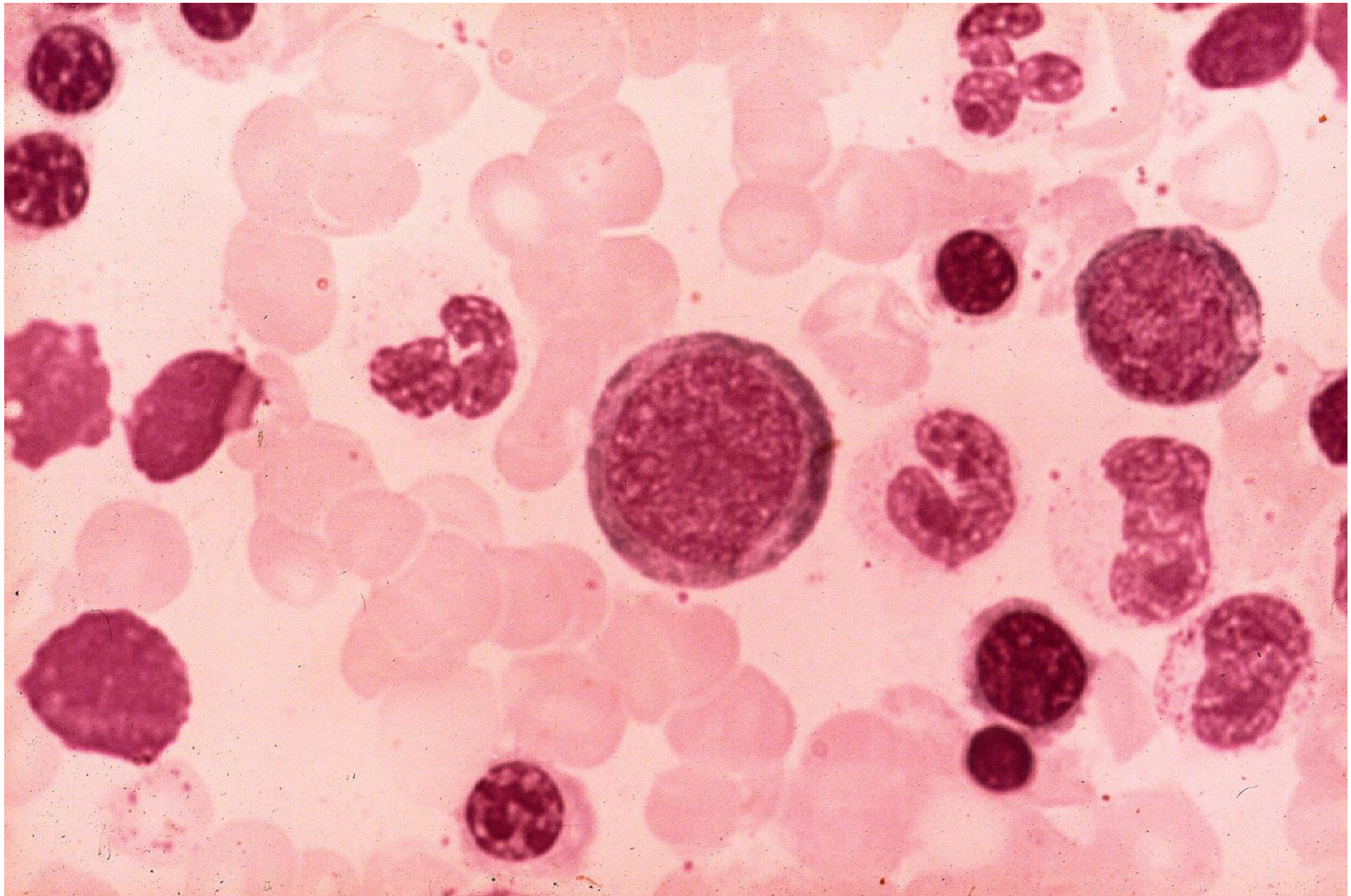
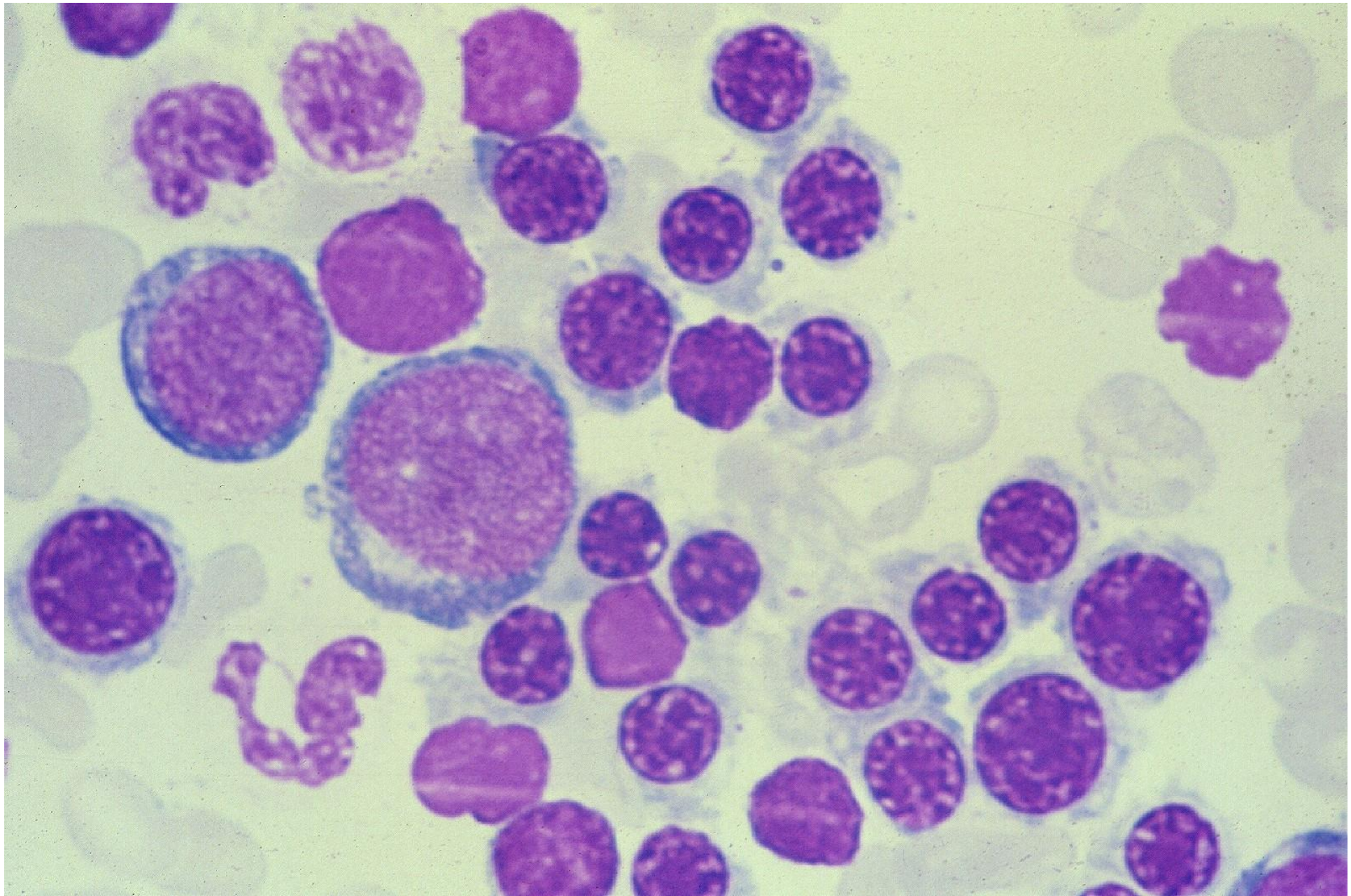
Normales Knochenmark :**Proerythroblast**

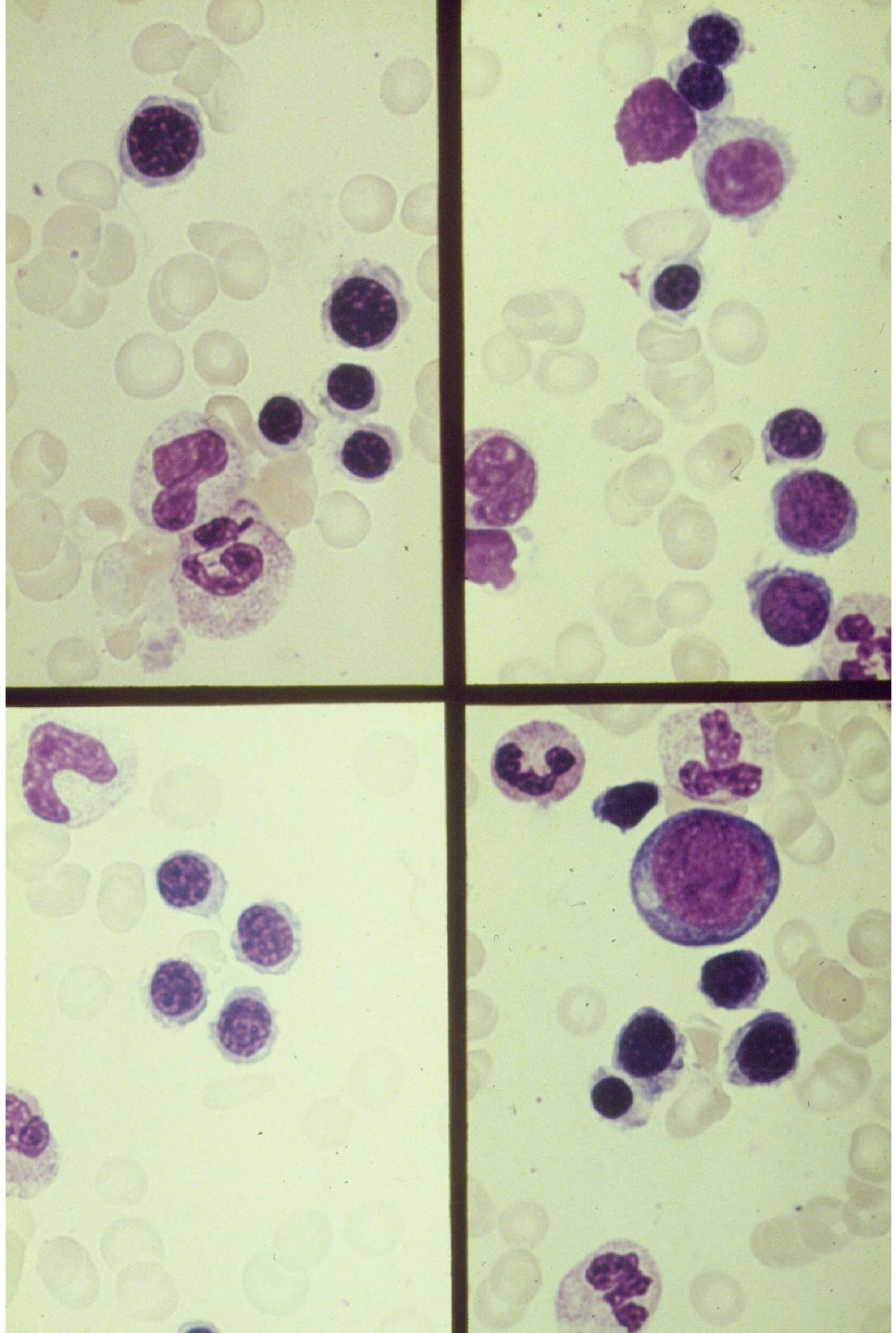


Normales Knochenmark : **Erythron**



Faustregel:

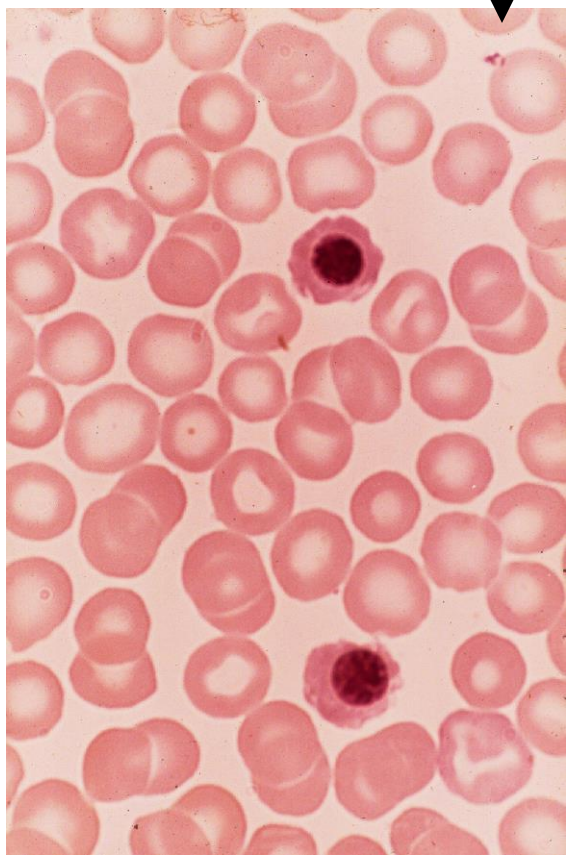
rote Reihe - **runde** Kerne

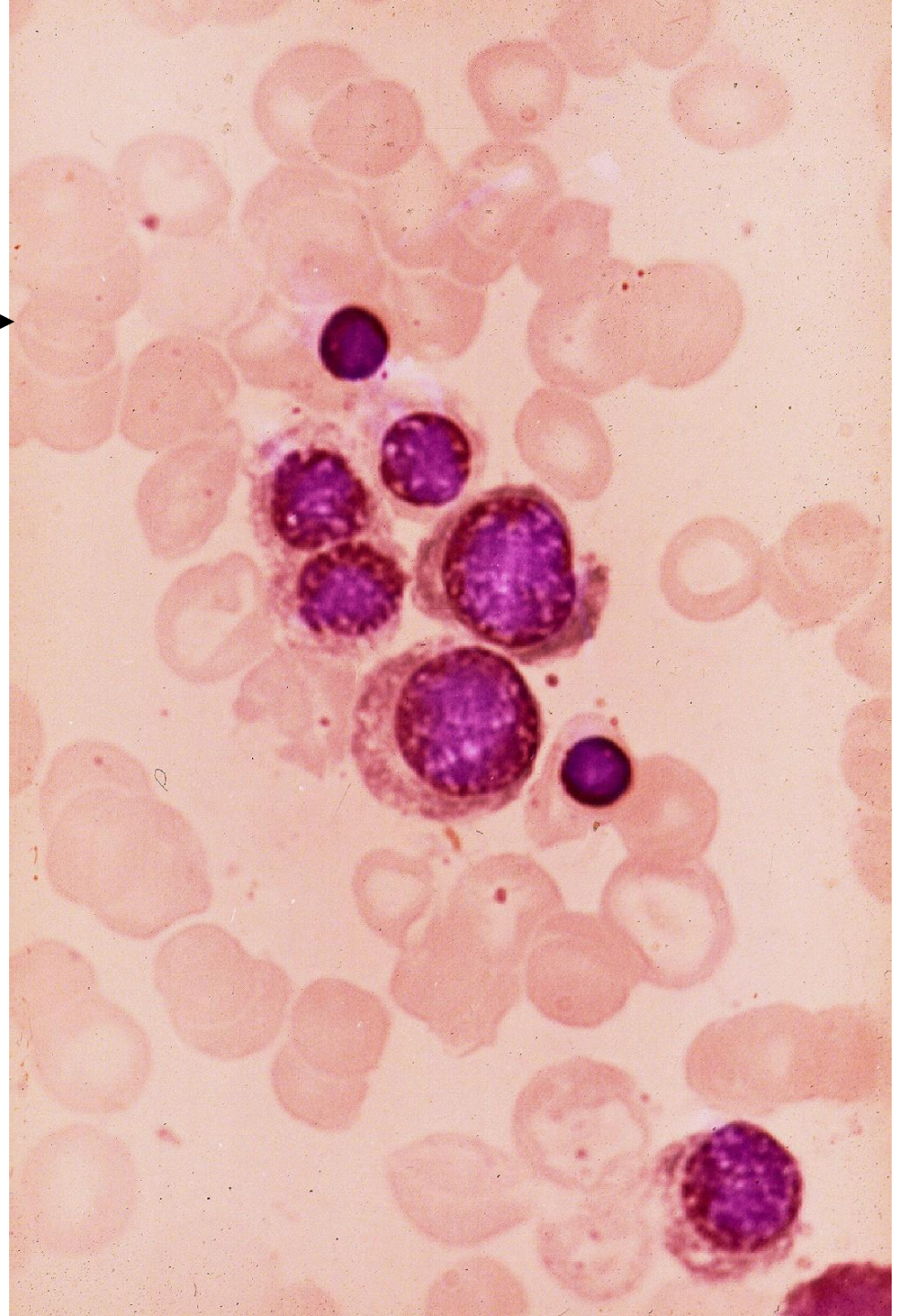


Normales Knochenmark :

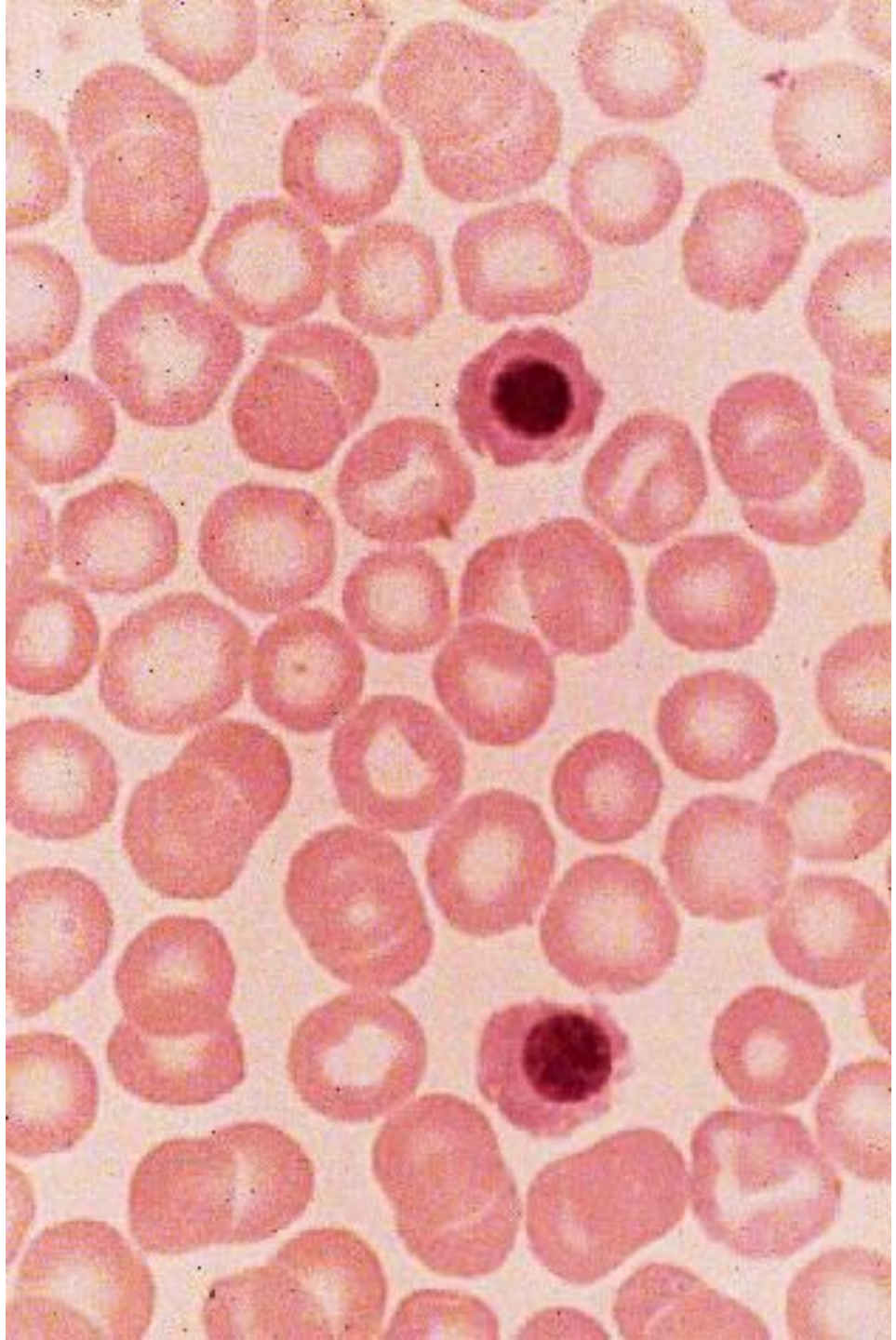
Normoblast, basophil

Normoblast, eosinophil

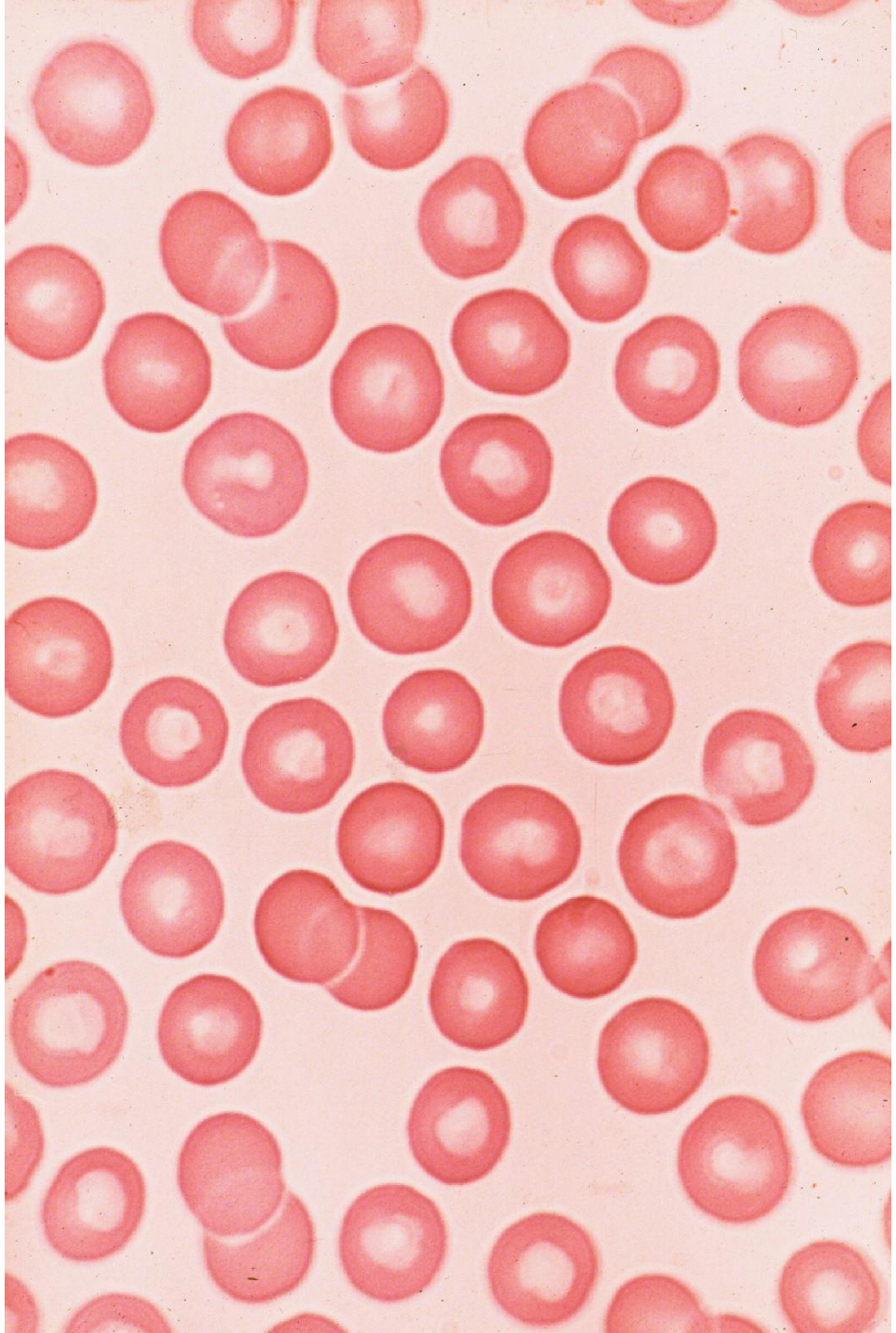


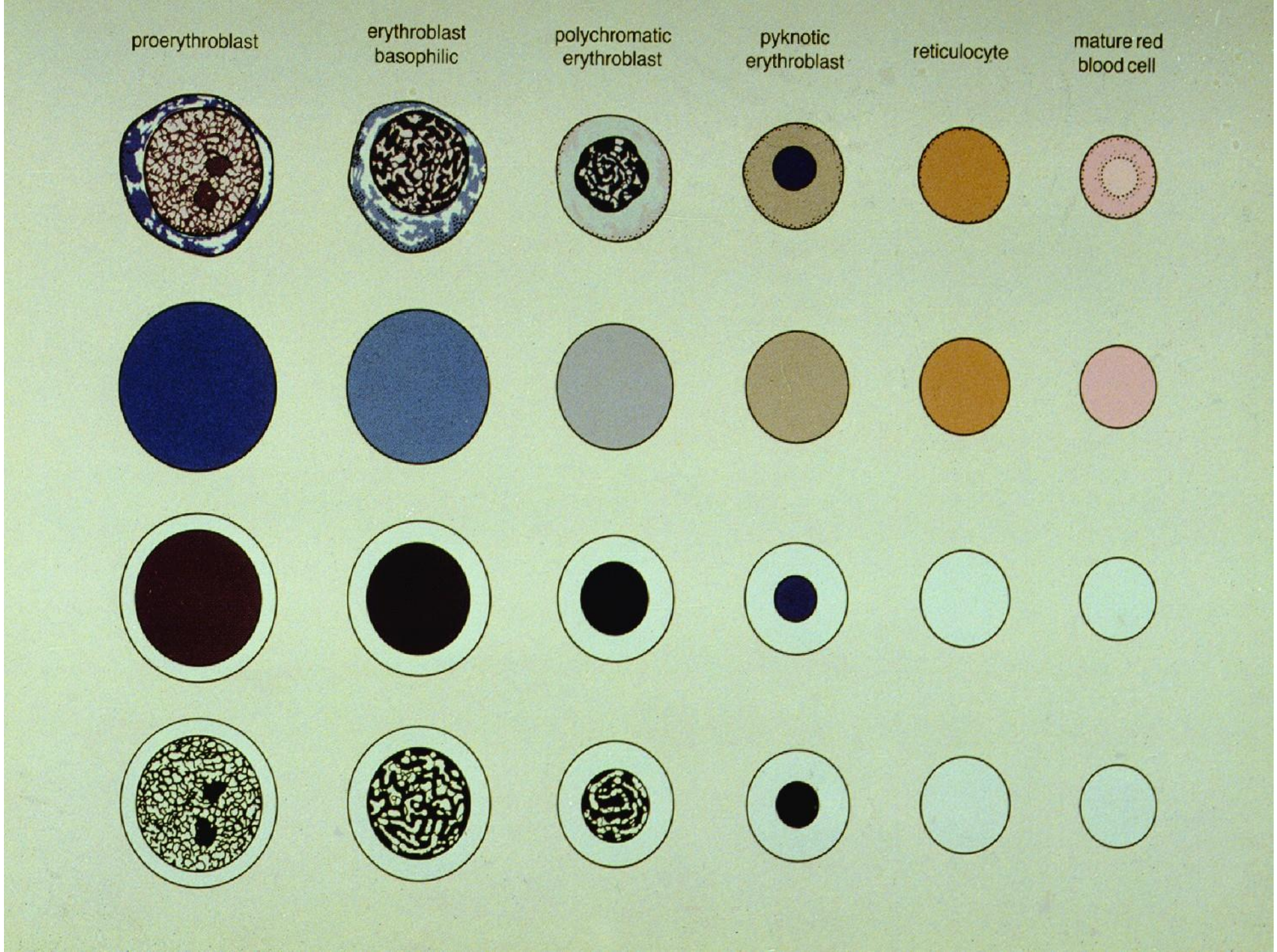


normale
Normoblasten,
polychromatisch



Peripheres Blut: normale Erythrozyten-morphologie




proerythroblast
erythroblast basophilic
polychromatic erythroblast
pyknotic erythroblast
reticulocyte
mature red blood cell

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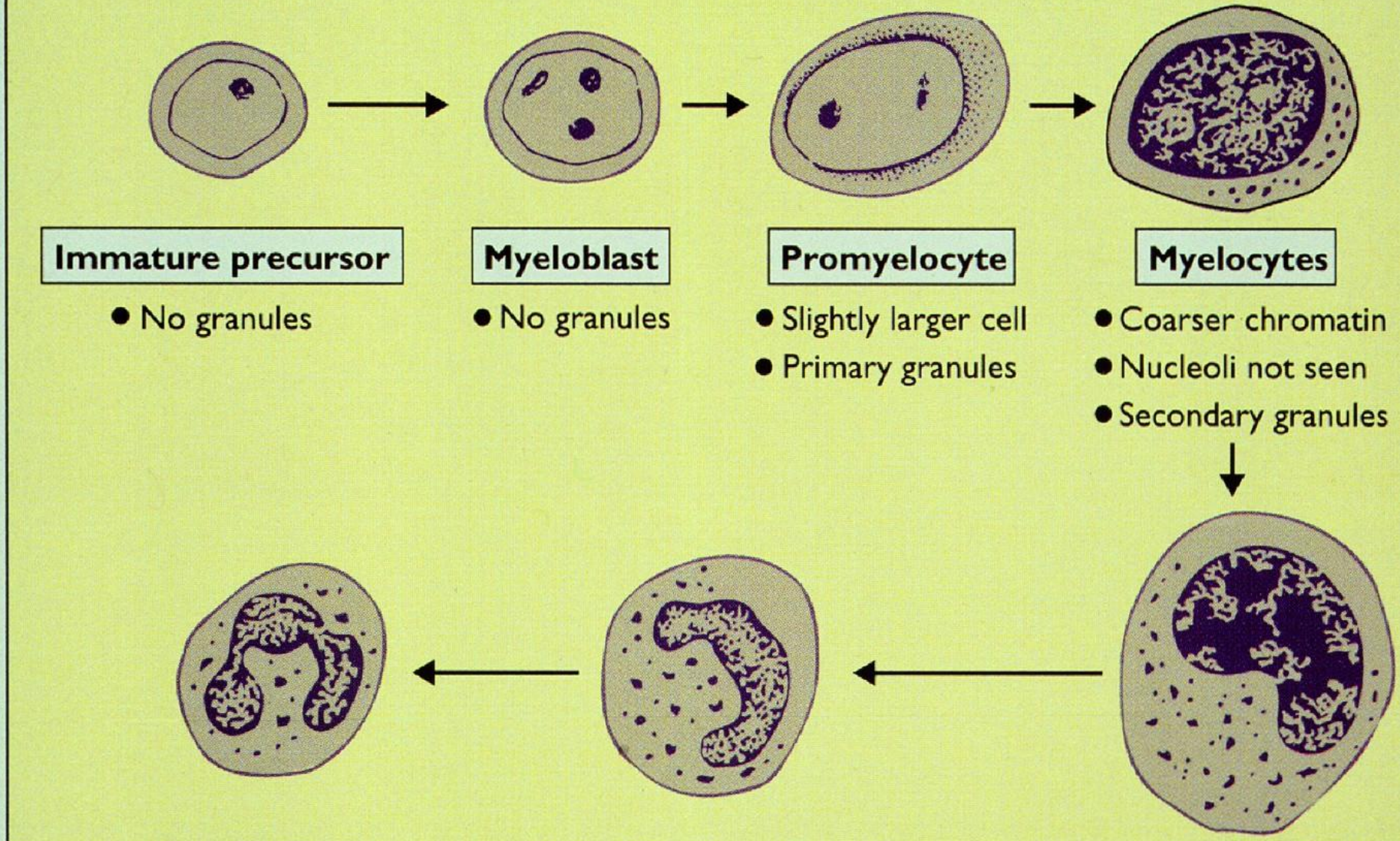
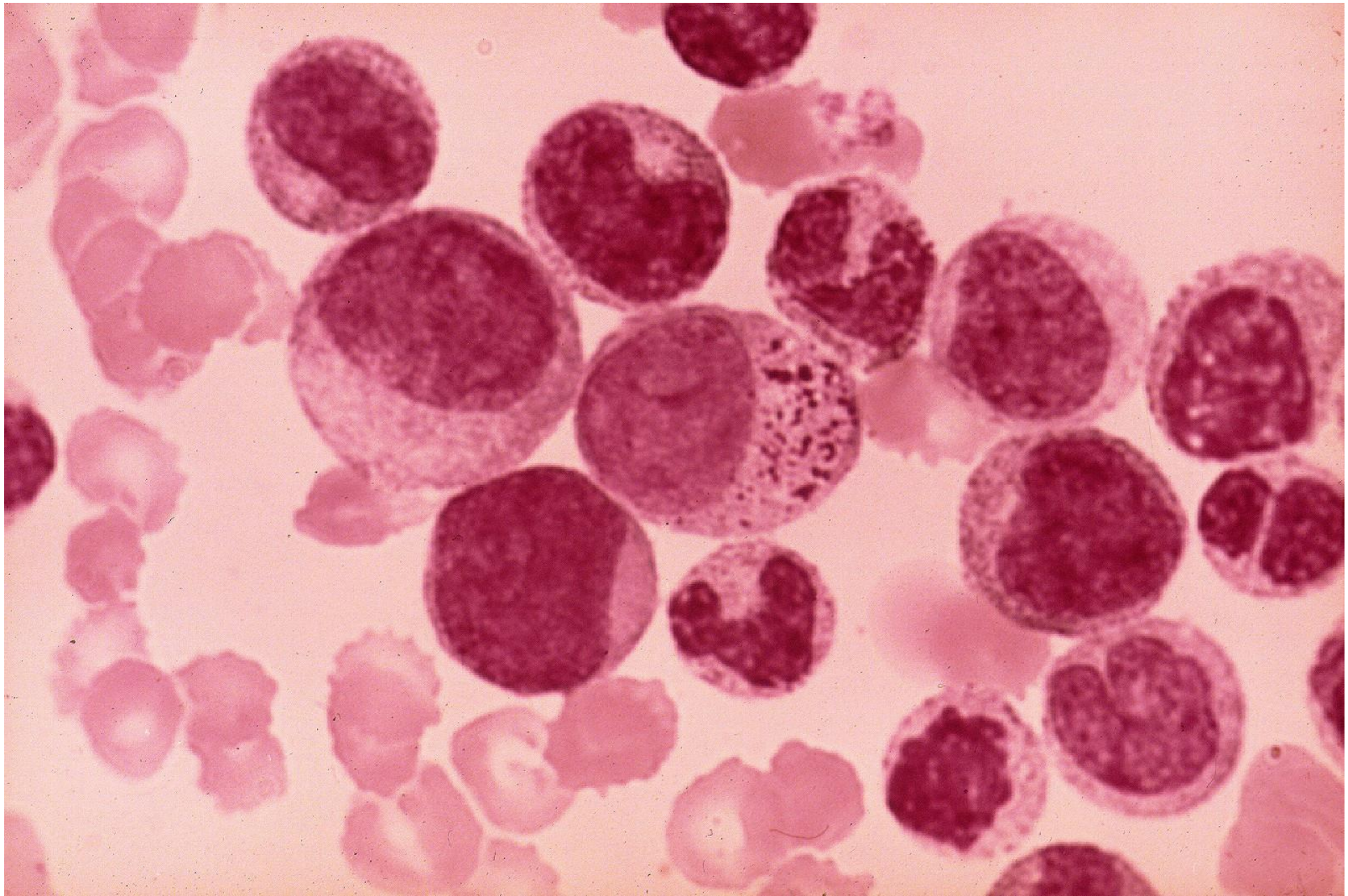
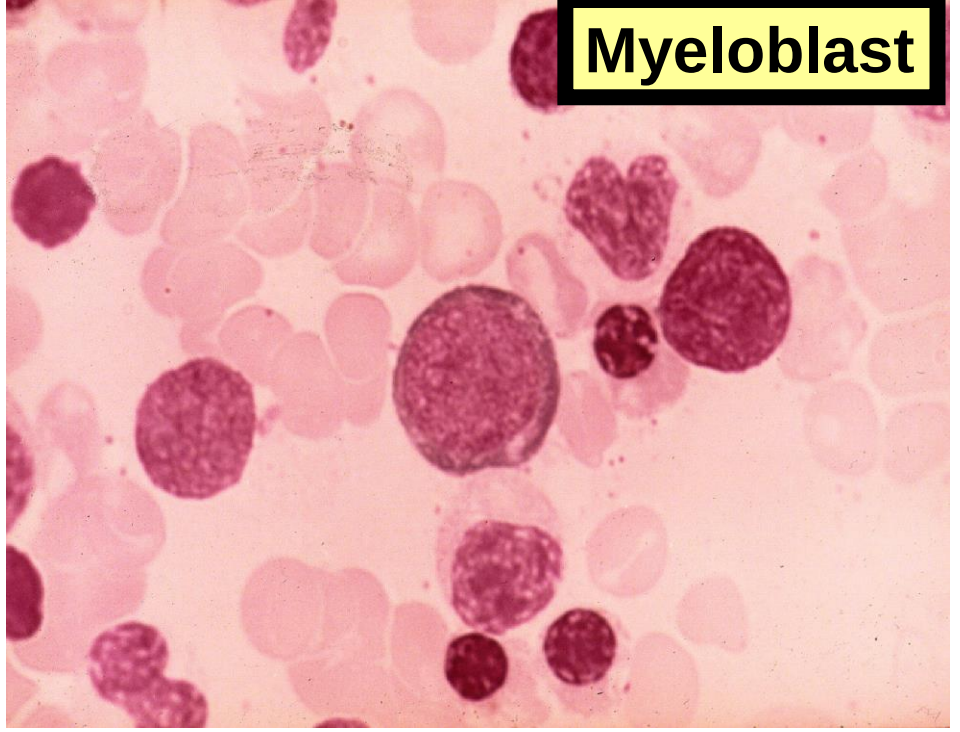

Immature precursor
No granules
Myeloblast
No granules
Promyelocyte
Slightly larger cell
Primary granules
Myelocytes
Coarser chromatin
Nucleoli not seen
Secondary granules
Metamyelocyte
Indented nucleus
Band form
Nucleus lobated
Neutrophil
Lobes separated by narrow structures

Normales Knochenmark : Myelozytopoese




Myelozyt, unreif

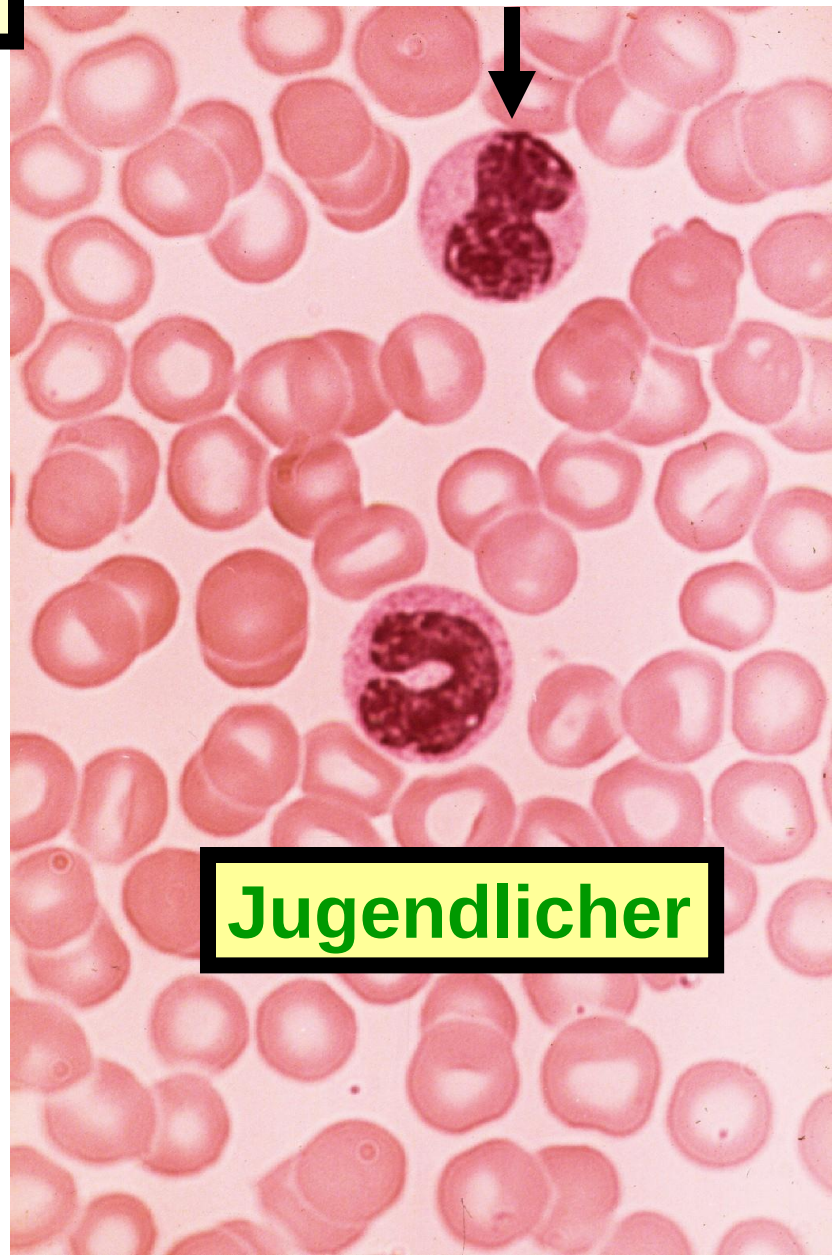

Myeloblast


Myelozyt, reif

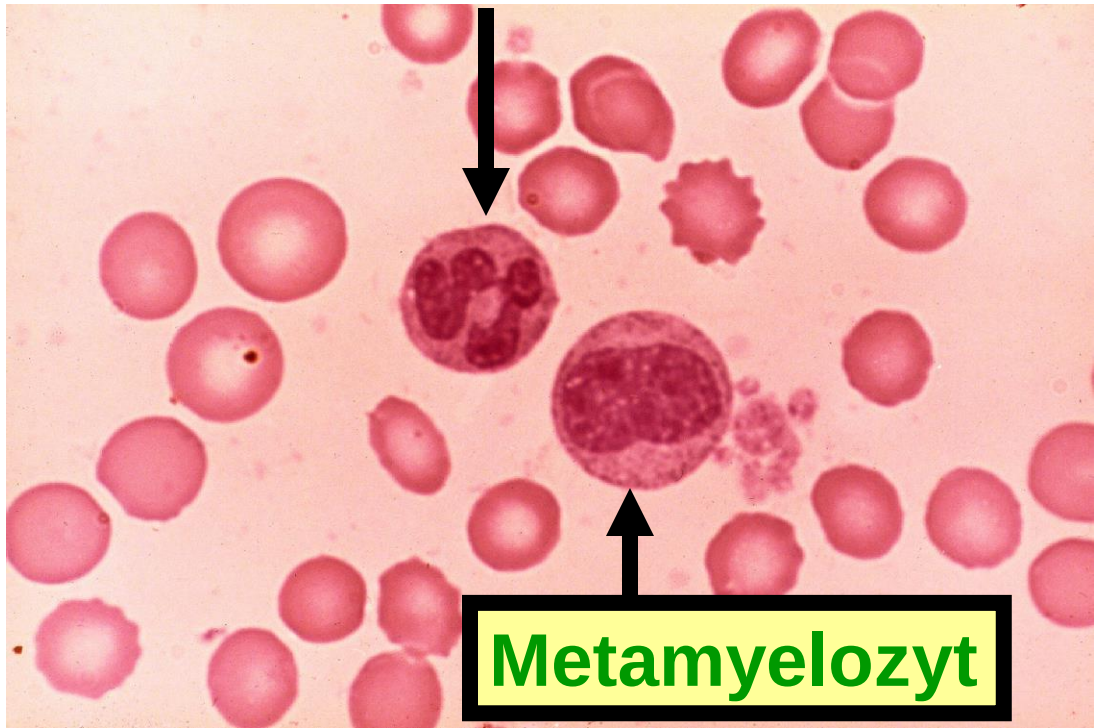

Myelozyt, unreif

Zellen der Myelozyto- bzw.Granulozytopoese

Stabkerniger



Granulozyt, segmentkernig

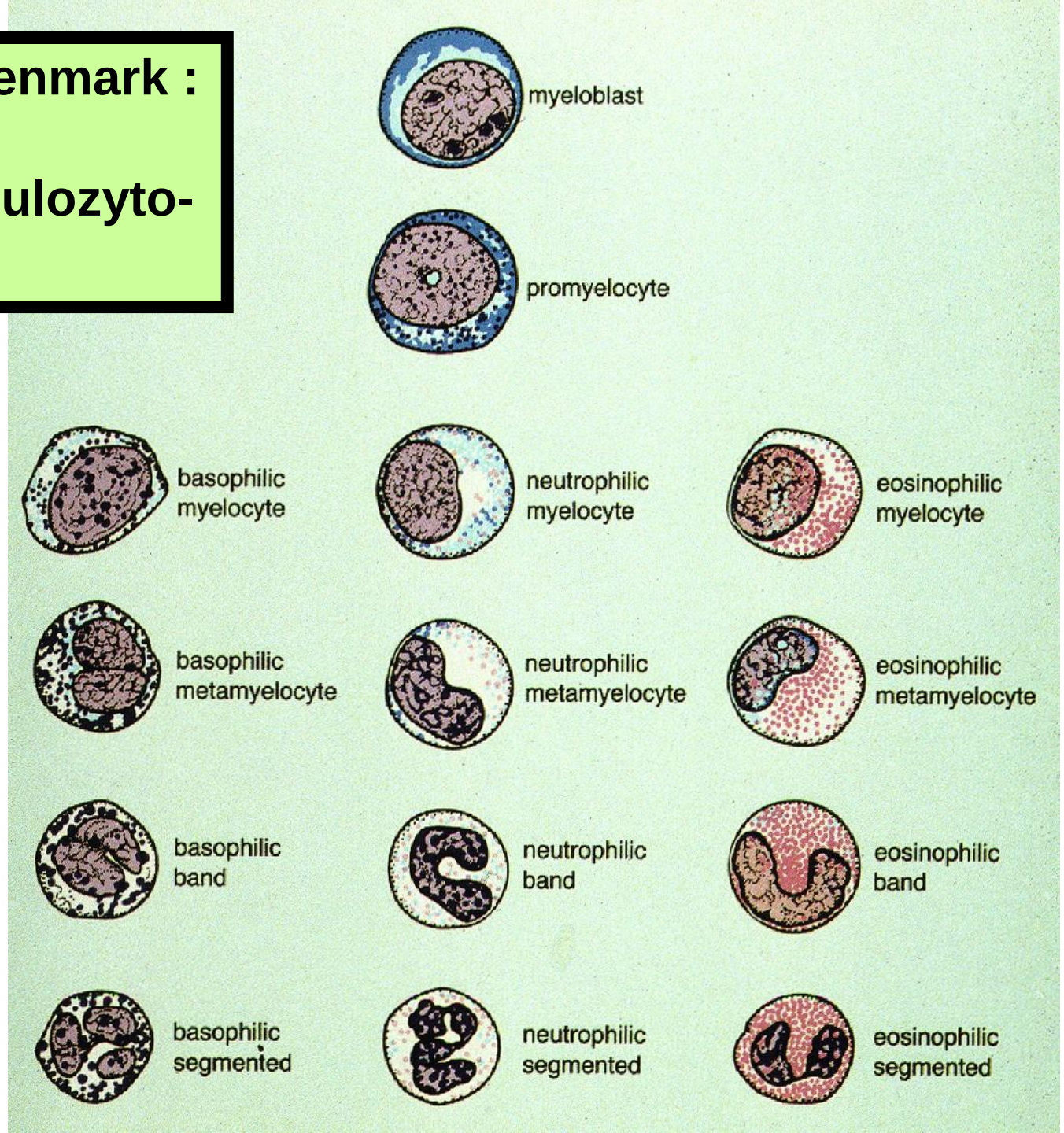


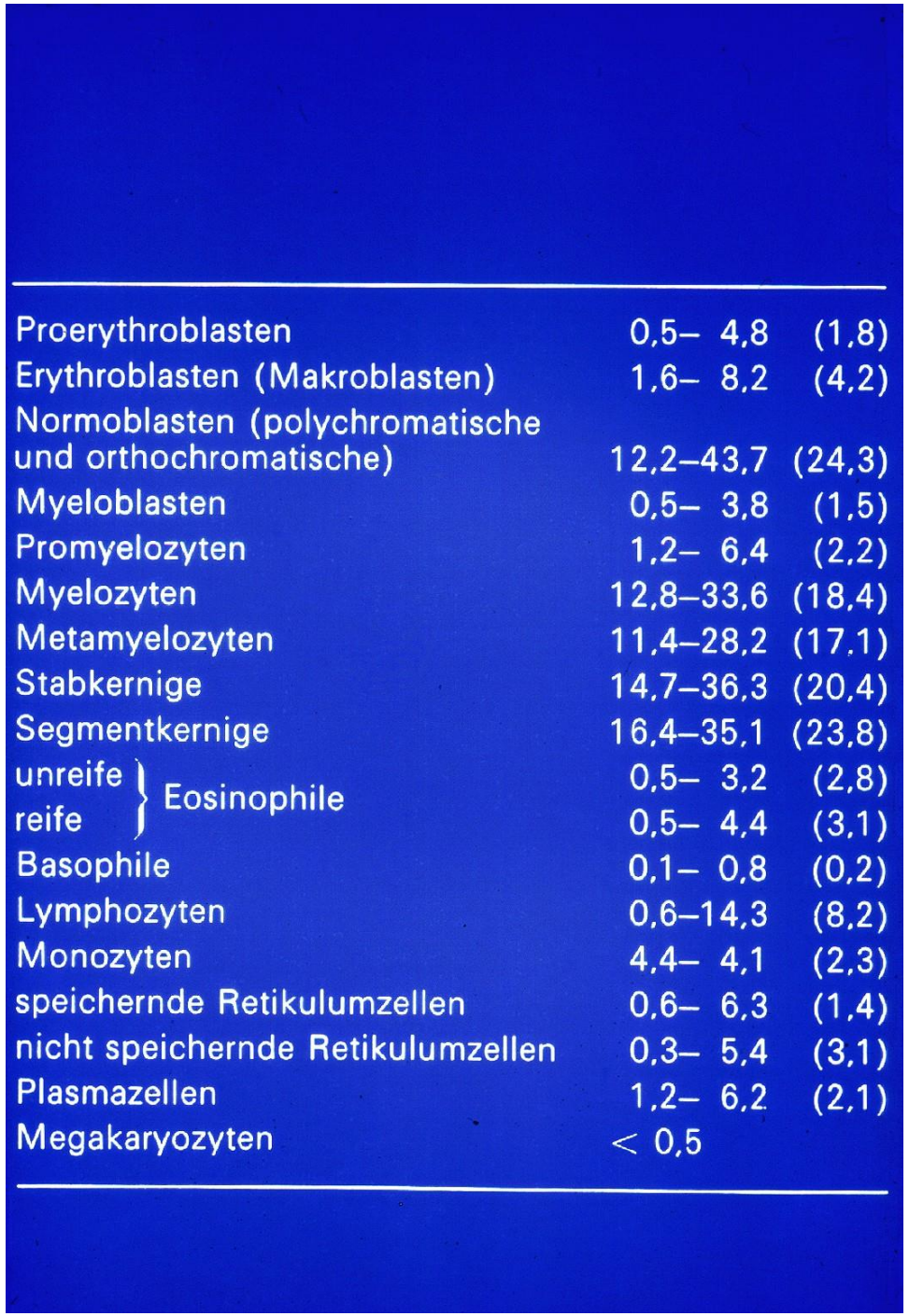
Jugendlicher

Metamyelozyt

Normales Knochenmark :

Myelo- bzw. Granulozyto-poese





Proerythroblasten	0,5– 4,8	(1,8)
Erythroblasten (Makroblasten)	1,6– 8,2	(4,2)
Normoblasten (polychromatische und orthochromatische)	12,2–43,7	(24,3)
Myeloblasten	0,5– 3,8	(1,5)
Promyelozyten	1,2– 6,4	(2,2)
Myelozyten	12,8–33,6	(18,4)
Metamyelozyten	11,4–28,2	(17,1)
Stabkernige	14,7–36,3	(20,4)
Segmentkernige	16,4–35,1	(23,8)
unreife Eosinophile	0,5– 3,2	(2,8)
reife Eosinophile	0,5– 4,4	(3,1)
Basophile	0,1– 0,8	(0,2)
Lymphozyten	0,6–14,3	(8,2)
Monozyten	4,4– 4,1	(2,3)
speichernde Retikulumzellen	0,6– 6,3	(1,4)
nicht speichernde Retikulumzellen	0,3– 5,4	(3,1)
Plasmazellen	1,2– 6,2	(2,1)
Megakaryozyten	< 0,5	

Bildquelle nicht mehr eruierbar

Zellen	Normalbereich (/µl)	Vermehrung	Verminderung
Leukozyten	4000 – 8000	Leukozytose	Leukopenie
Stabkernige	250 – 750	Linksverschiebung	Rechtsverschiebung
Segmentkernige	2500 – 7500	Granulozytose	Granulozytopenie
Eosinophile	40 – 440	Eosinophilie	Eosinopenie
Basophile	15 – 100	Basophilie	Basopenie
Monozytose	200 – 500	Monozytose	Monozytopenie
Lymphozyten	1500 – 3500	Lymphozytose	Lymphopenie

Bildquelle nicht mehr eruierbar

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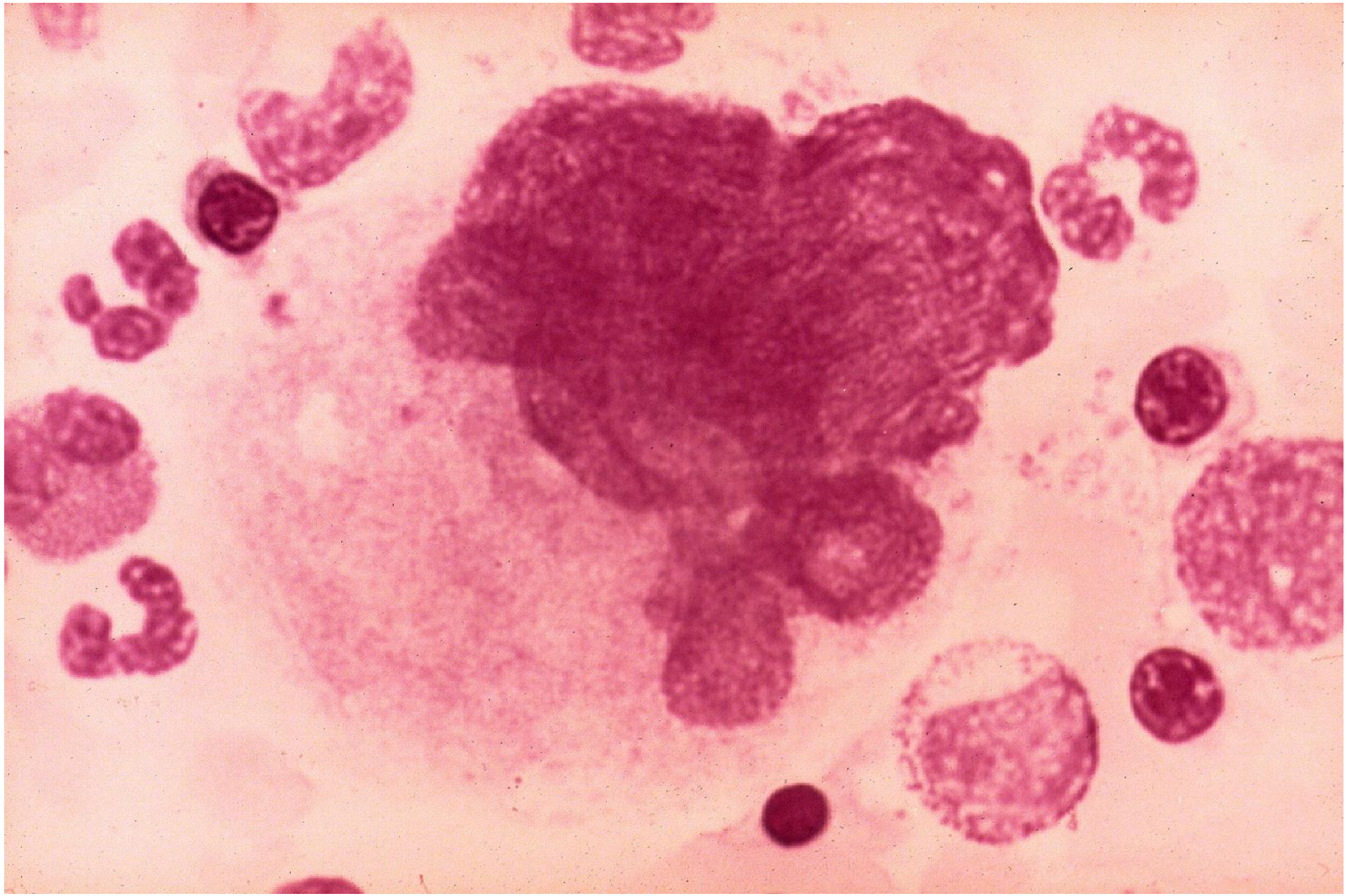

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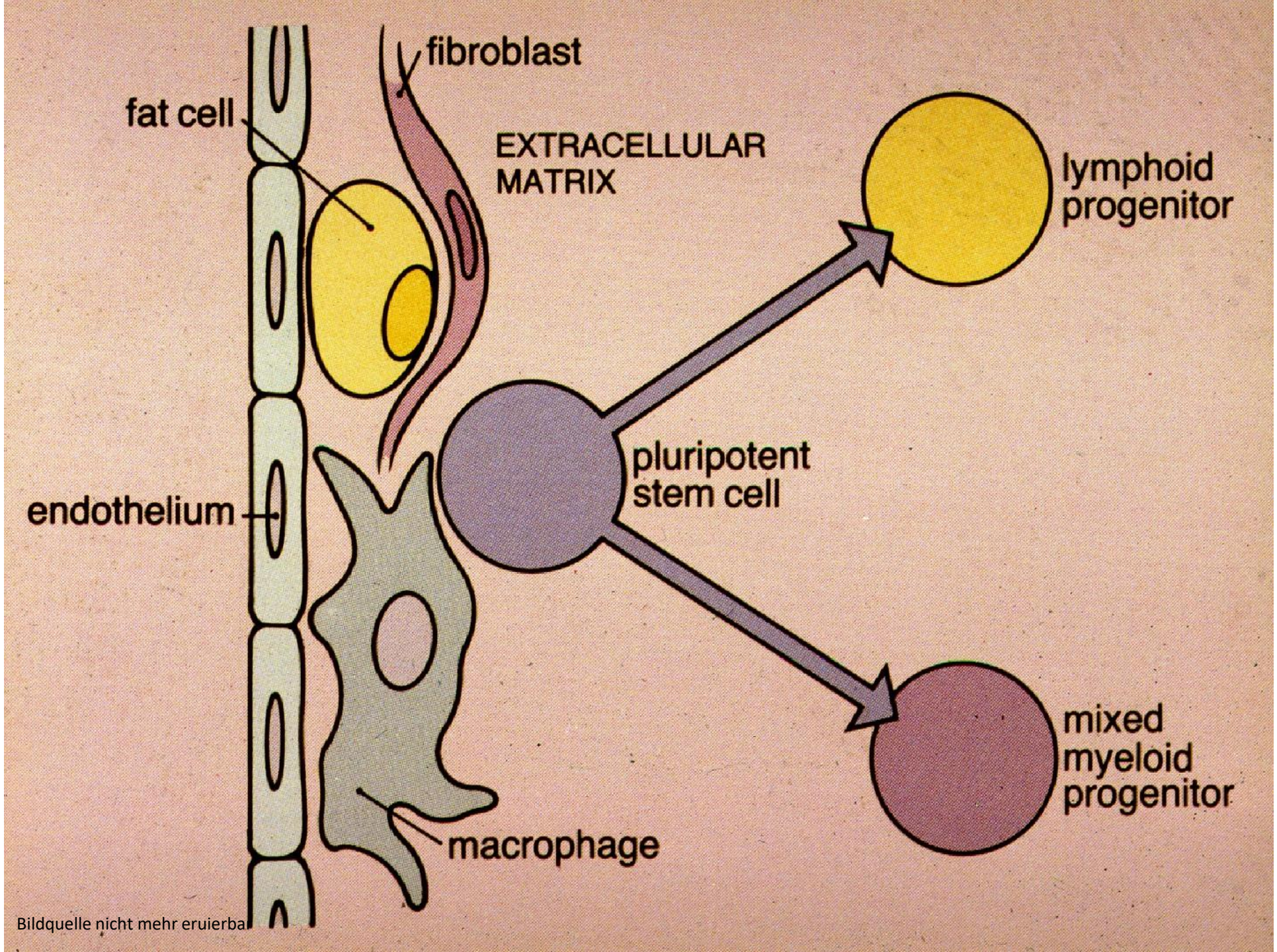

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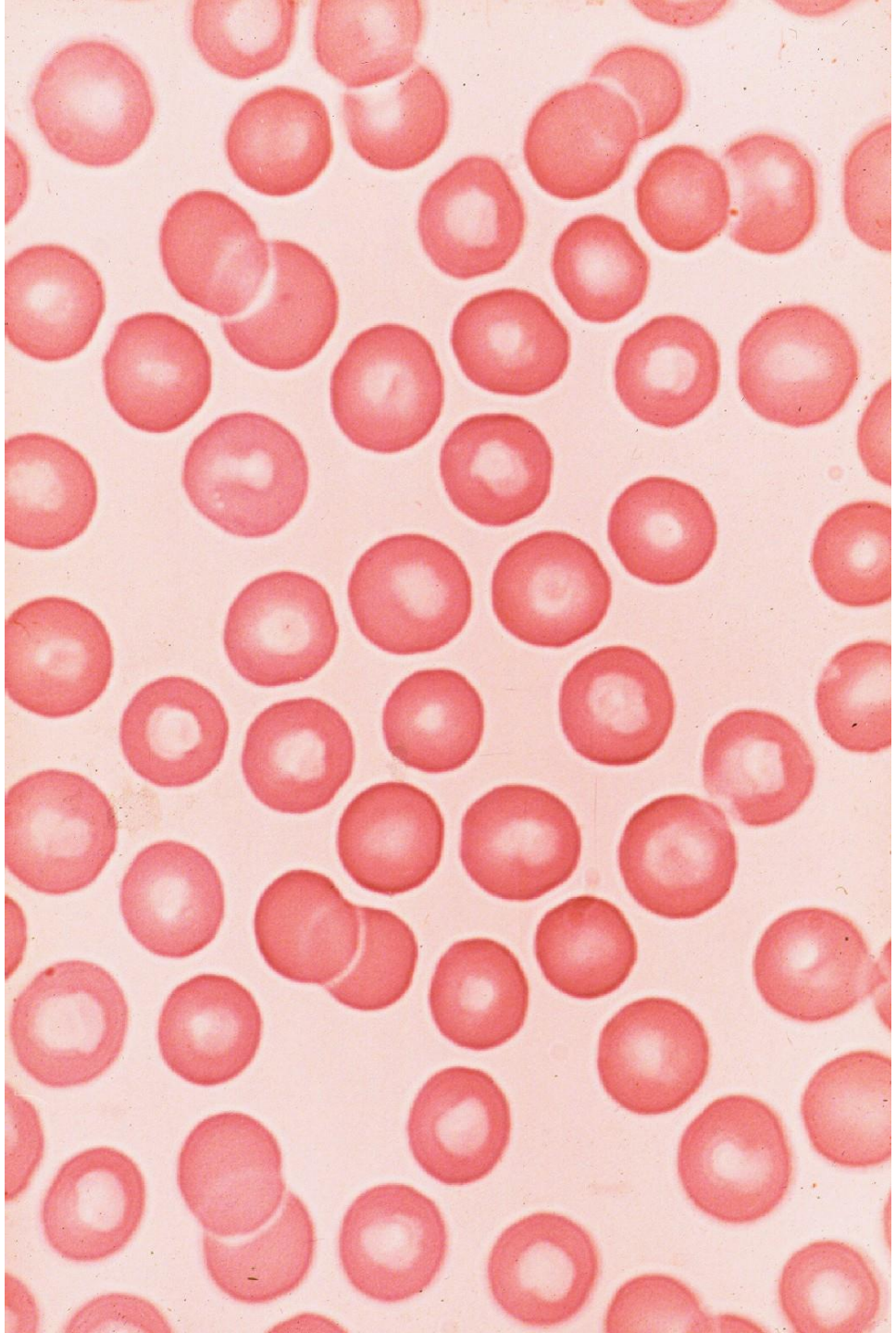
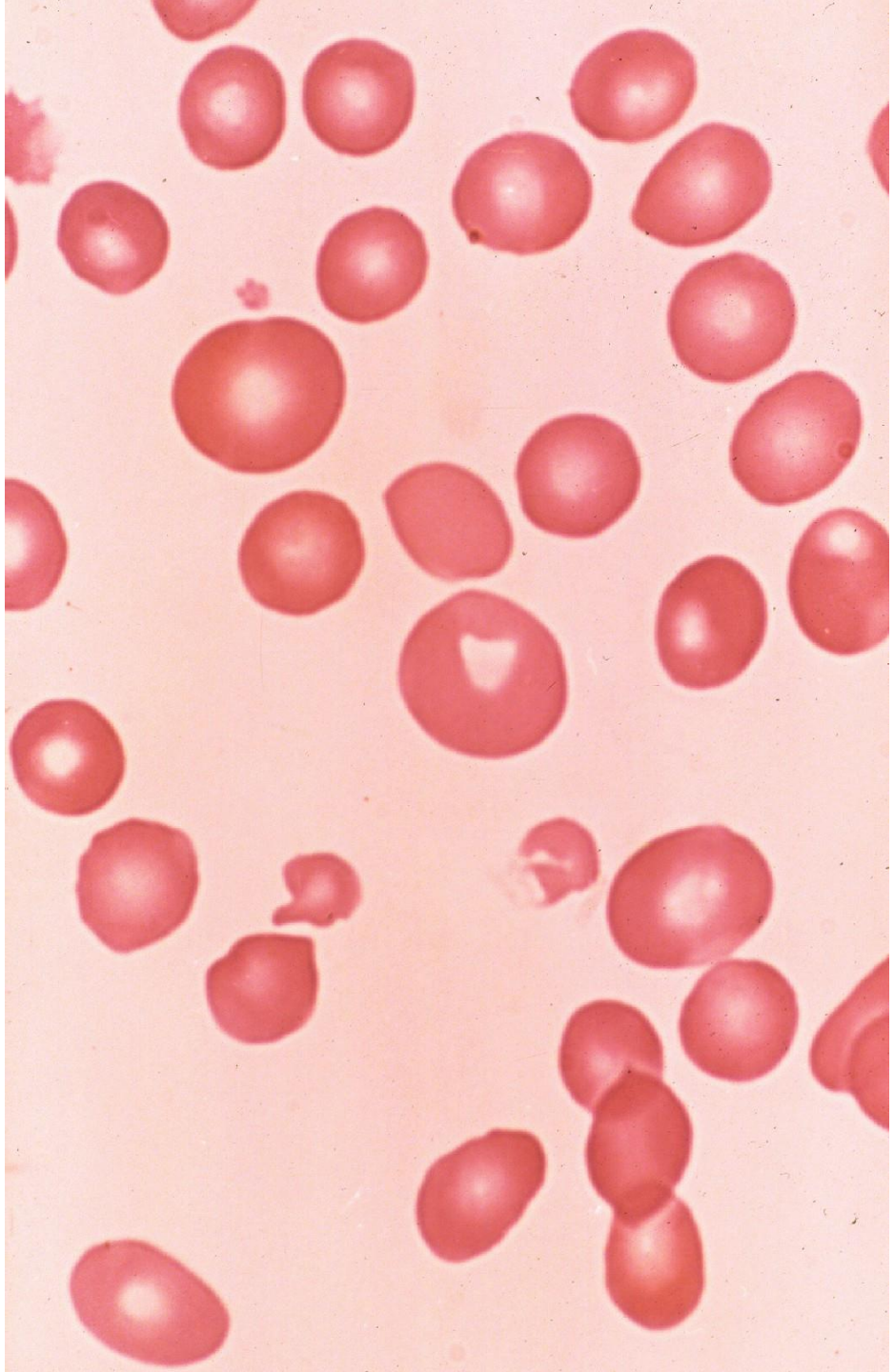
Peripheres Blut: normale Erythrozyten-morphologie

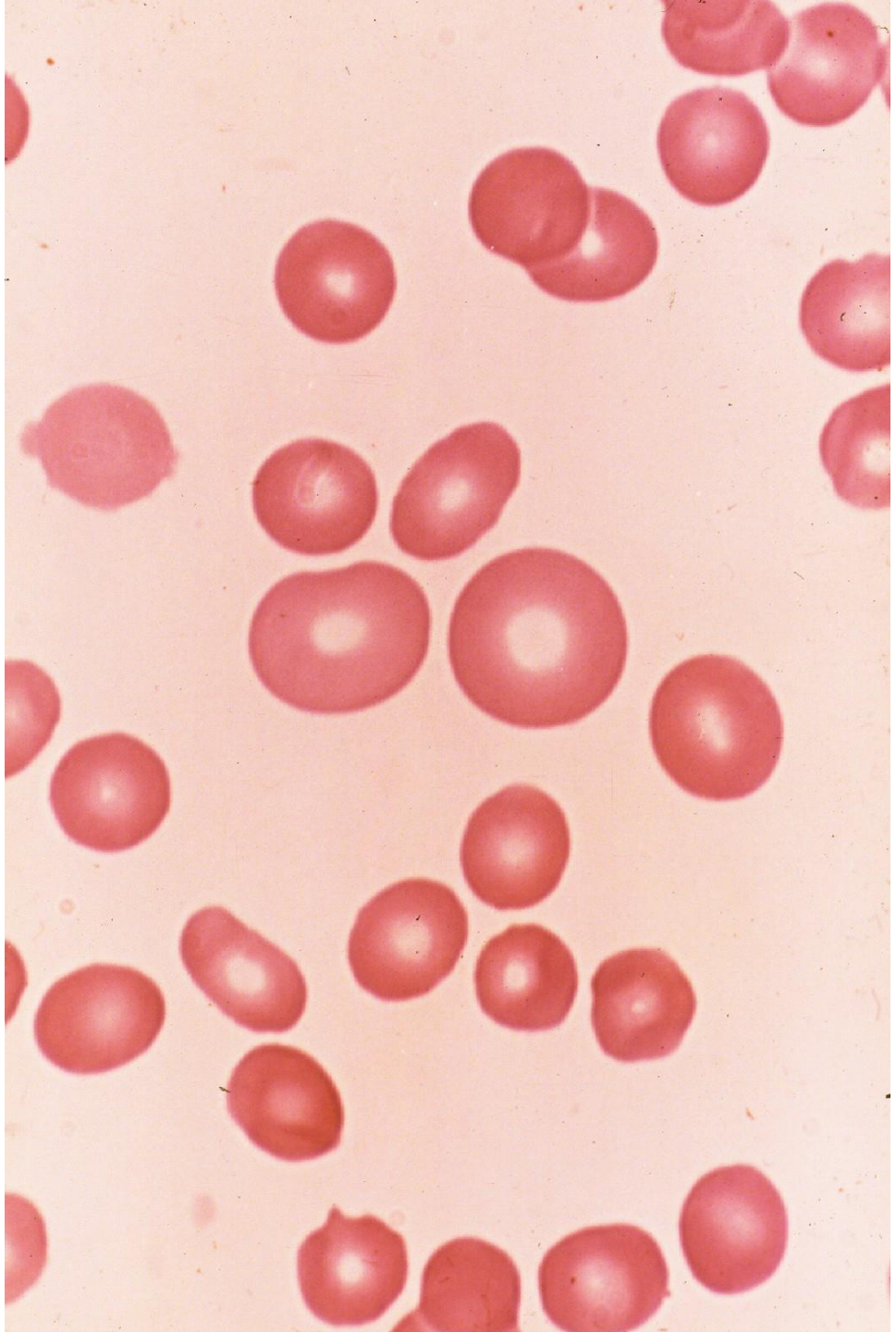


Pathologische Erythrozytenmorphologien
und einzelne Besonderheiten
(Malaria und Schlafkrankheit)

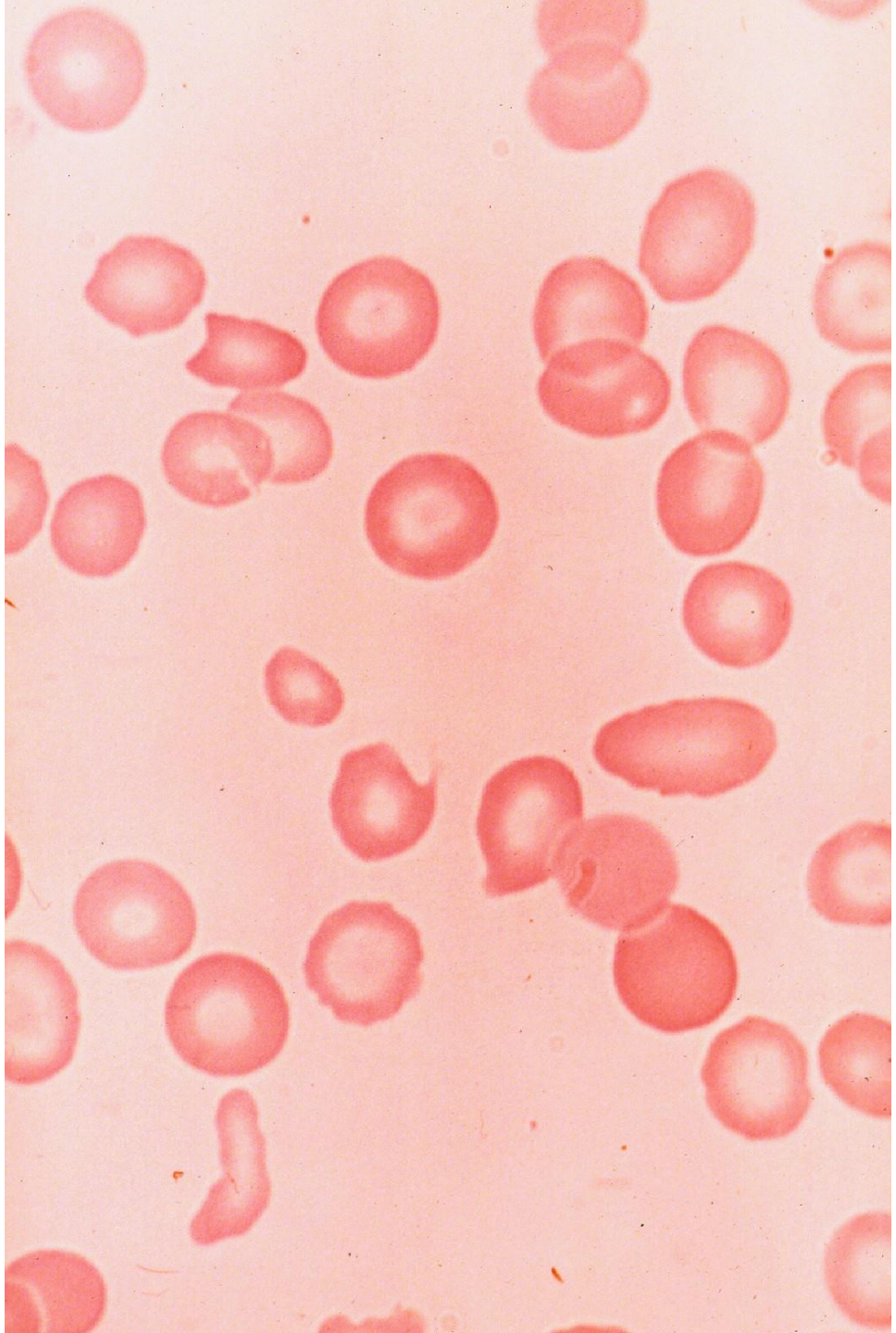
Anisozytose



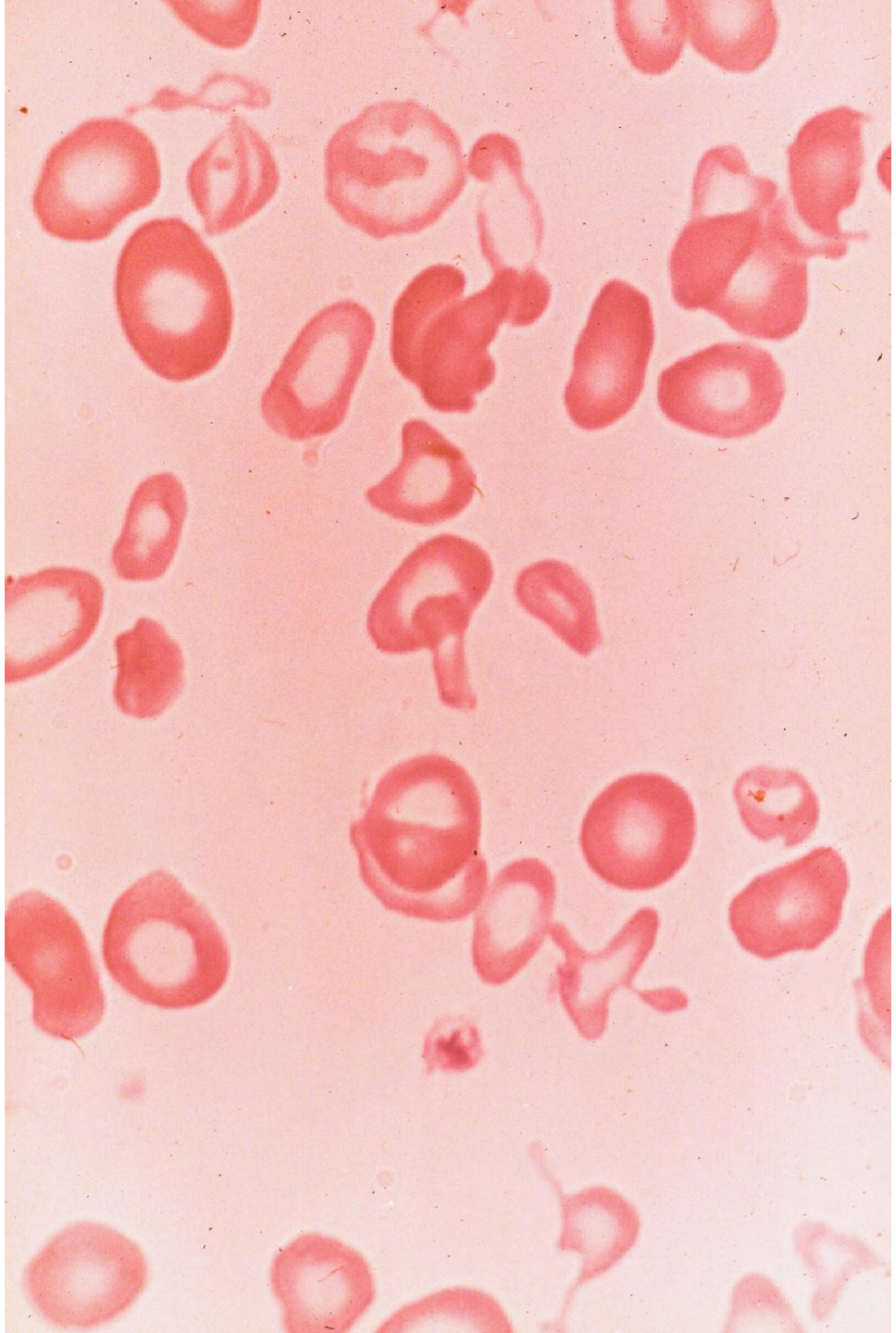
Makrozytose



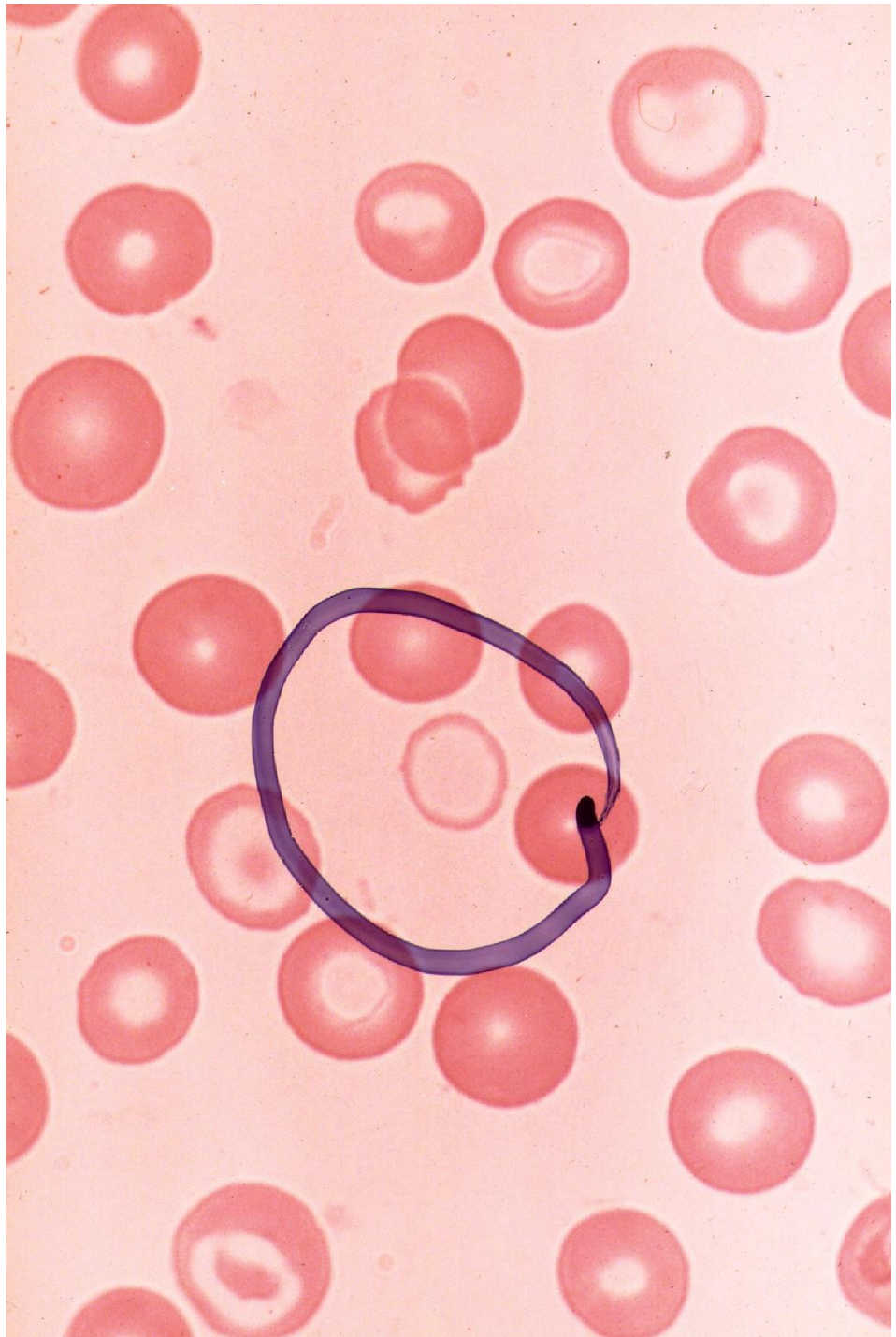
Mikrozytose



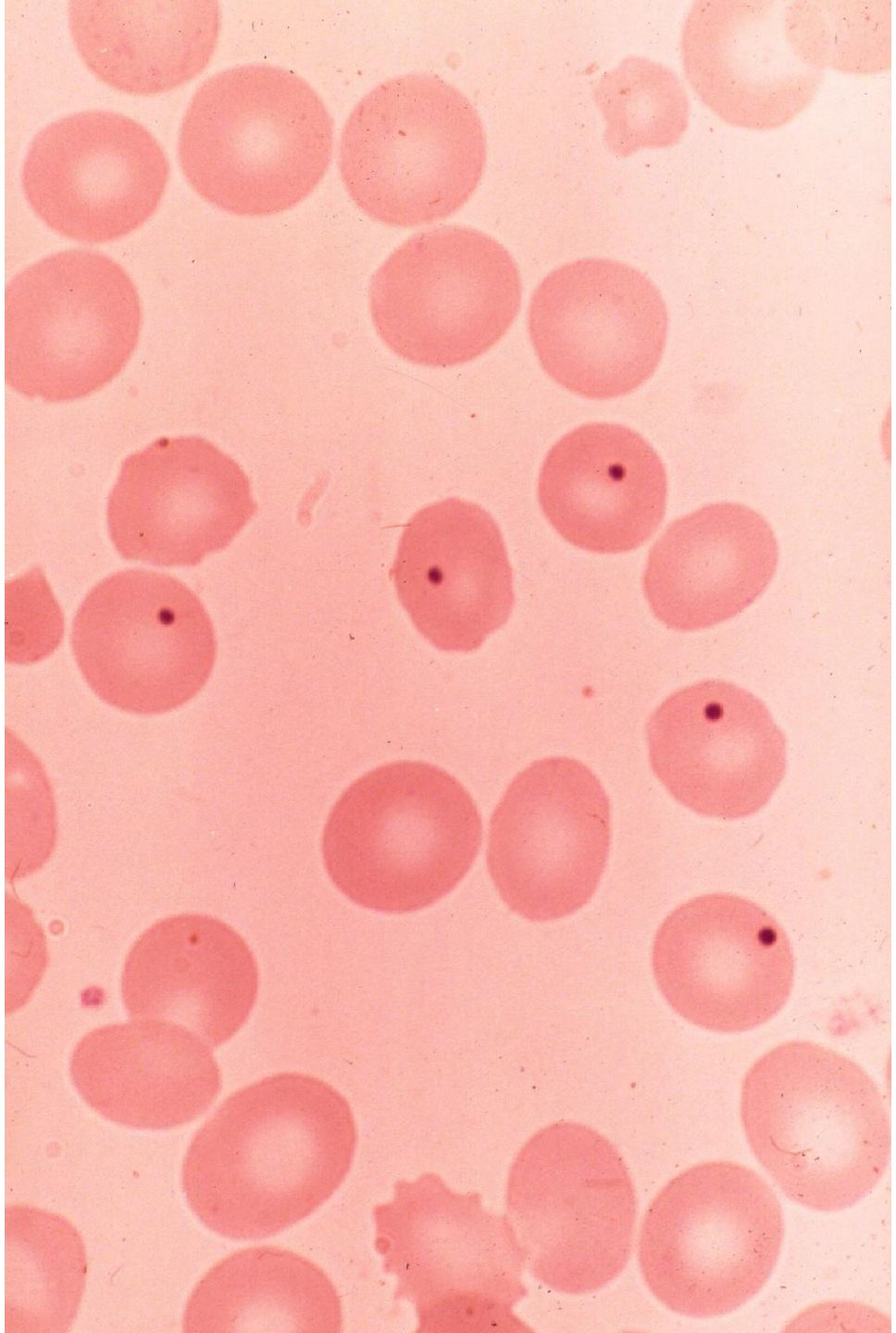
Poikilozytose



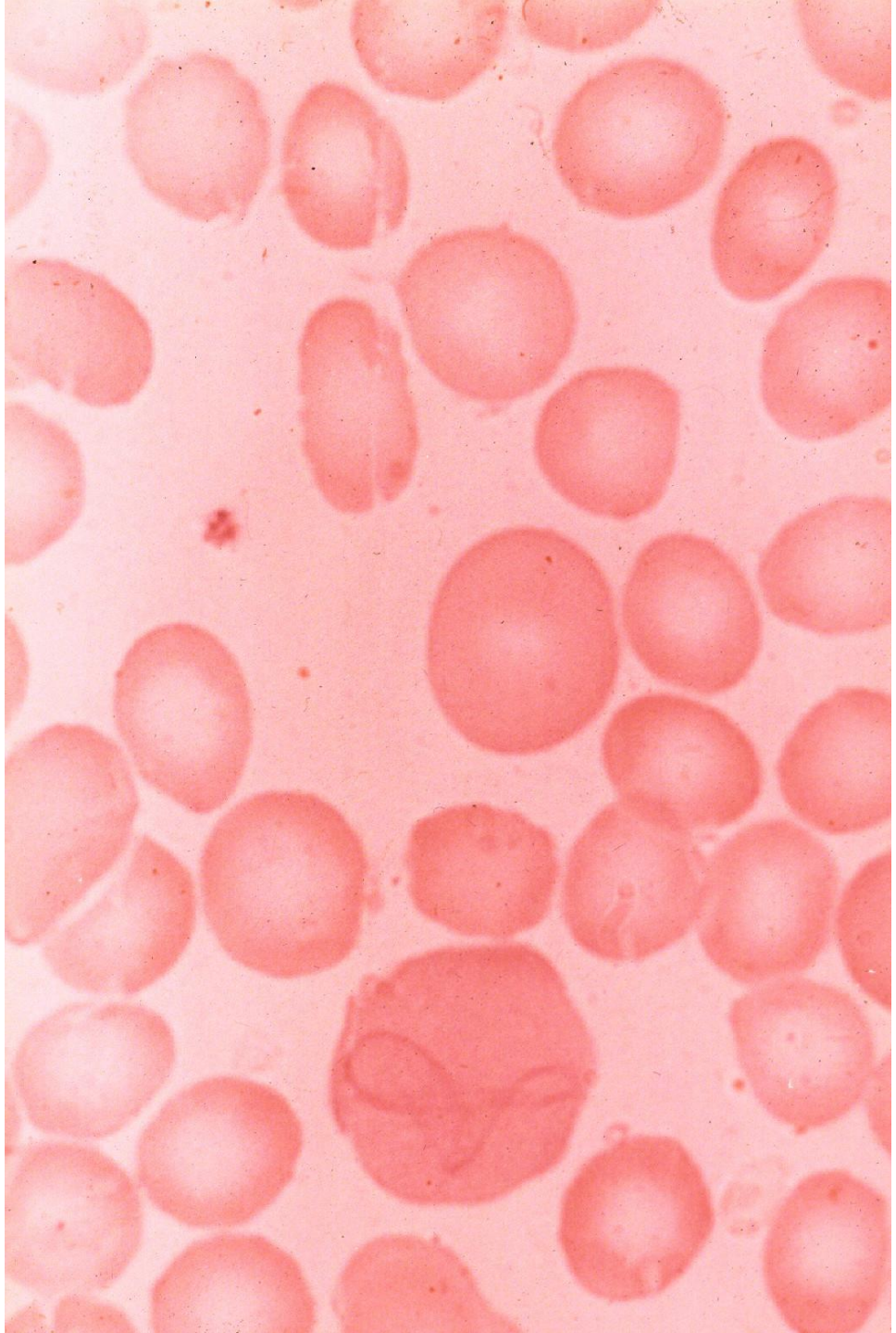
Anulozytose



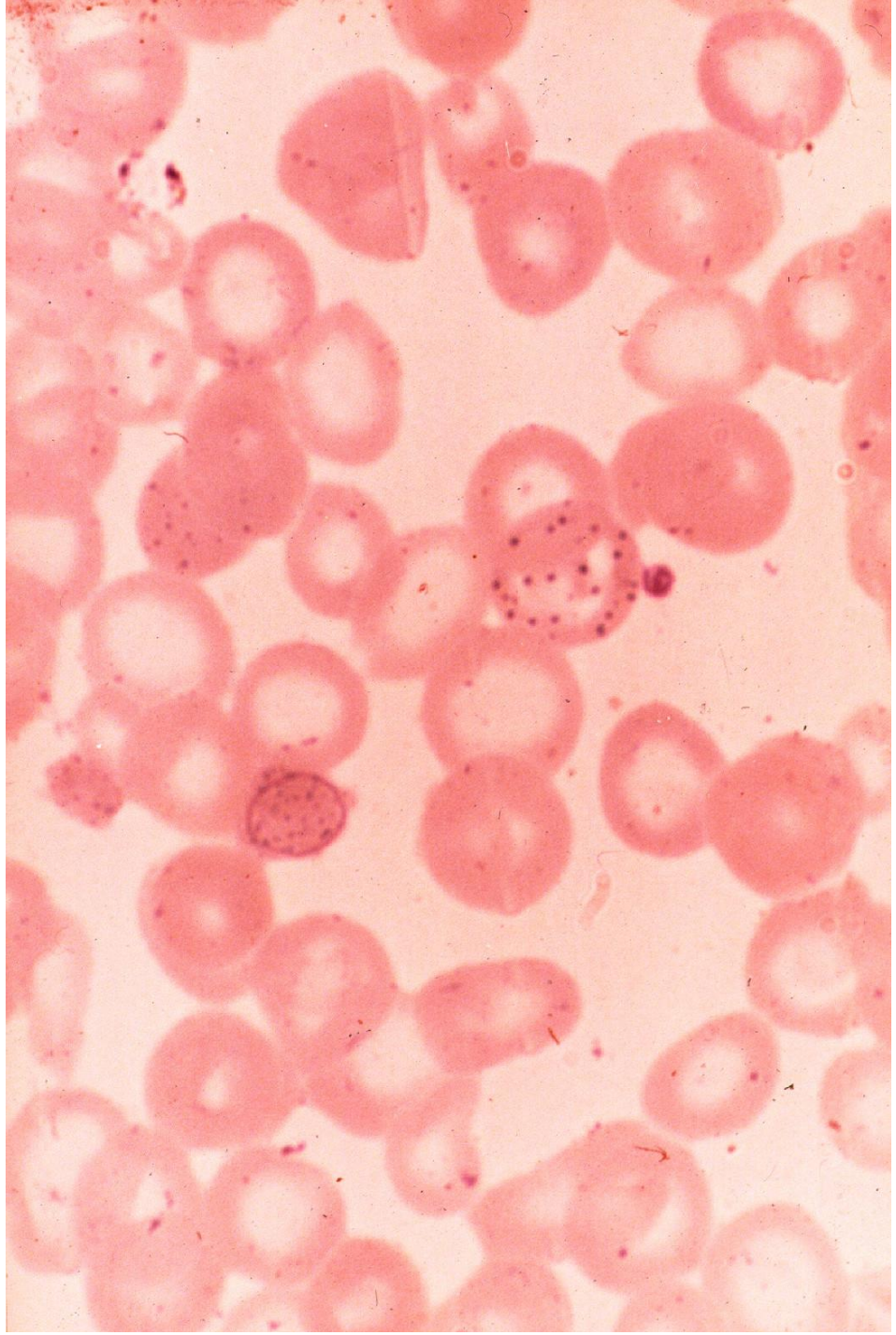
Howell-Jolly-Körperchen



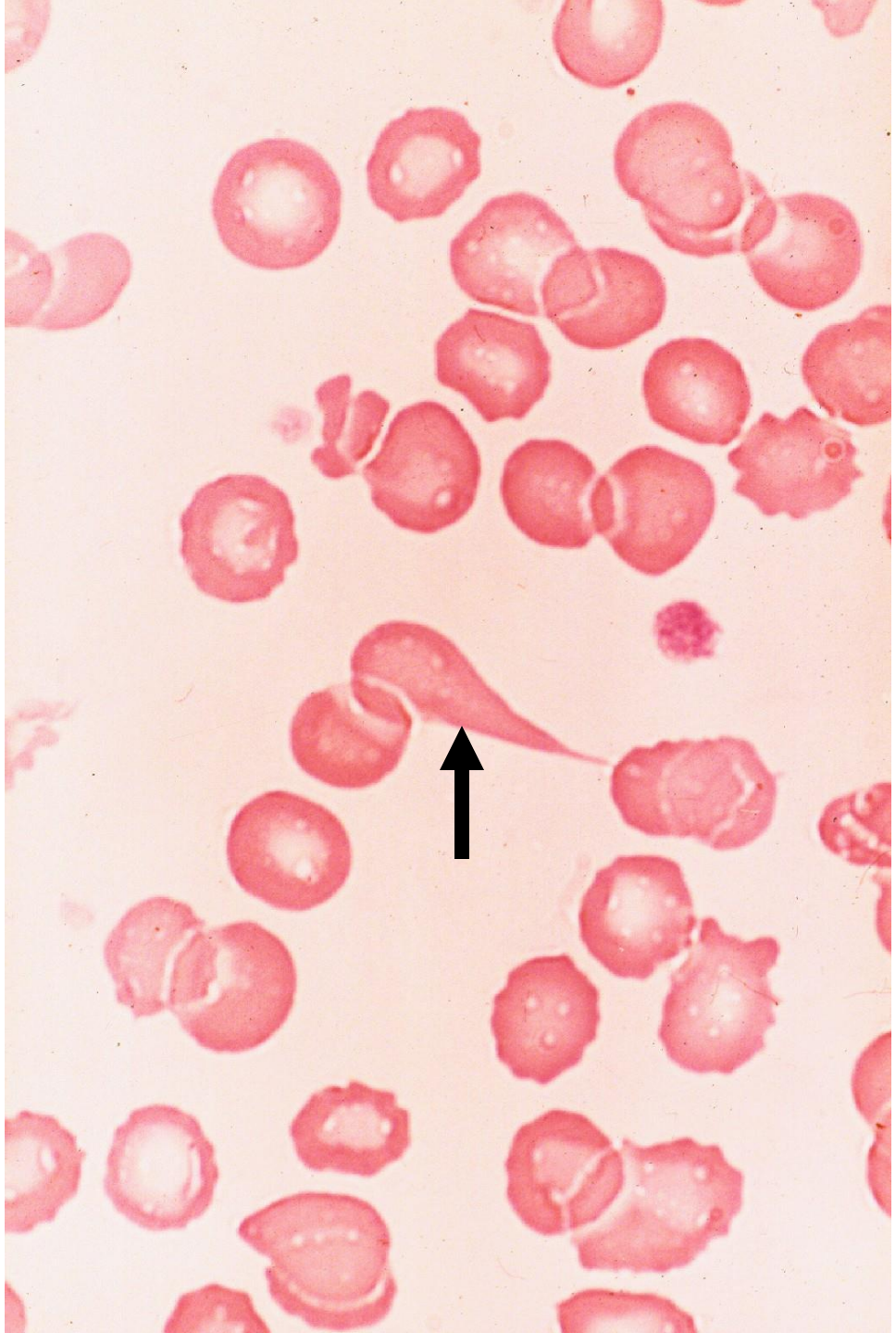
Cabot-Ringe



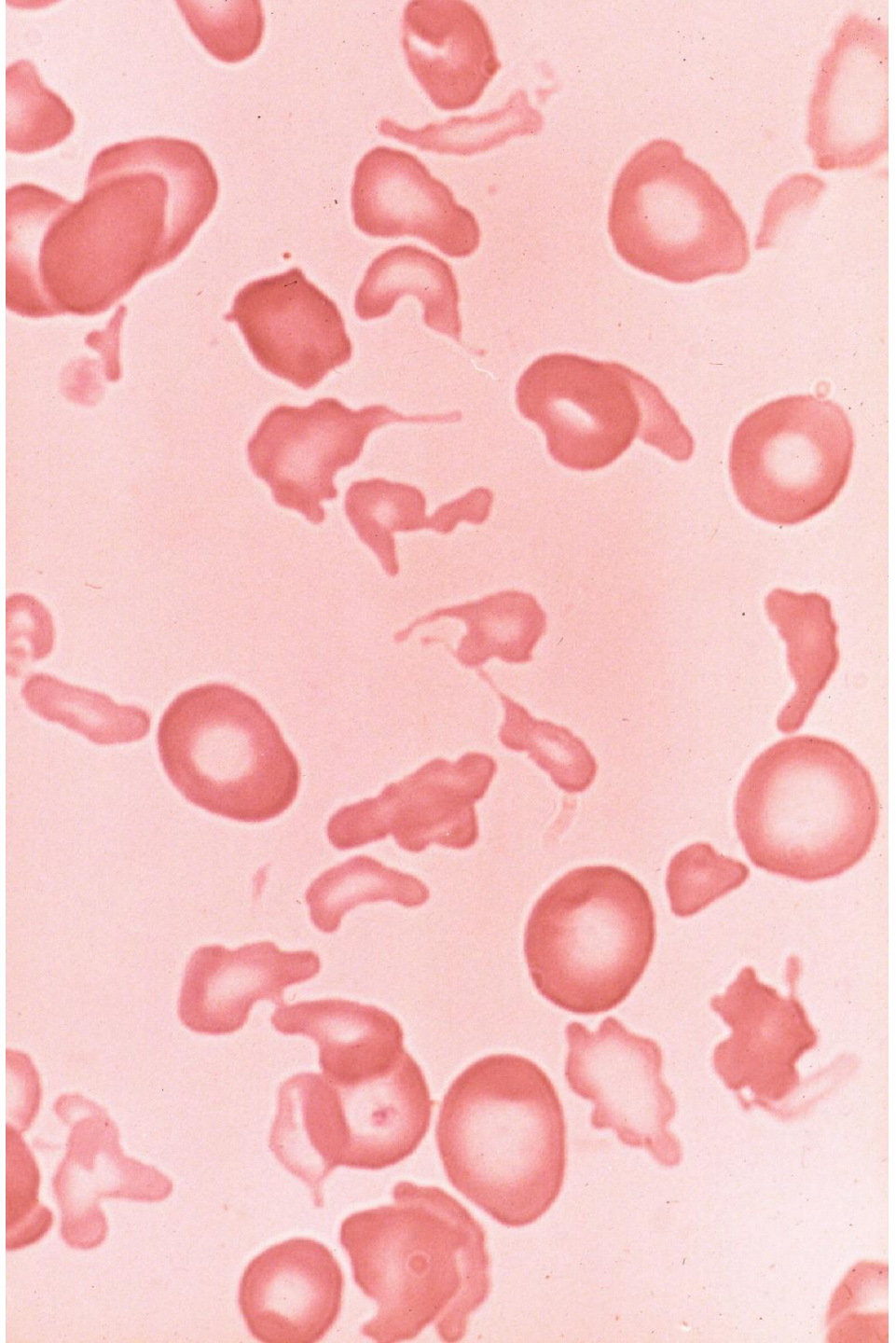
Basophile Tüpfelung



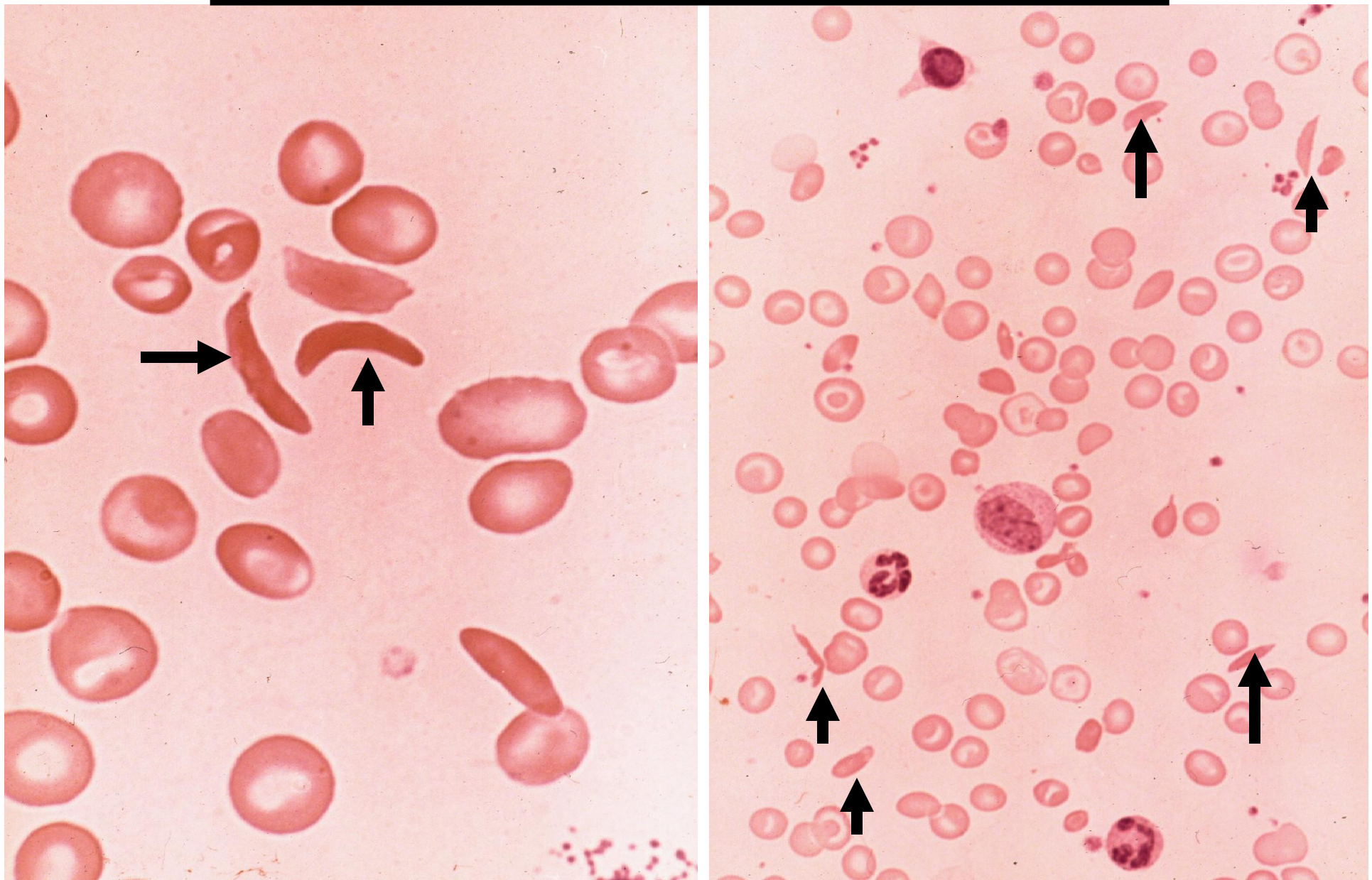
Gestörte Erythrozyten-morphologie : Tränentropfen

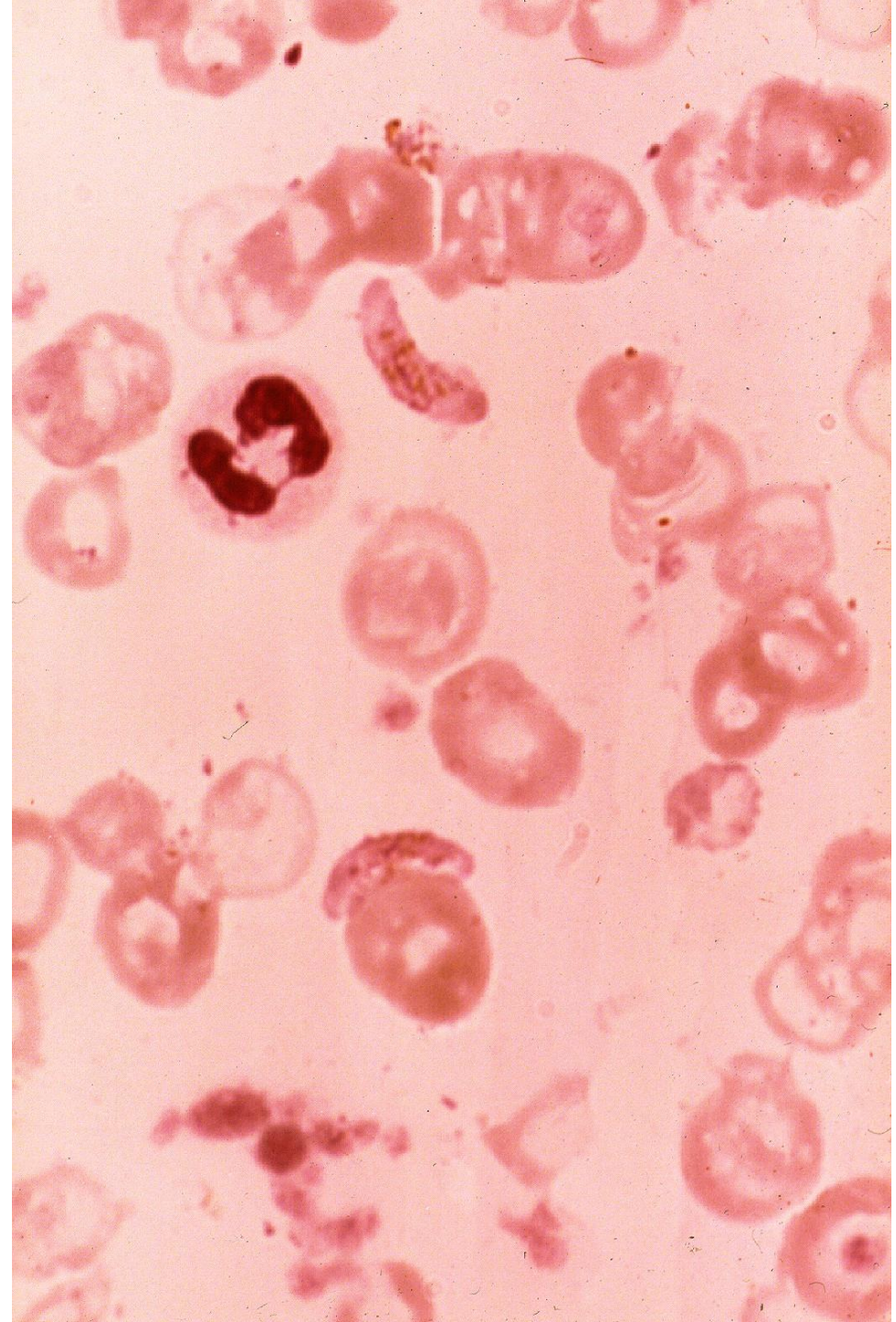


Gestörte Erythrozyten-morphologie : Fragmentozyten

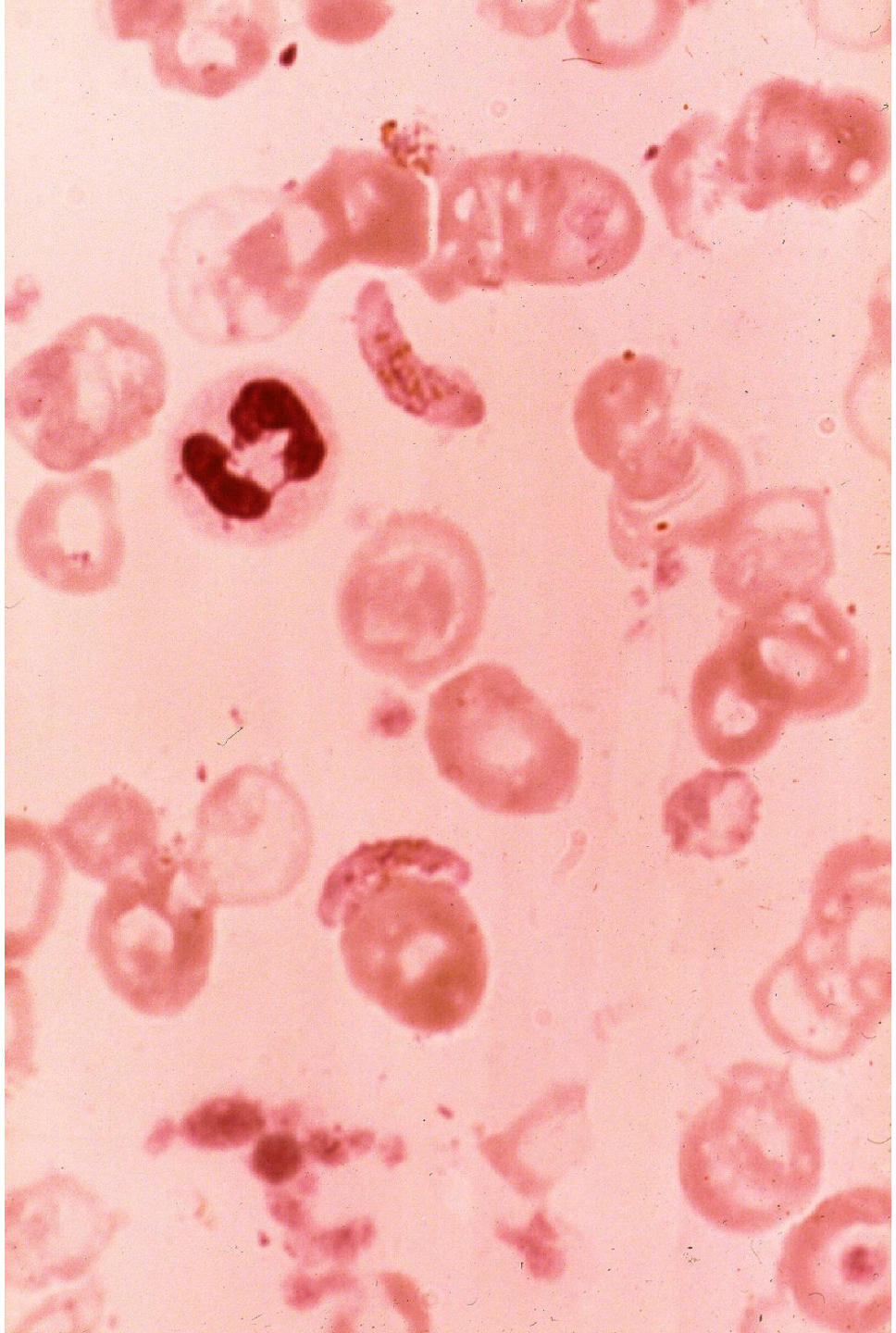


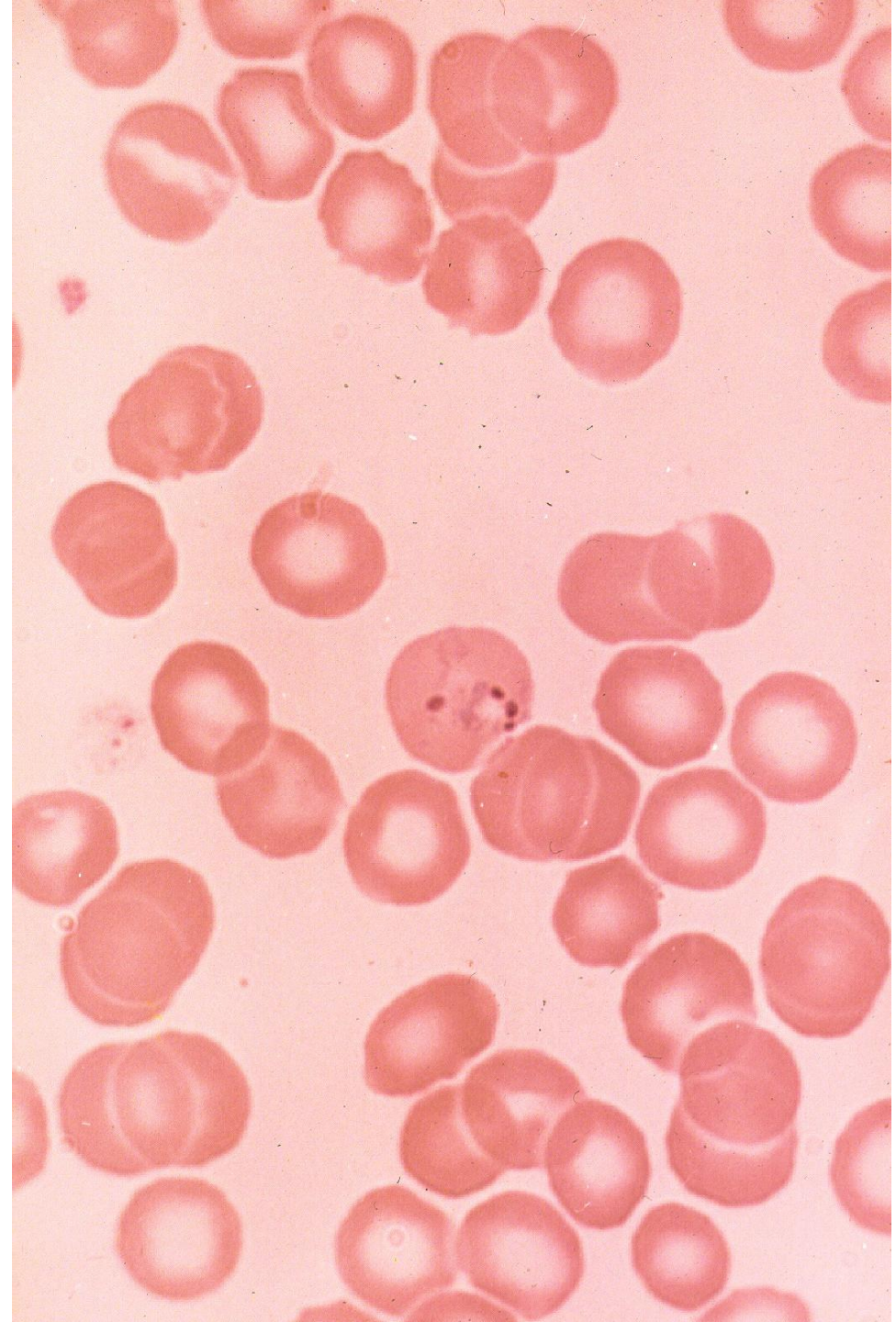
Gestörte Erythrozytenmorphologie : Sichelzellen



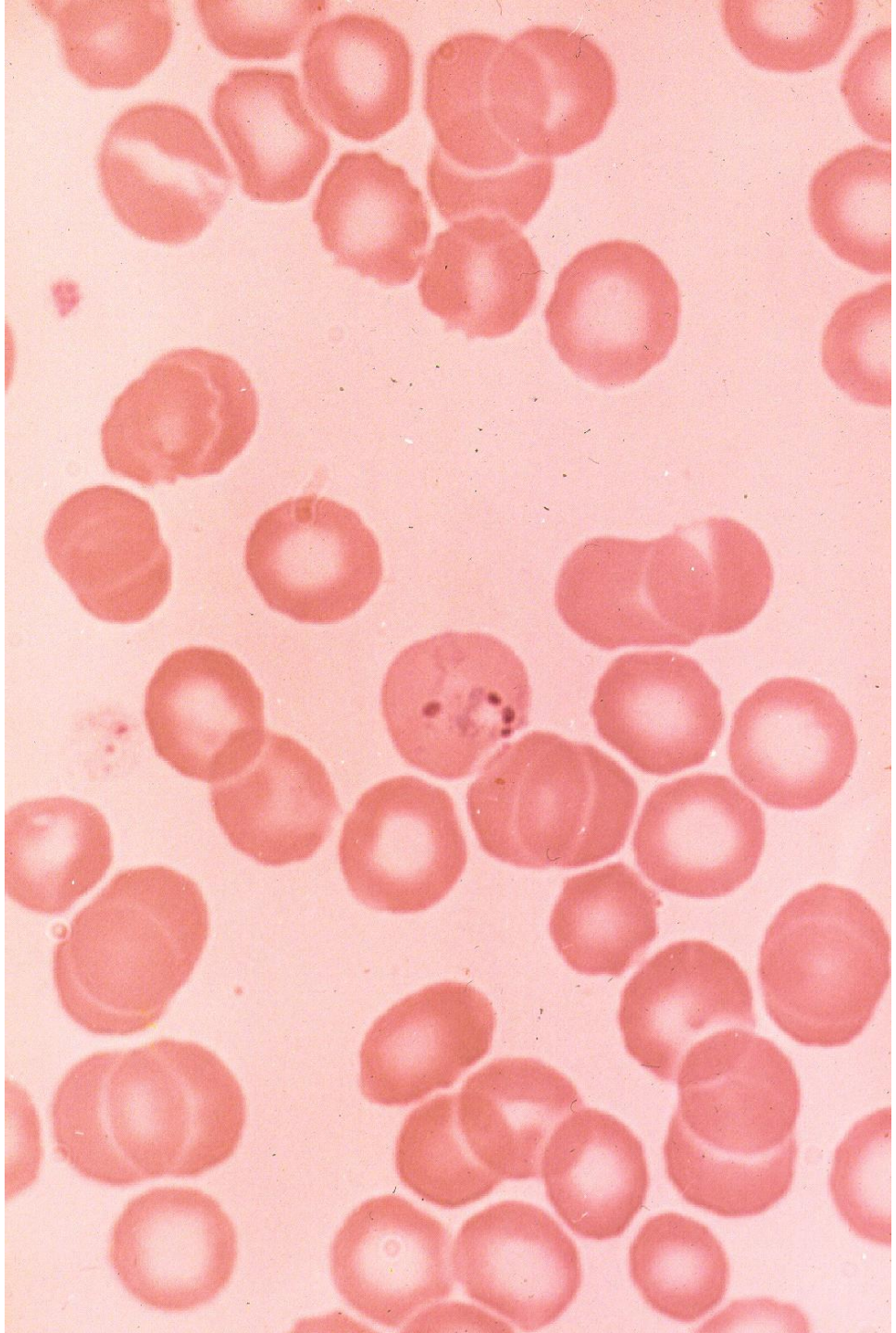


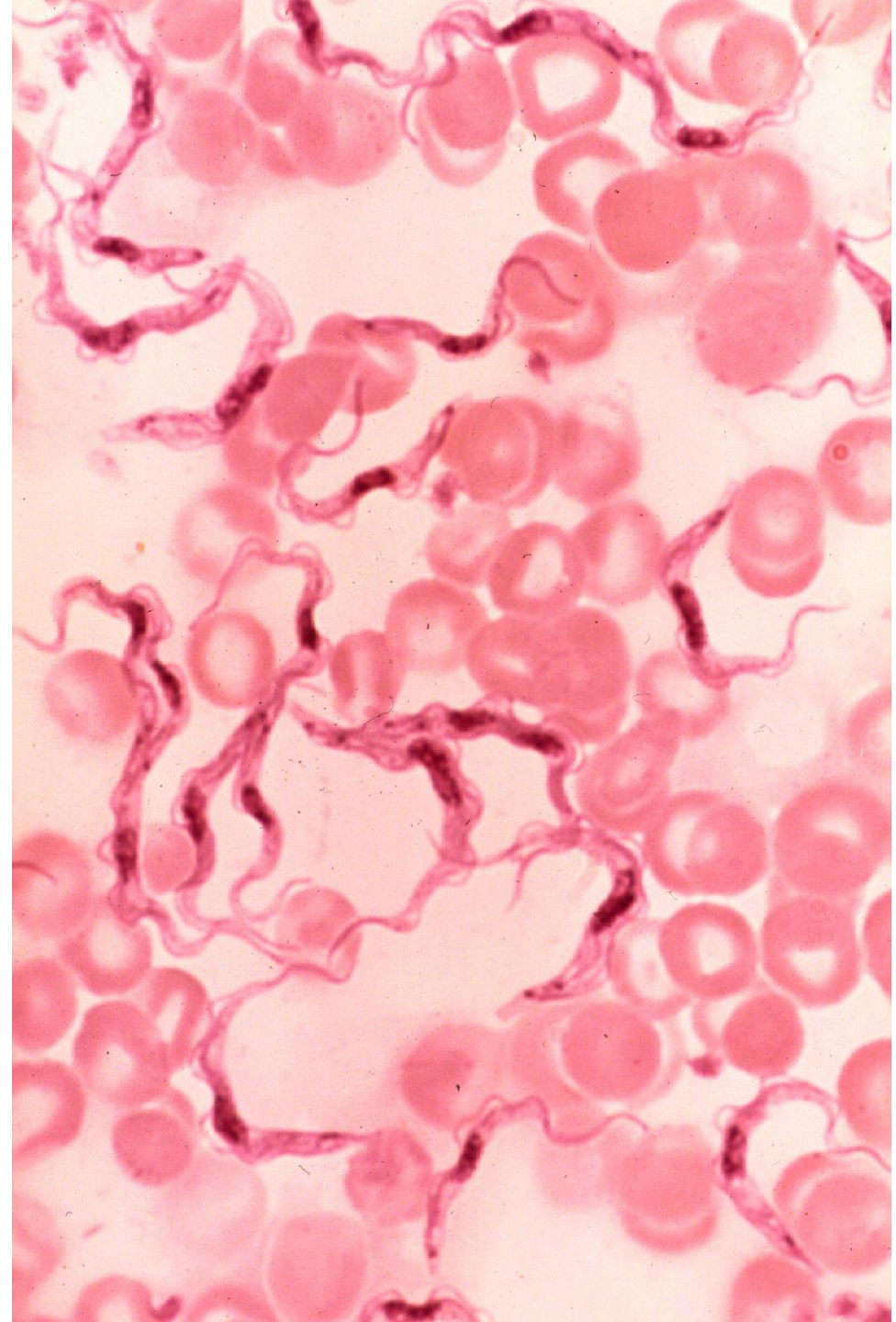
Malaria tropica : Gametozyten



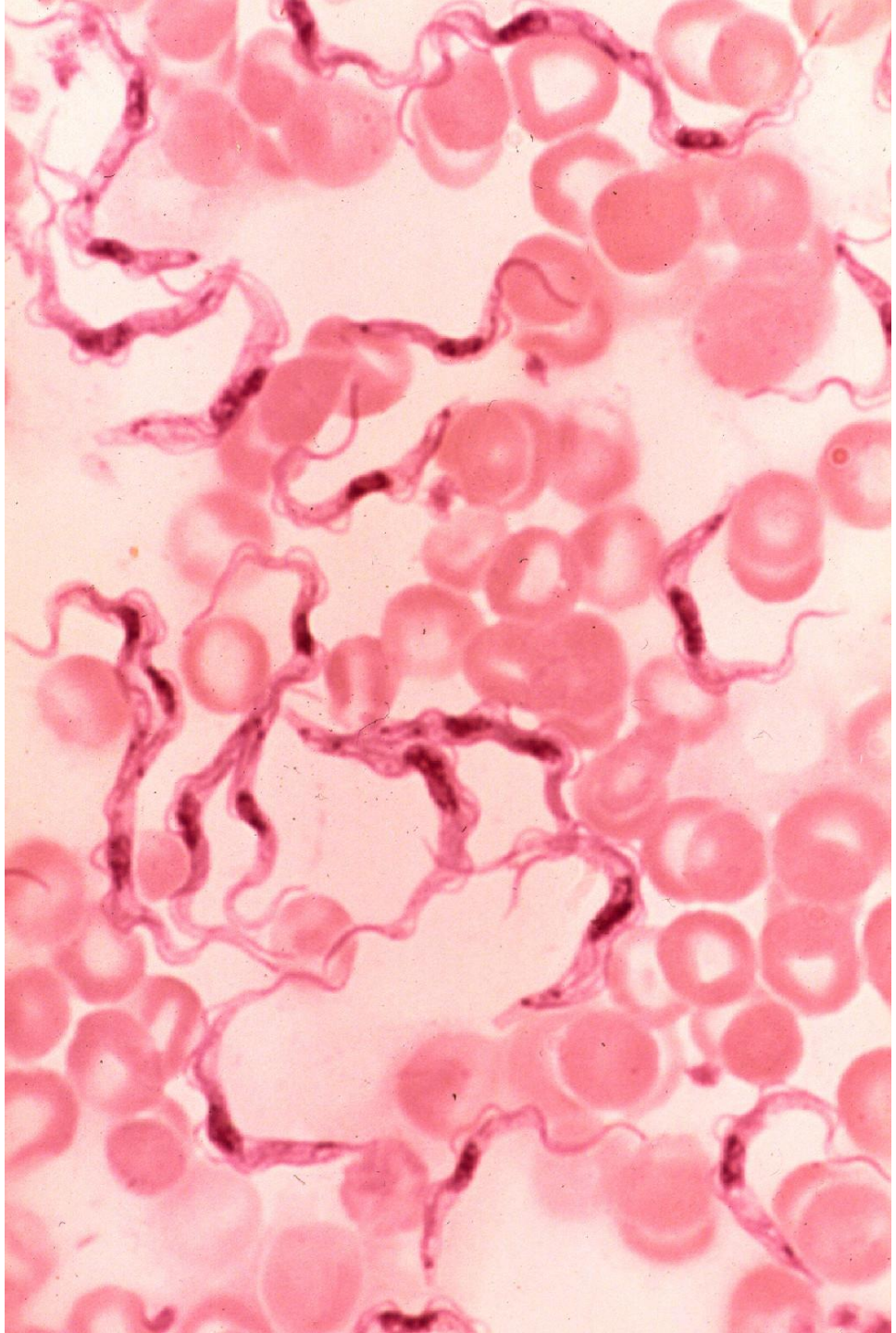


Malaria tropica : Plasmodien





Schlafkrankheit : Trypanosoma gambiense



Letztes teilweises update im Jahr 2002