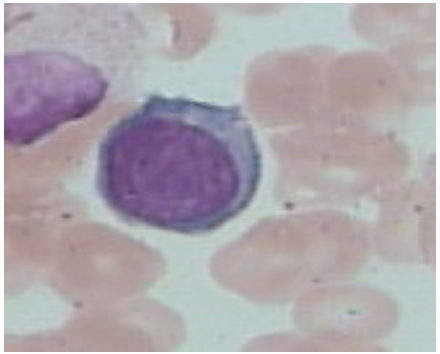
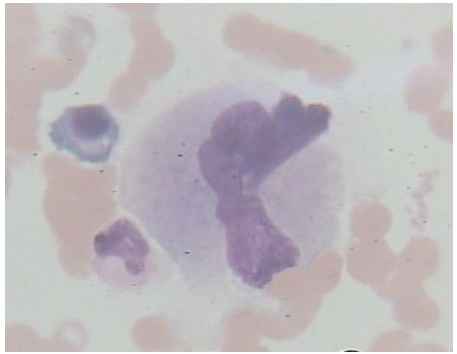


Мегакариобласт



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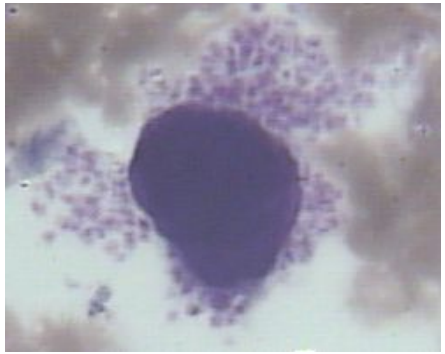
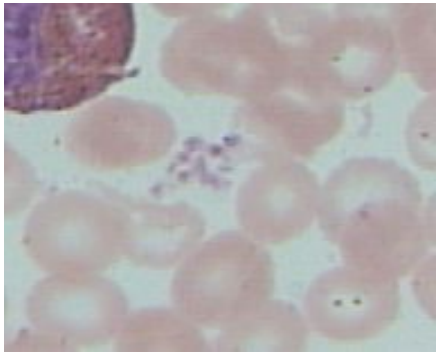


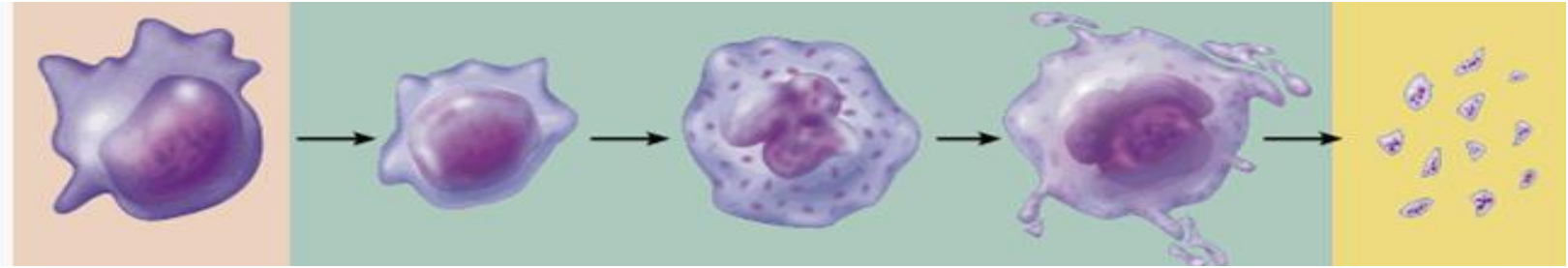
Мегакариоцит

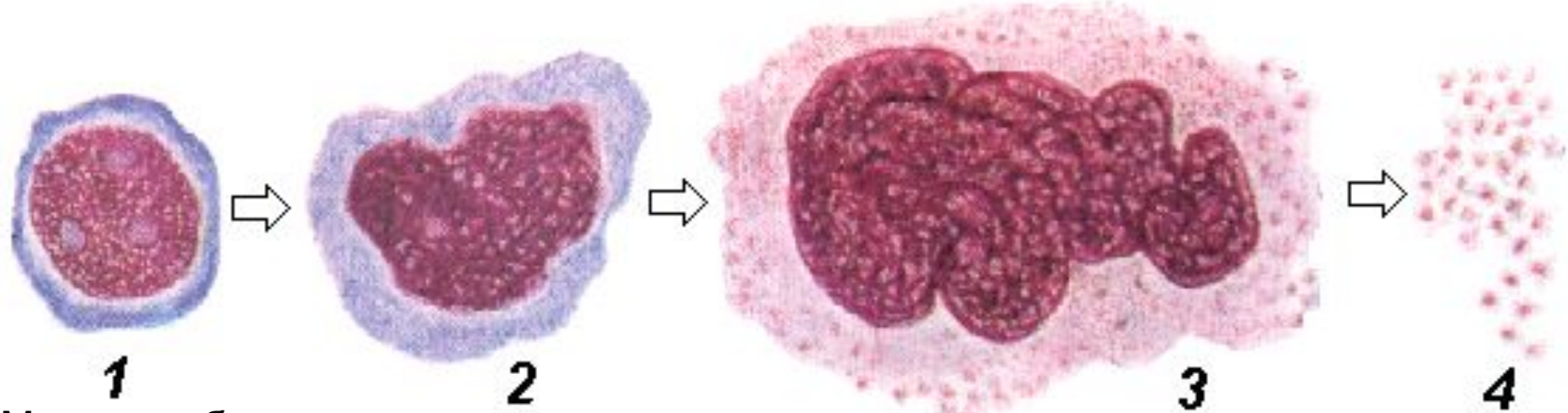


Тромбоциты

Мегакариобласт → промегакариоцит → мегакариоцит

25 часов





Мегакариобла
ст

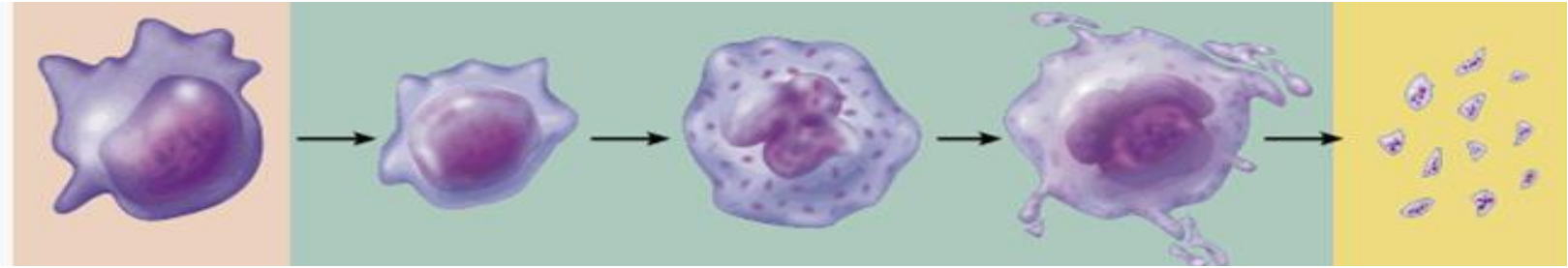
Промегакариоцит

Мегакариоцит

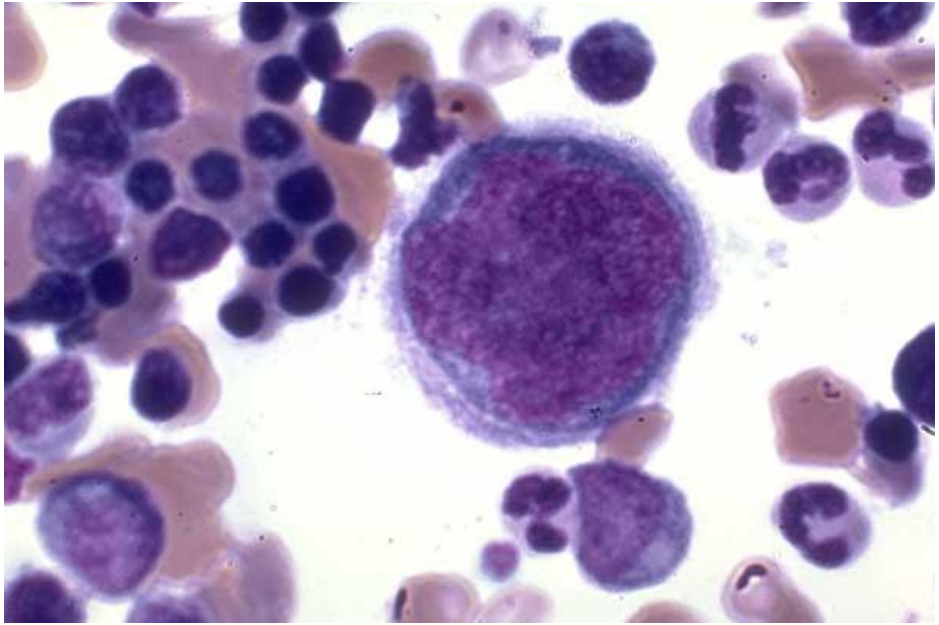
Тромбоциты

Мегакариобласт → промегакариоцит → мегакариоцит

25 часов

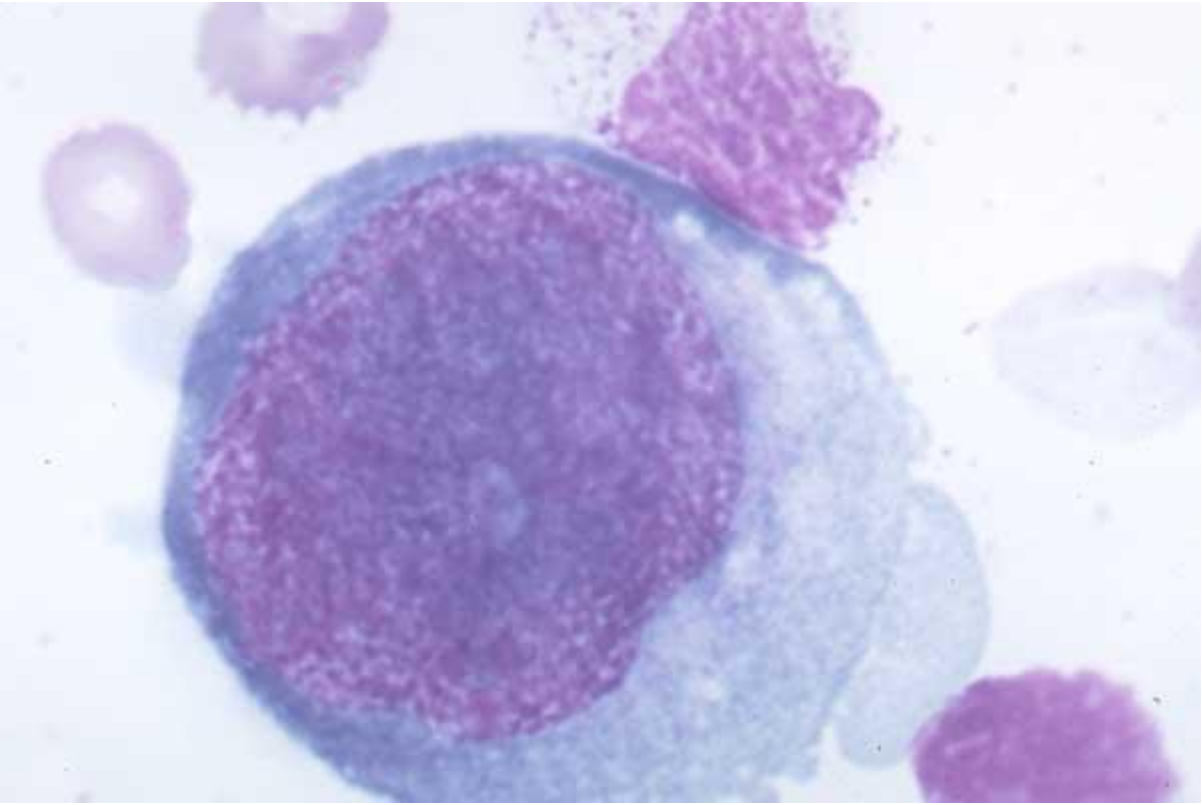


1. мегакариобласт

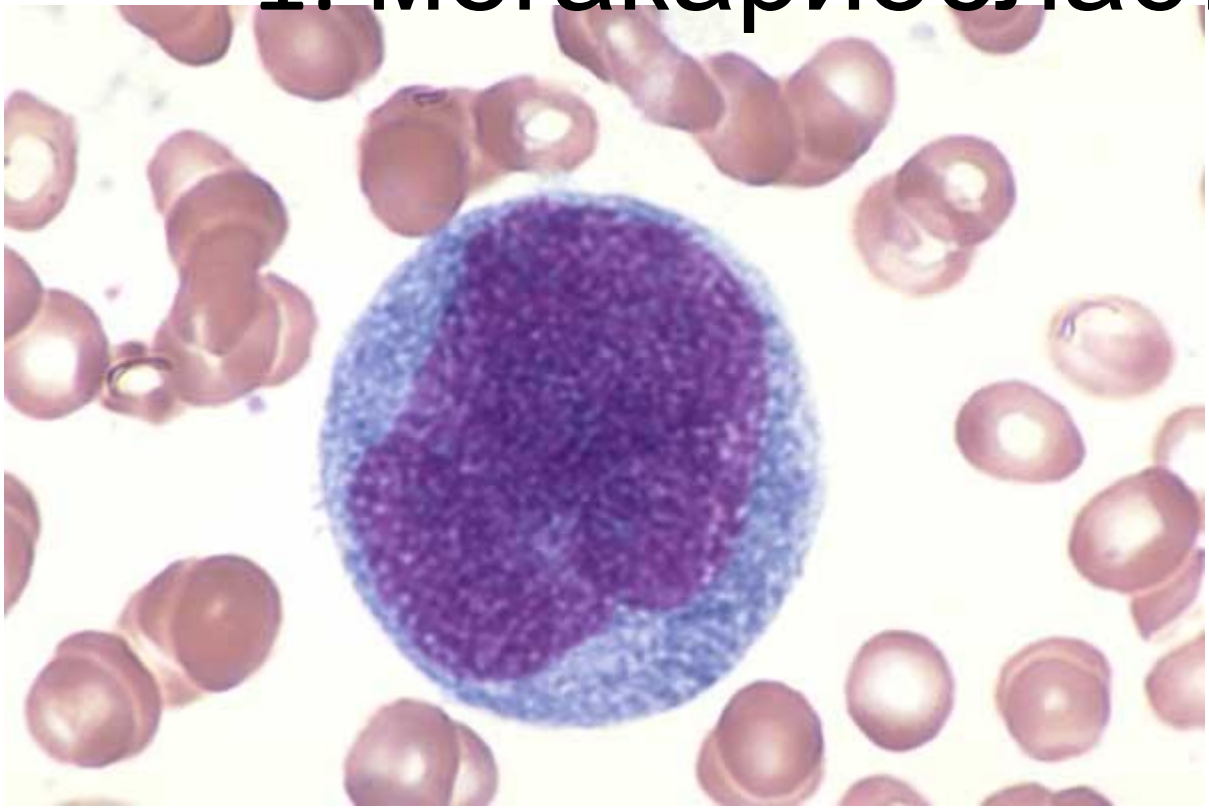


Мегакариобласты - родоначальные клетки мегакариоцитарного ряда. Размер - около 20 мкм. Ядро круглое, с мелкосетчатой структурой хроматина, иногда сплетенного в виде клубка. Структура ядра грубее, чем у недифференцированного бласта, нередко видны ядрышки. Цитоплазма базофильная, беззернистая, имеет вид узкого ободка. Часто контуры клеток неровные, с отростками цитоплазмы и образованием "голубых" пластинок.

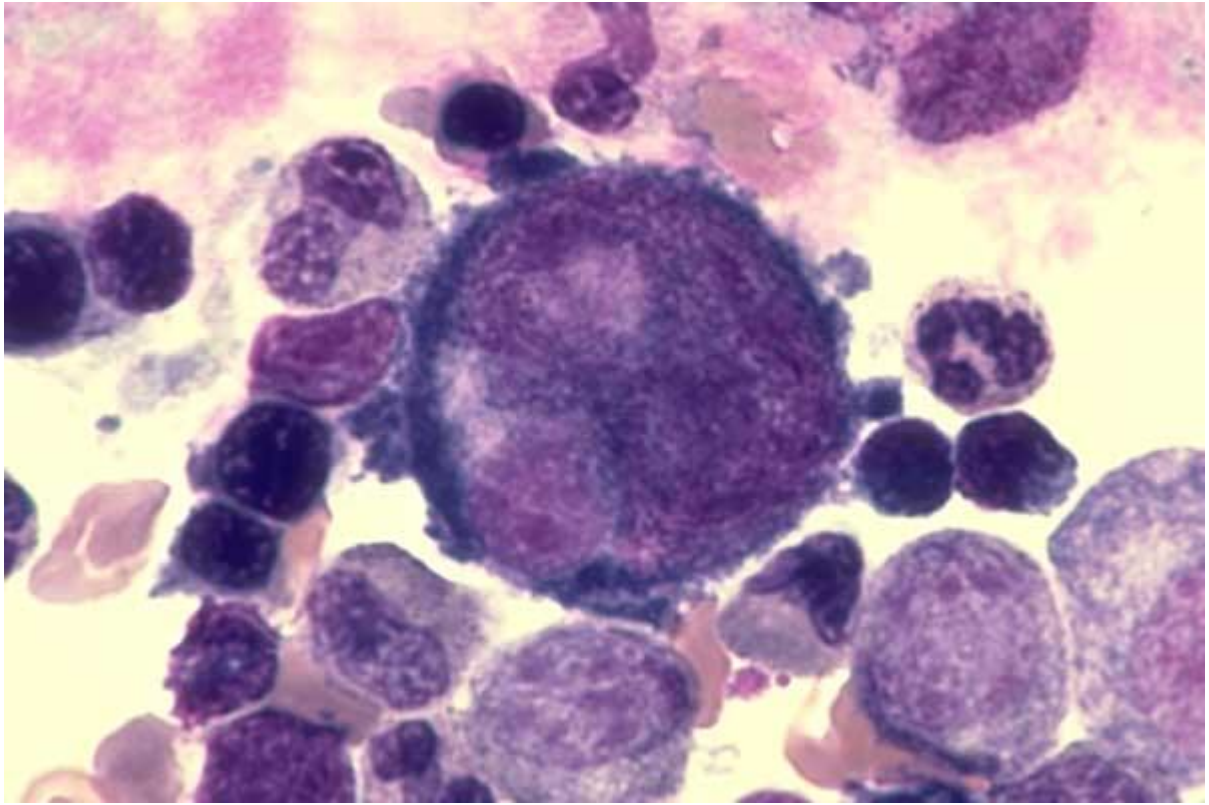
1. мегакариобласт



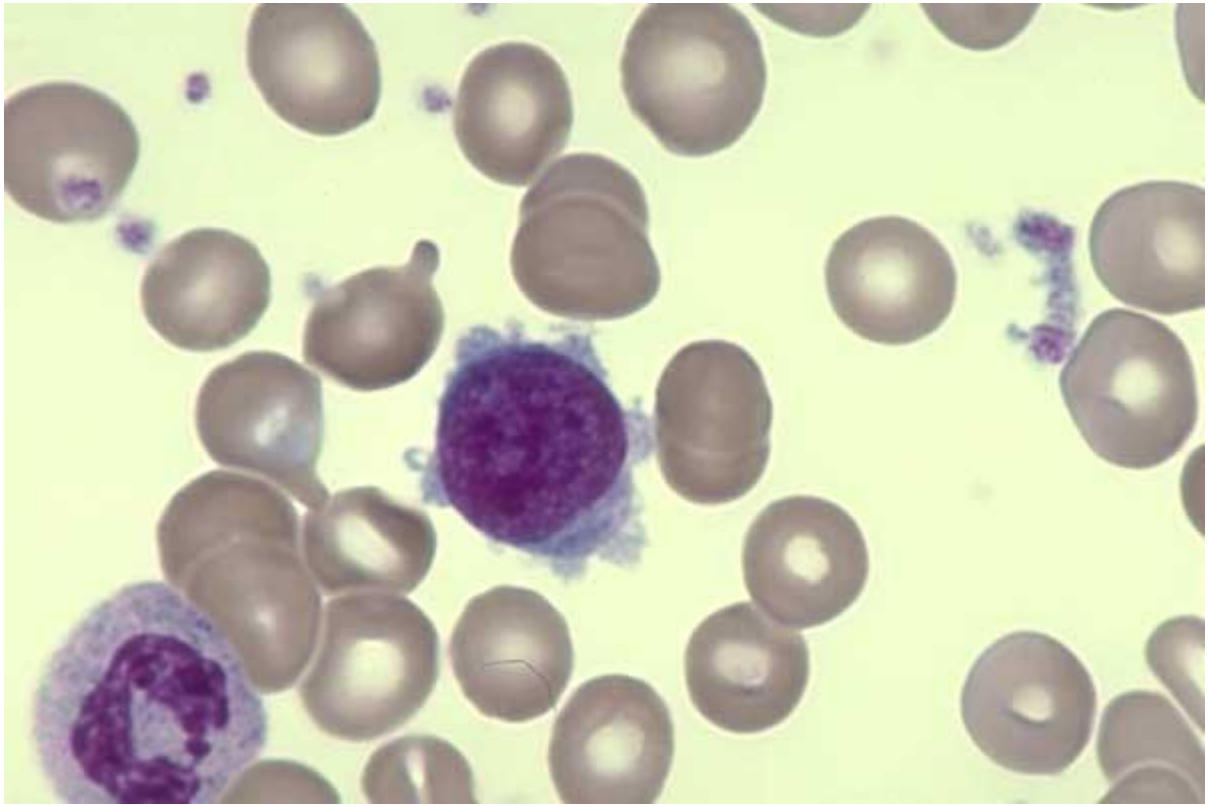
1. мегакариобласт

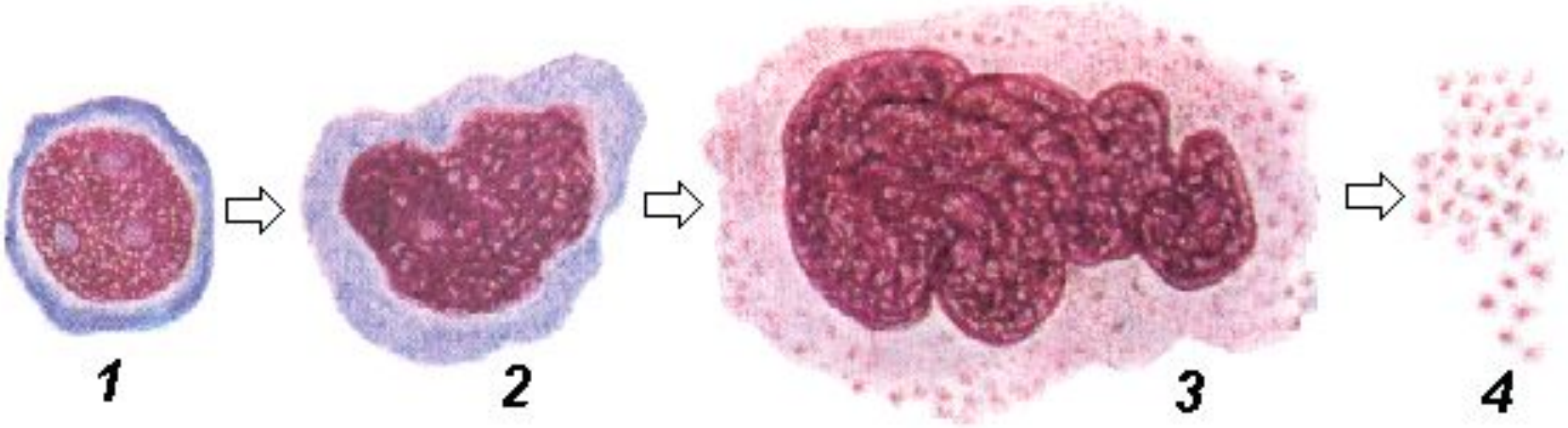


1. мегакариобласт



1. мегакариобласт

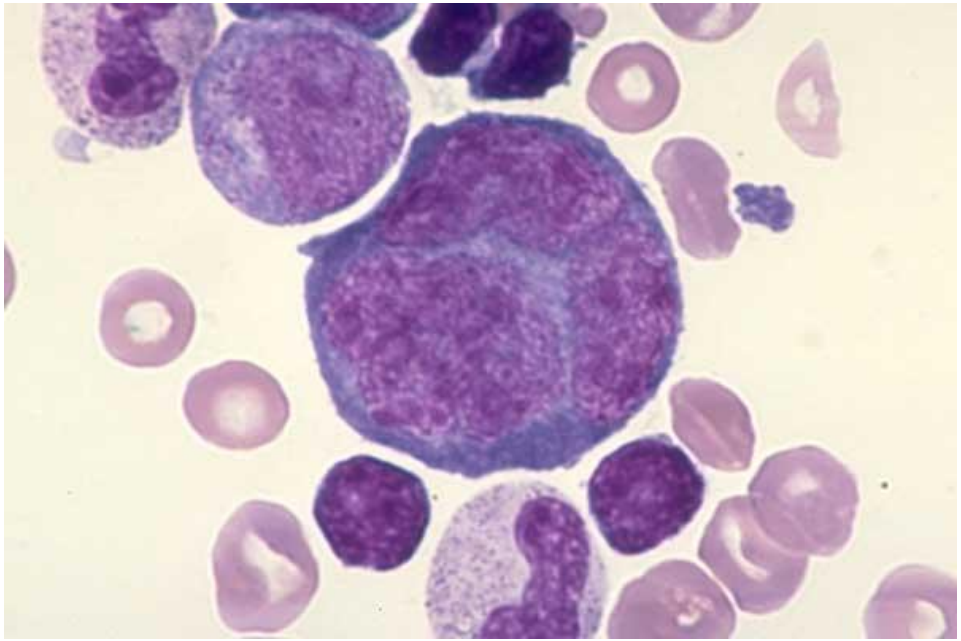




2.

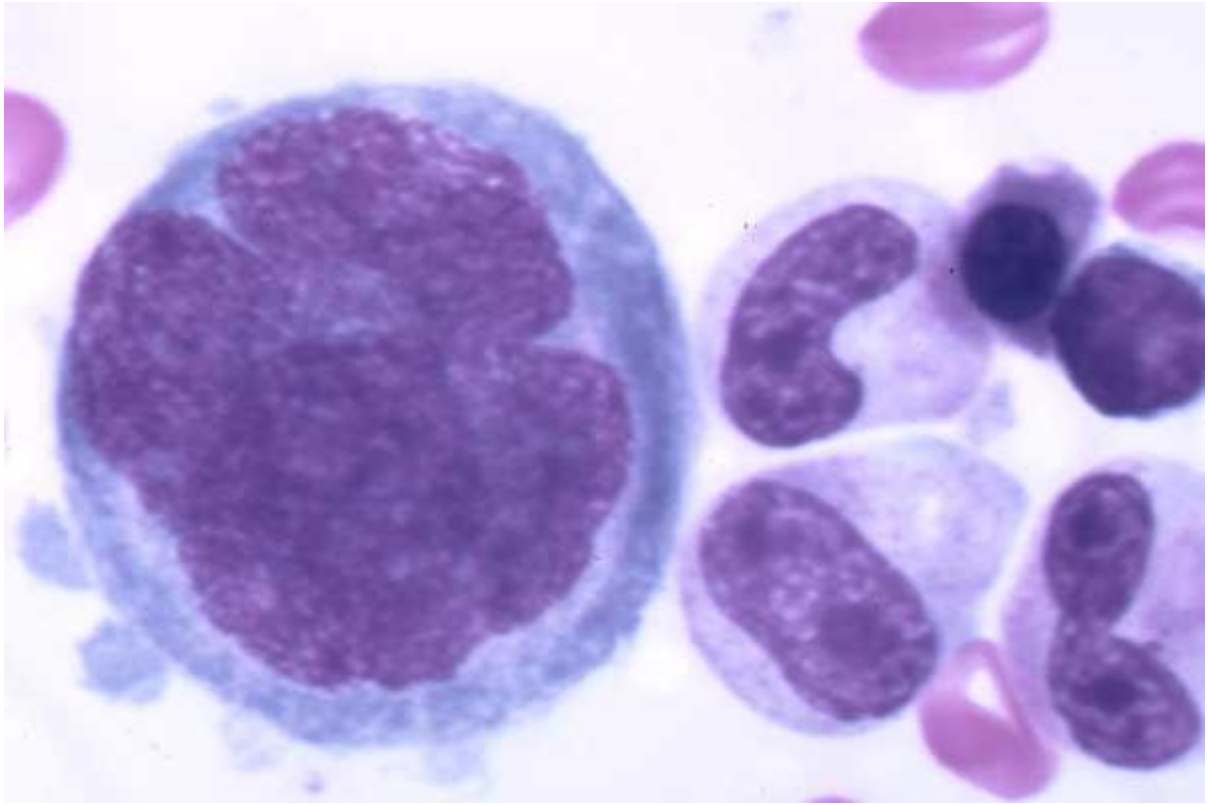
ПРОМЕГАКАРИОЦИТ

2. промегакариоцит

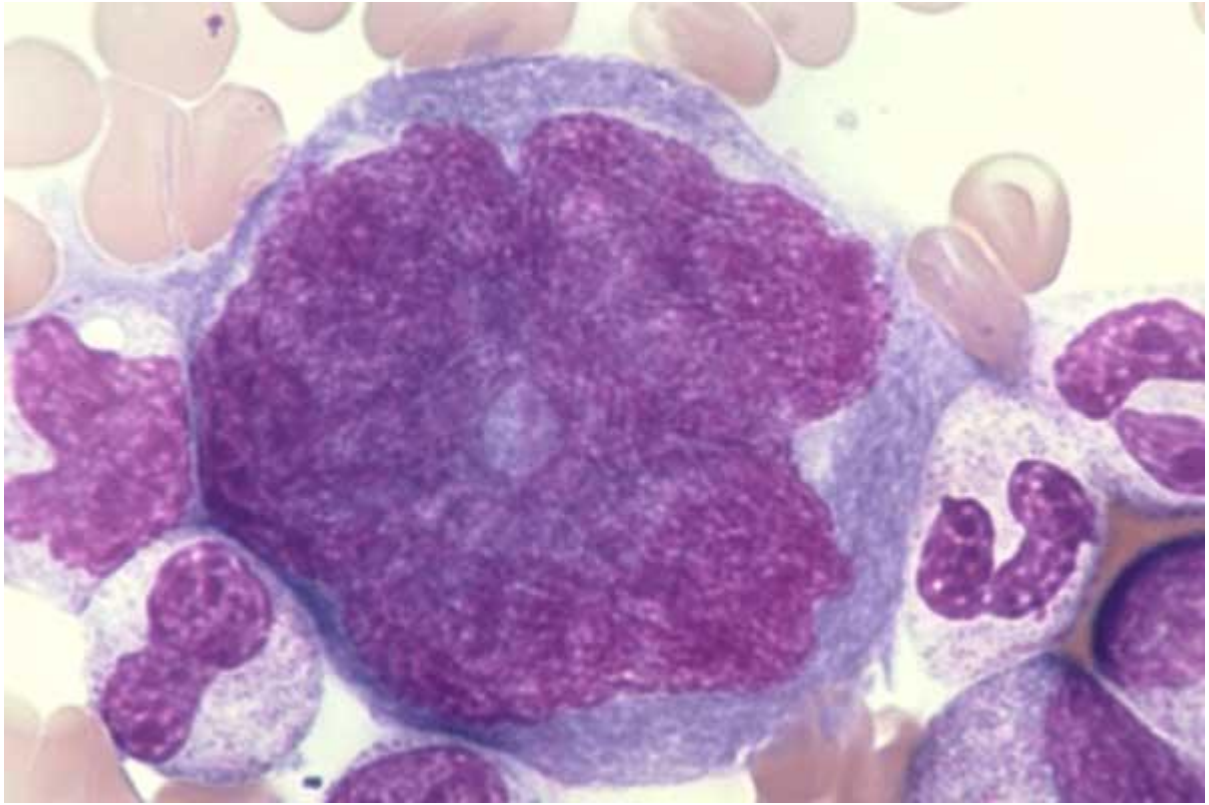


Промегакариоциты - клетки больших размеров, чем мегакариобласты. Ядро крупнее, чем у мегакариобласта, имеет несколько более грубую структуру и тенденцию к полиморфизму (бухтообразные вдавления, линии шнурования ядра и пр.). Цитоплазма базофильная, беззернистая, в виде узкого ободка, иногда с отростками и образованием "голубых" пластинок.

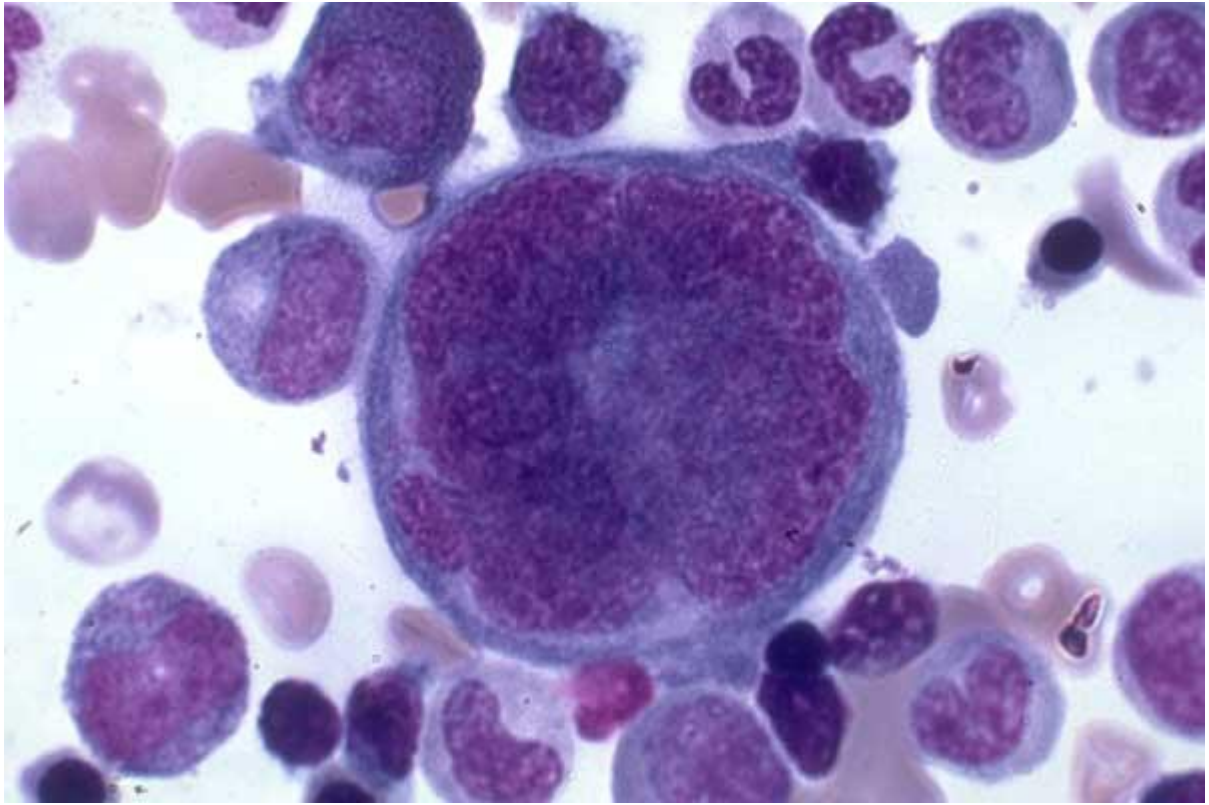
промегакариоцит

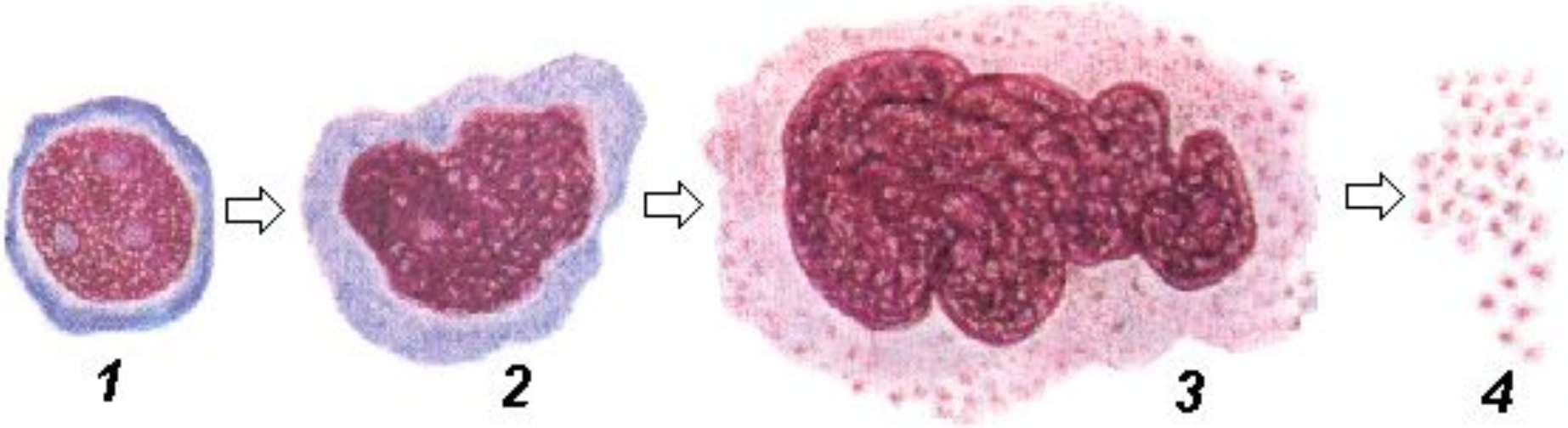


промегакариоцит



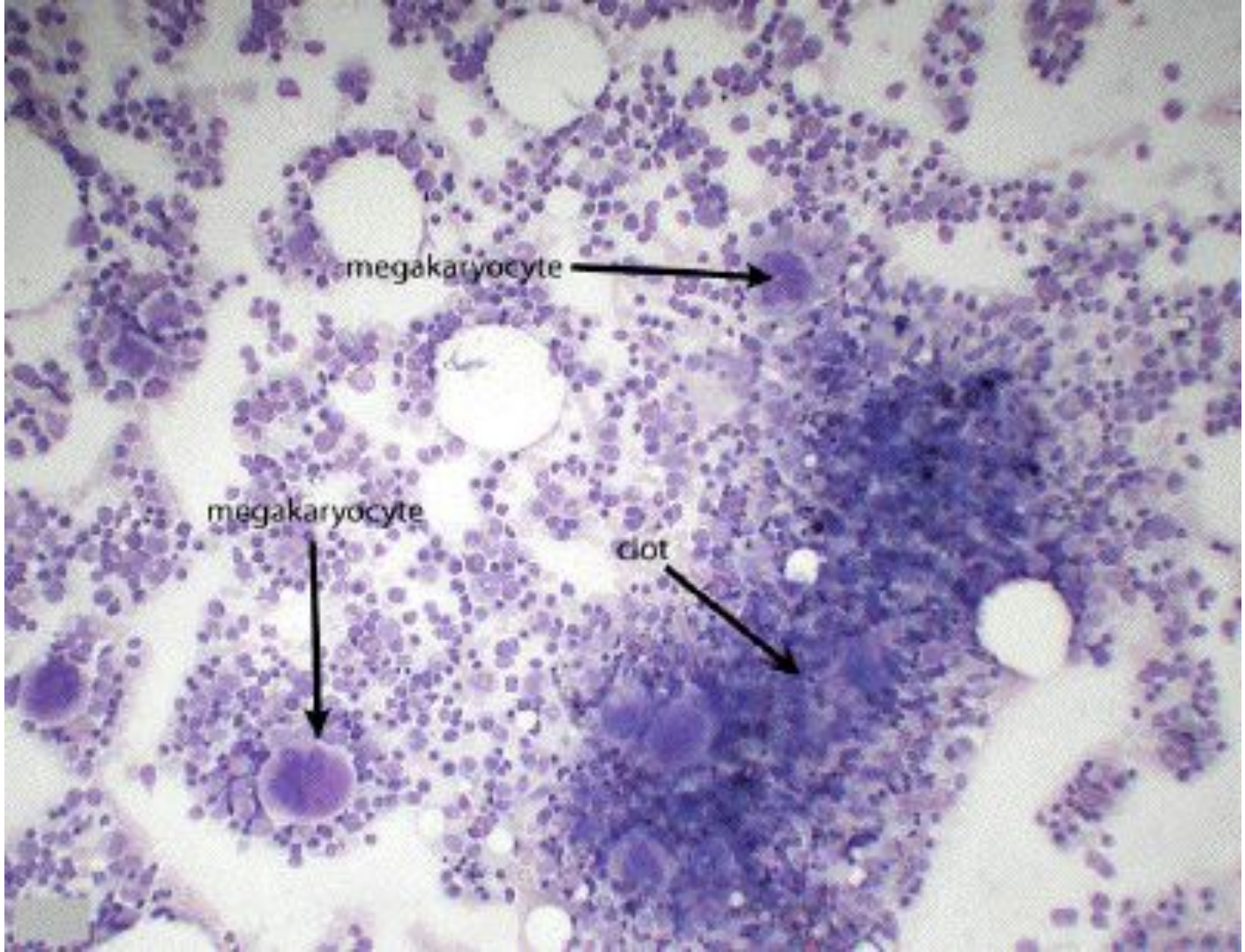
промегакариоцит



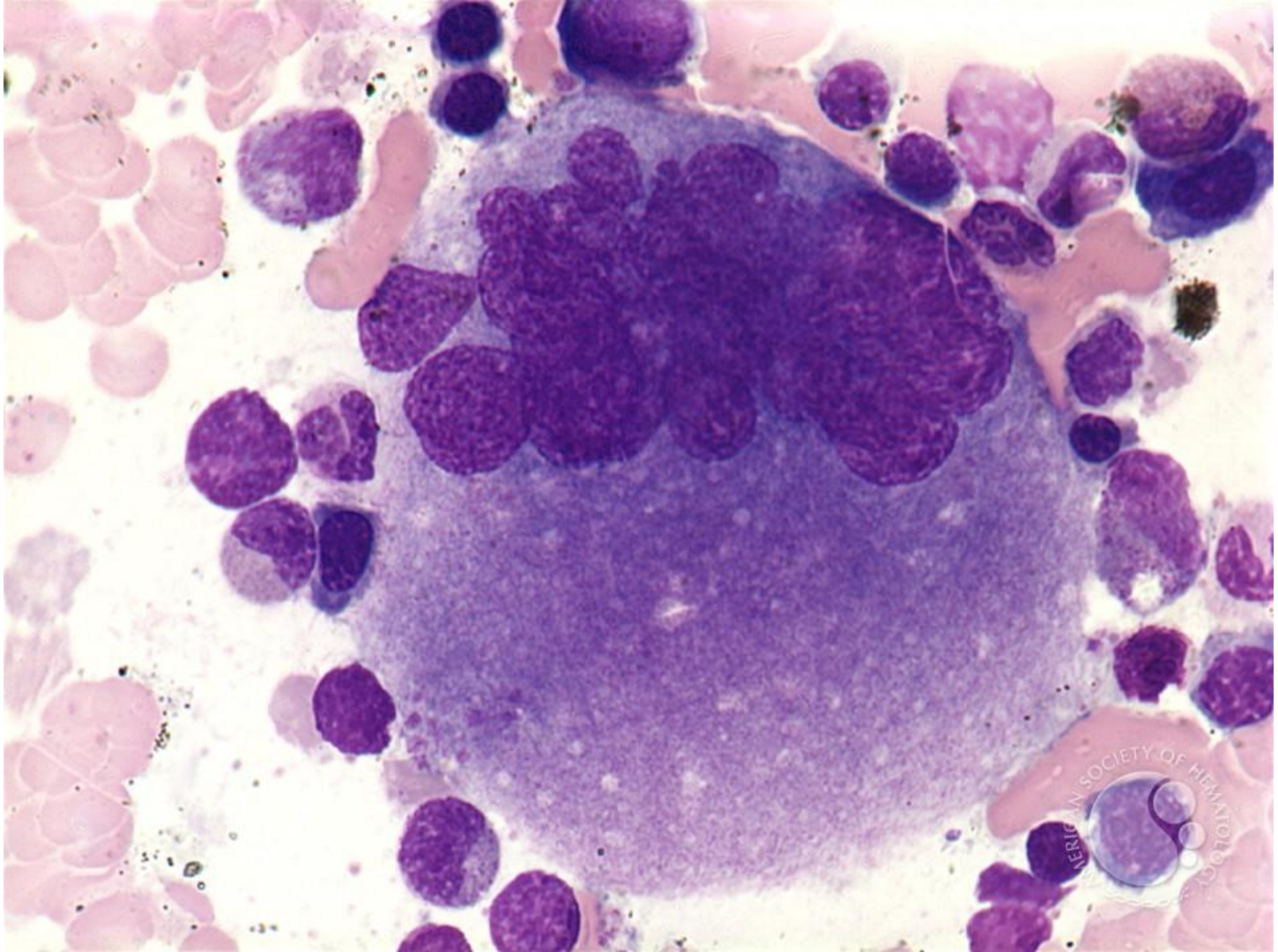


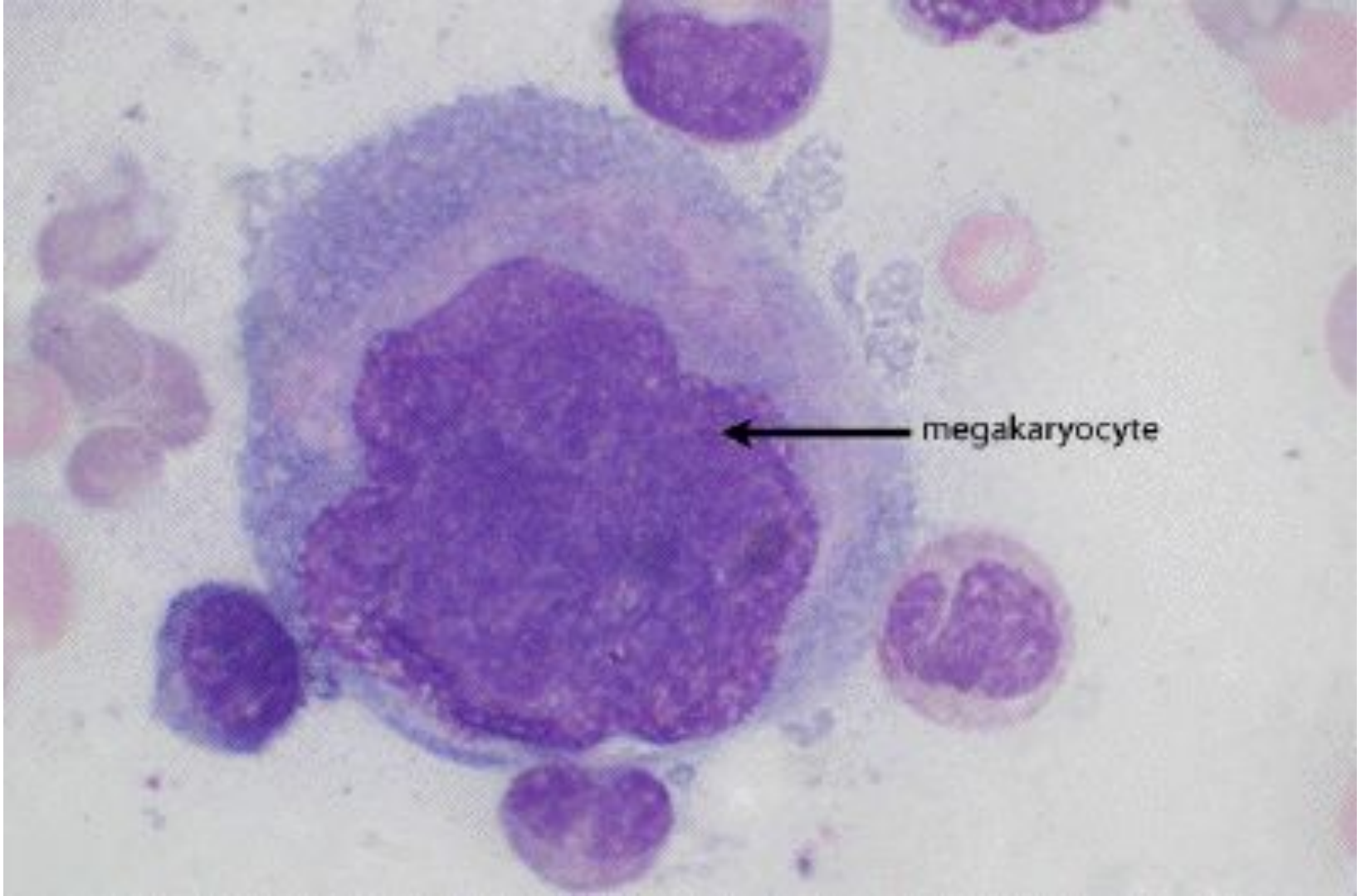
2.

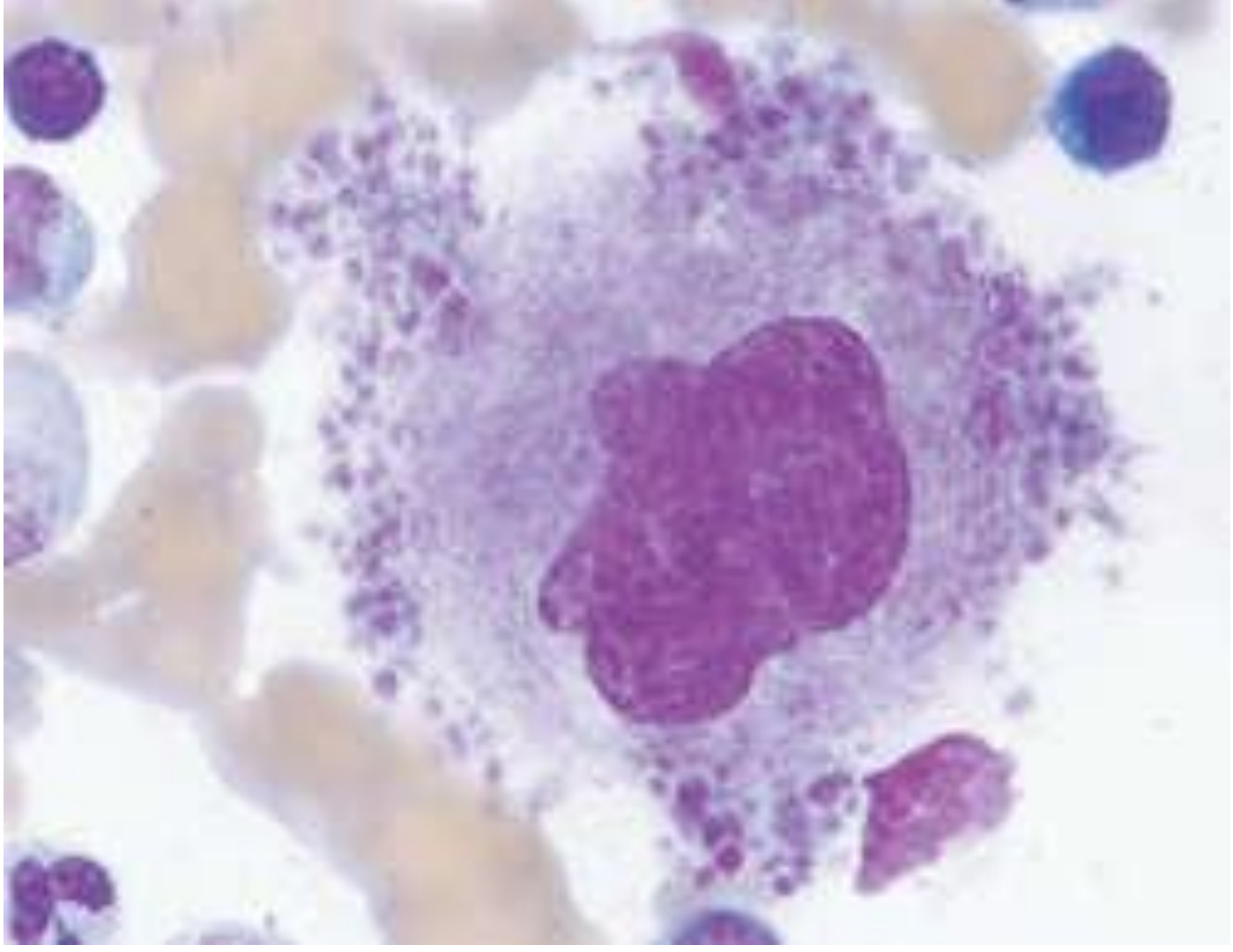
МЕГАКАРИОЦИТ

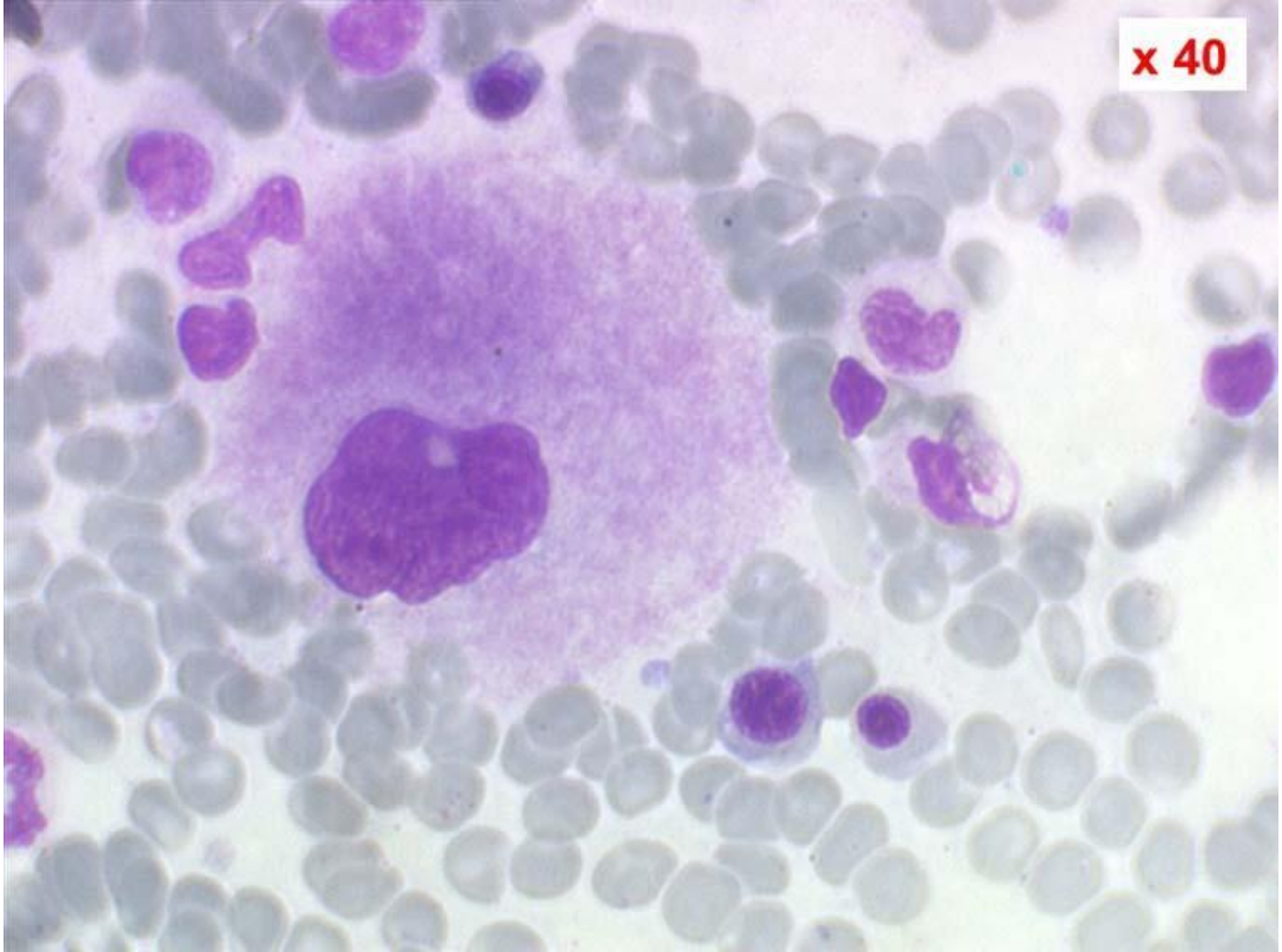

megakaryocyte
megakaryocyte
clot

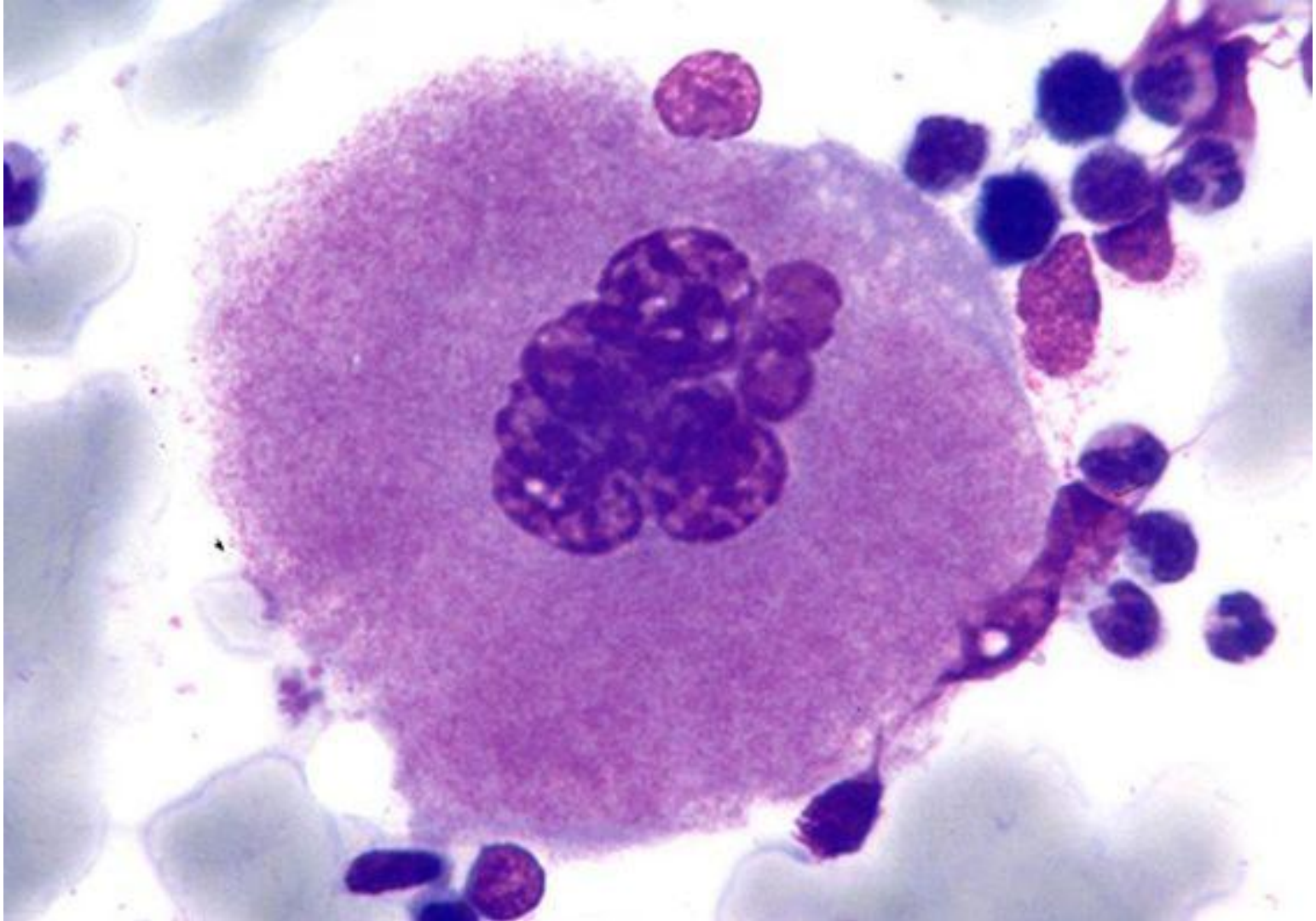
Мегакариобласт
Промегакариоцит
Мегакариоцит
Тромбоциты

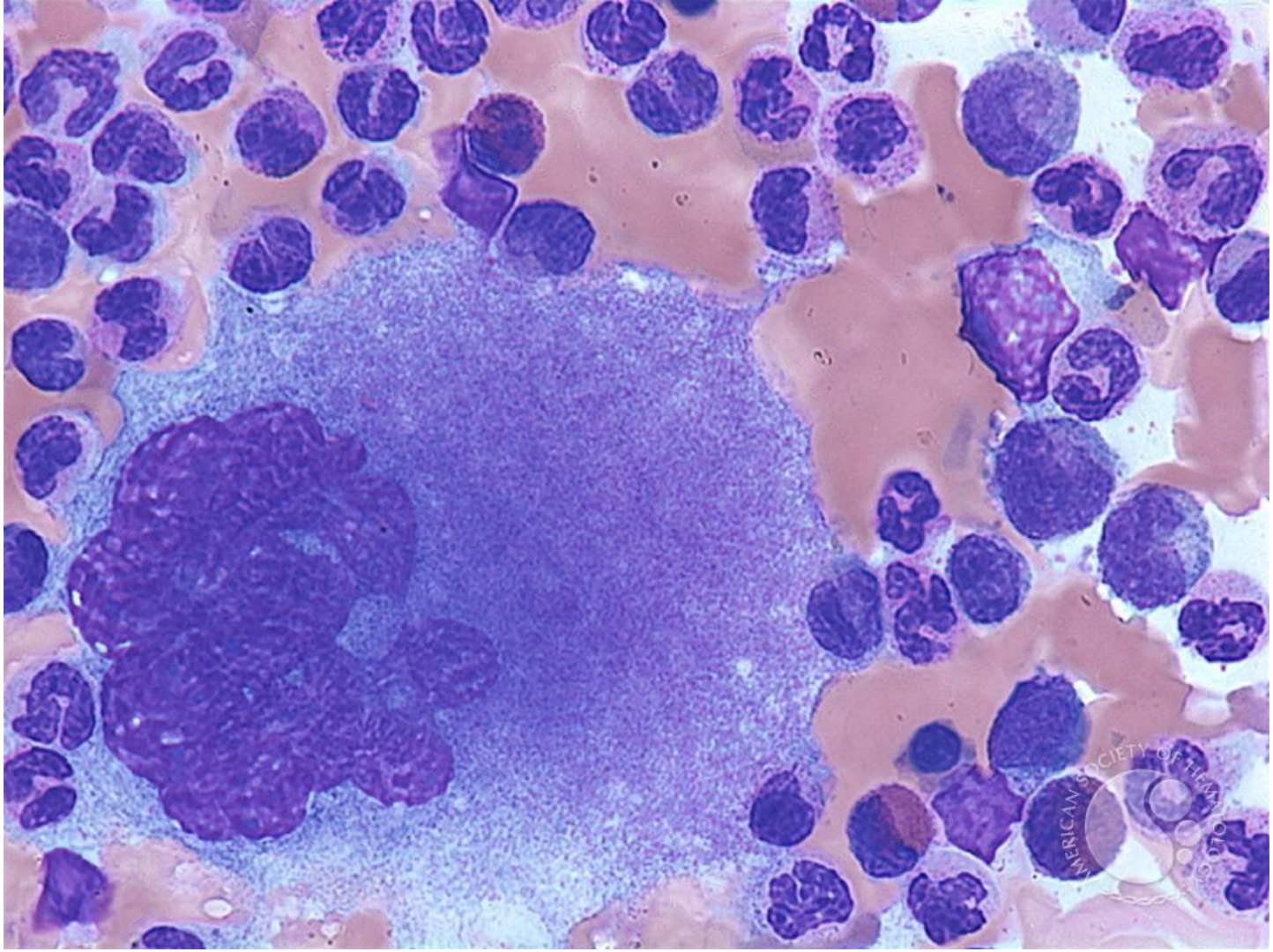

AMERICAN SOCIETY OF HEMATOLOGY

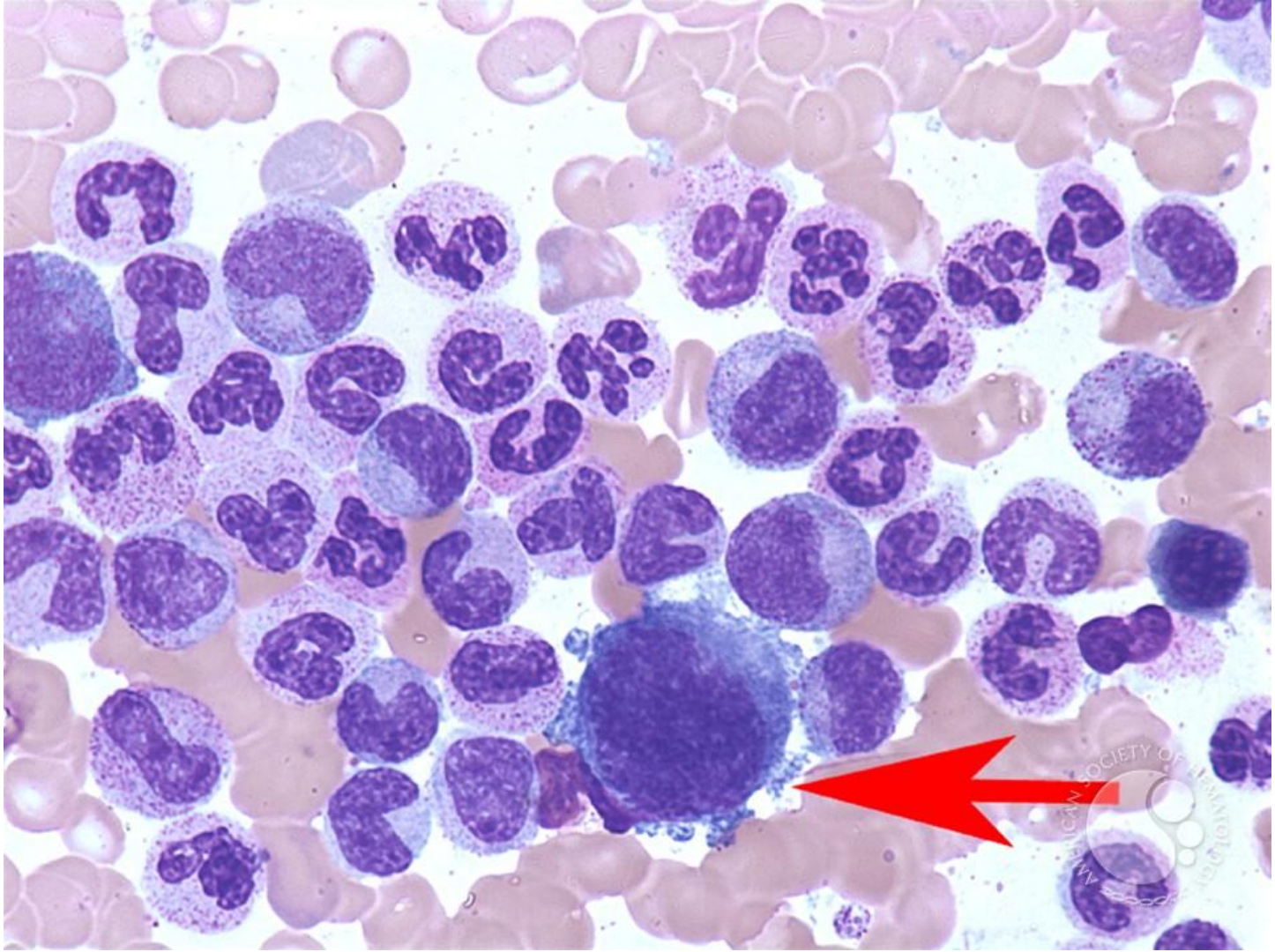

megakaryocyte

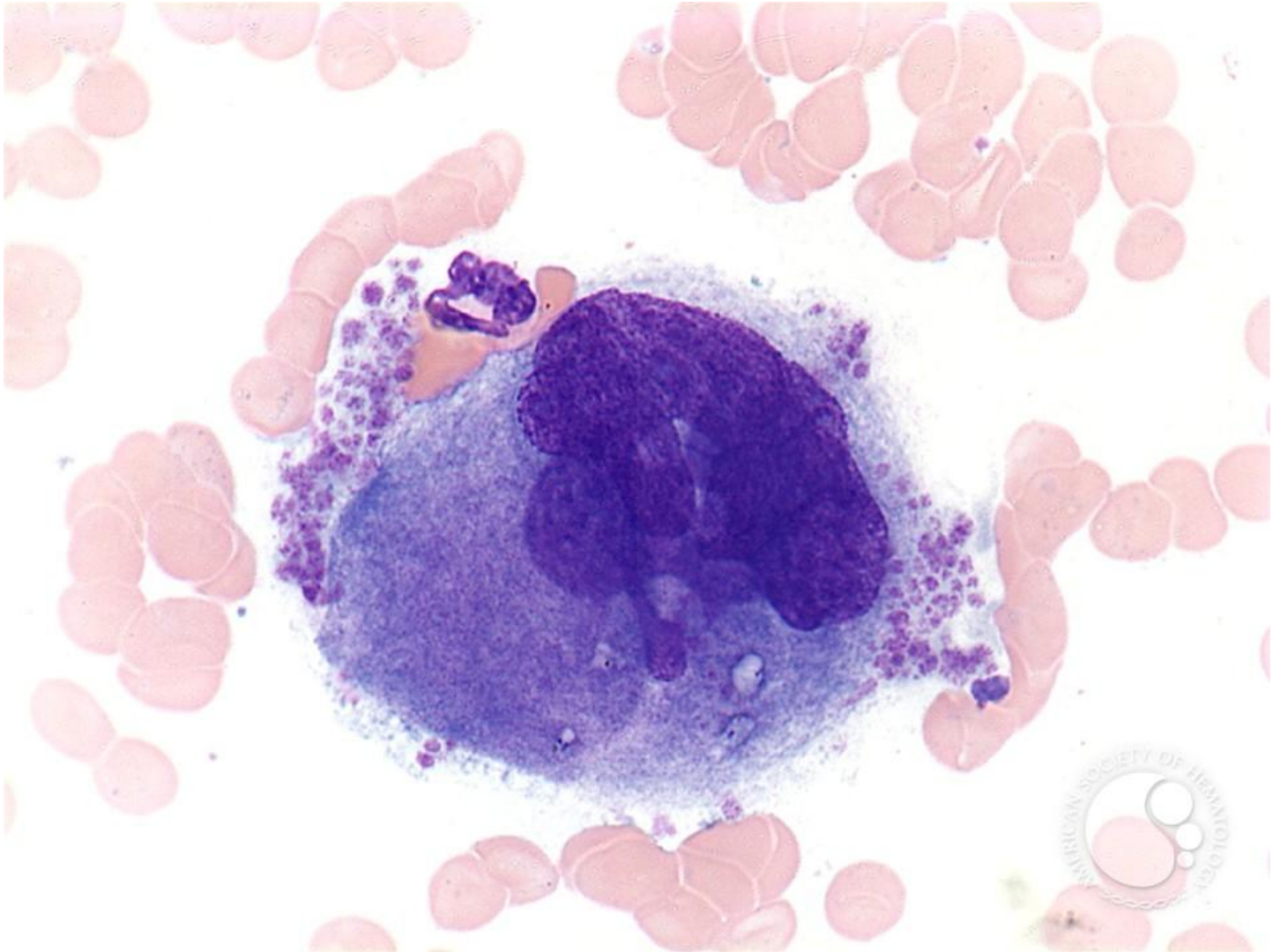


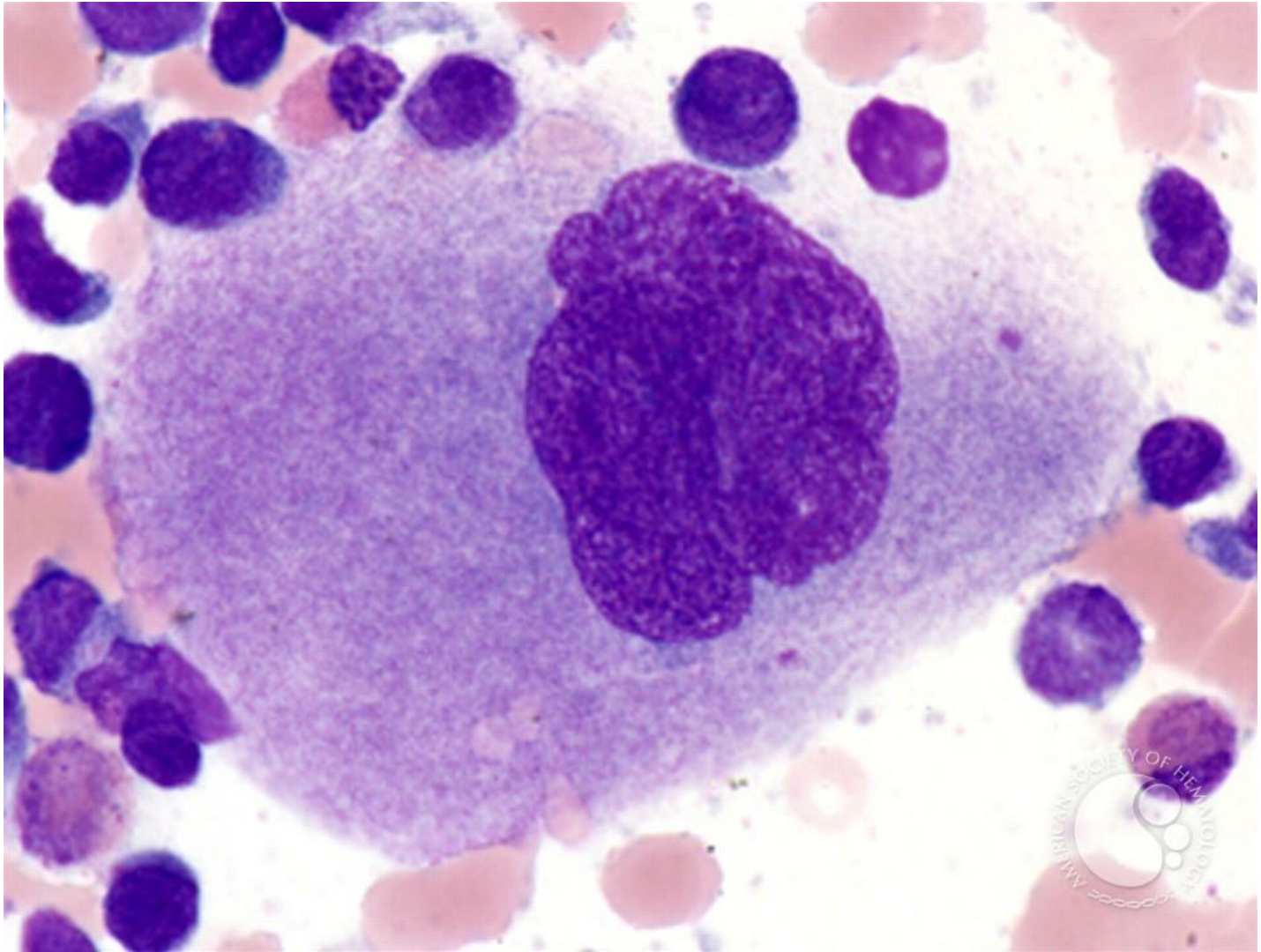

x 40




AMERICAN SOCIETY OF HEMATOLOGY




AMERICAN SOCIETY OF HEMATOLOGY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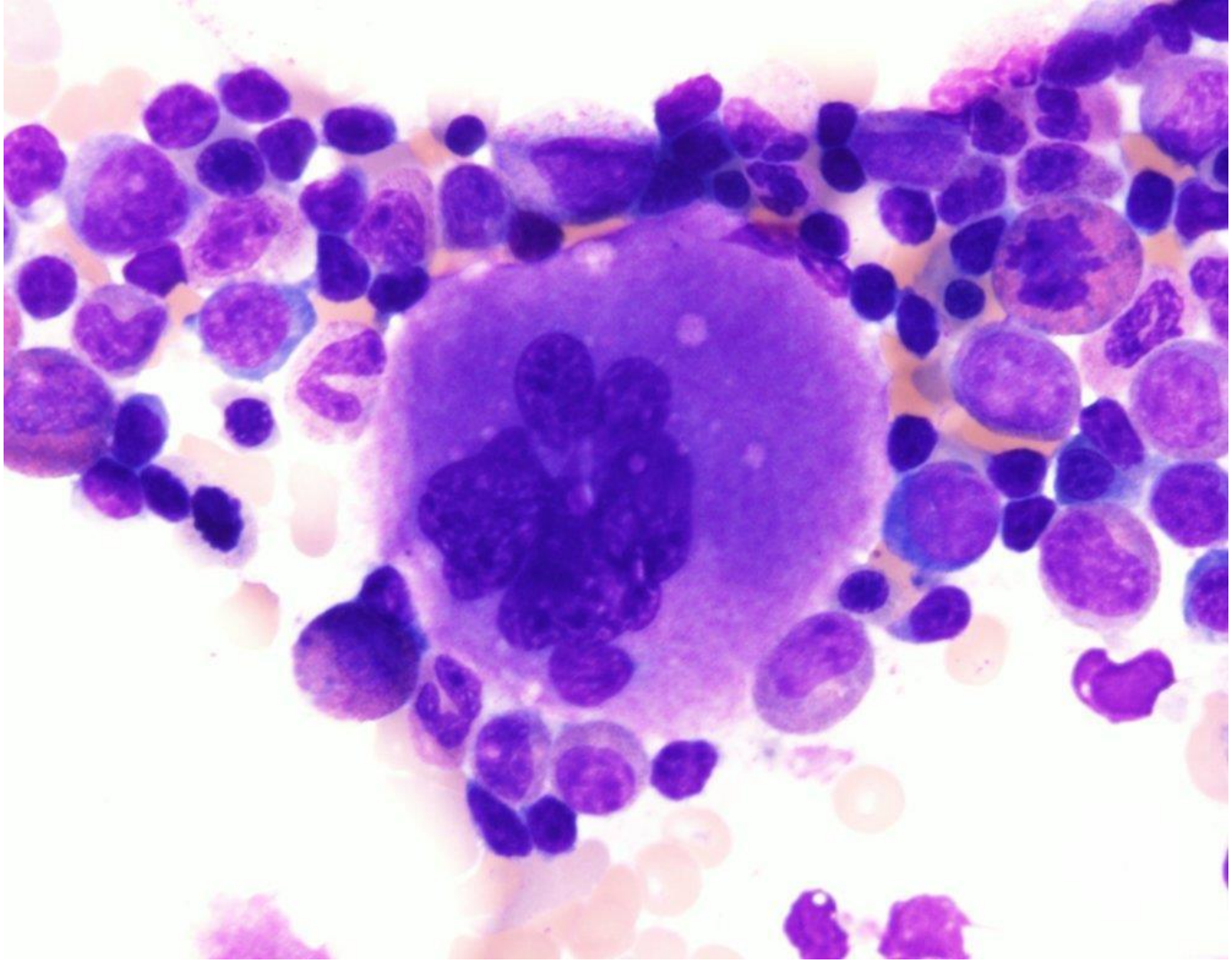
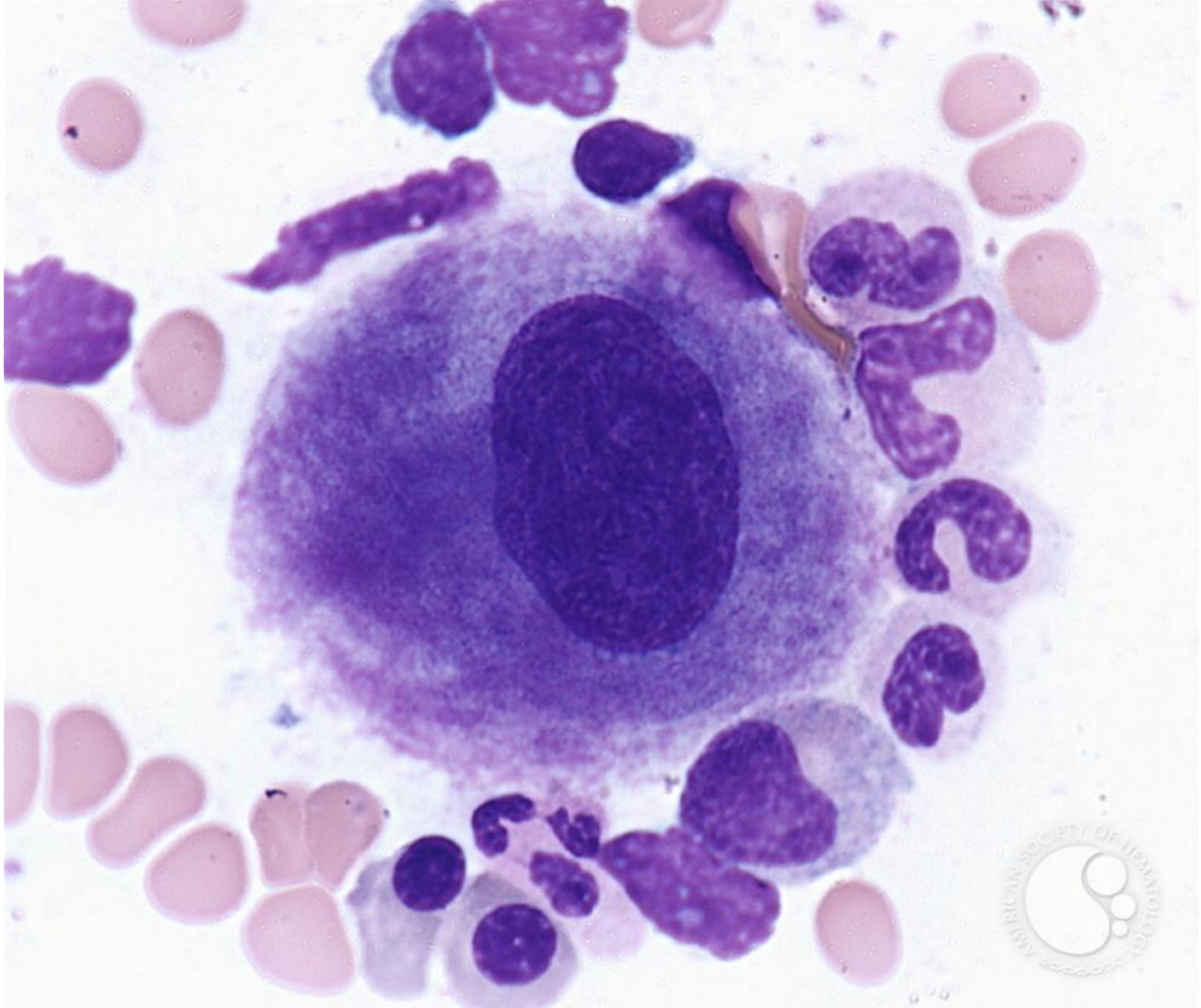
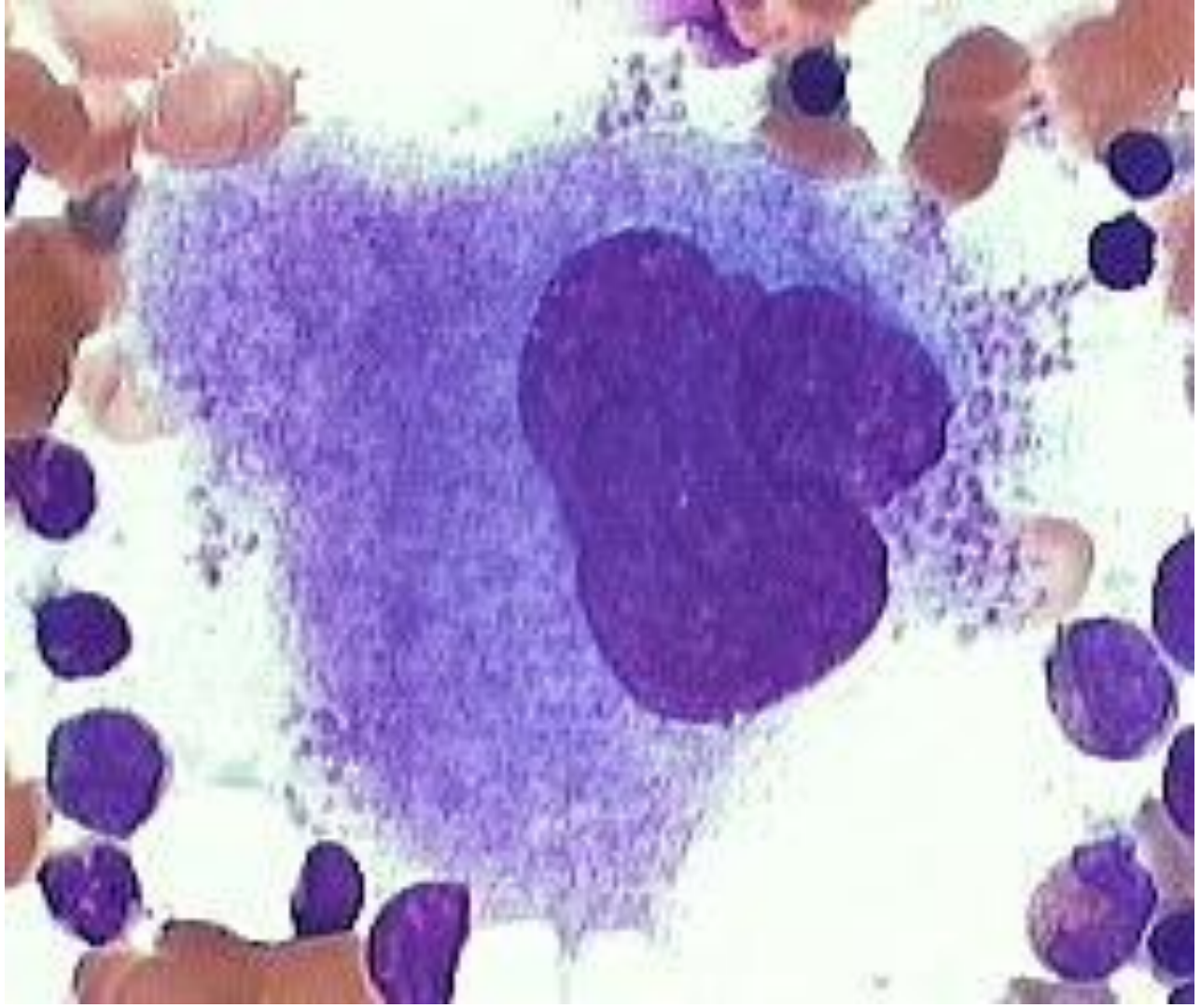



AMERICAN SOCIETY OF HEMATOLOGY

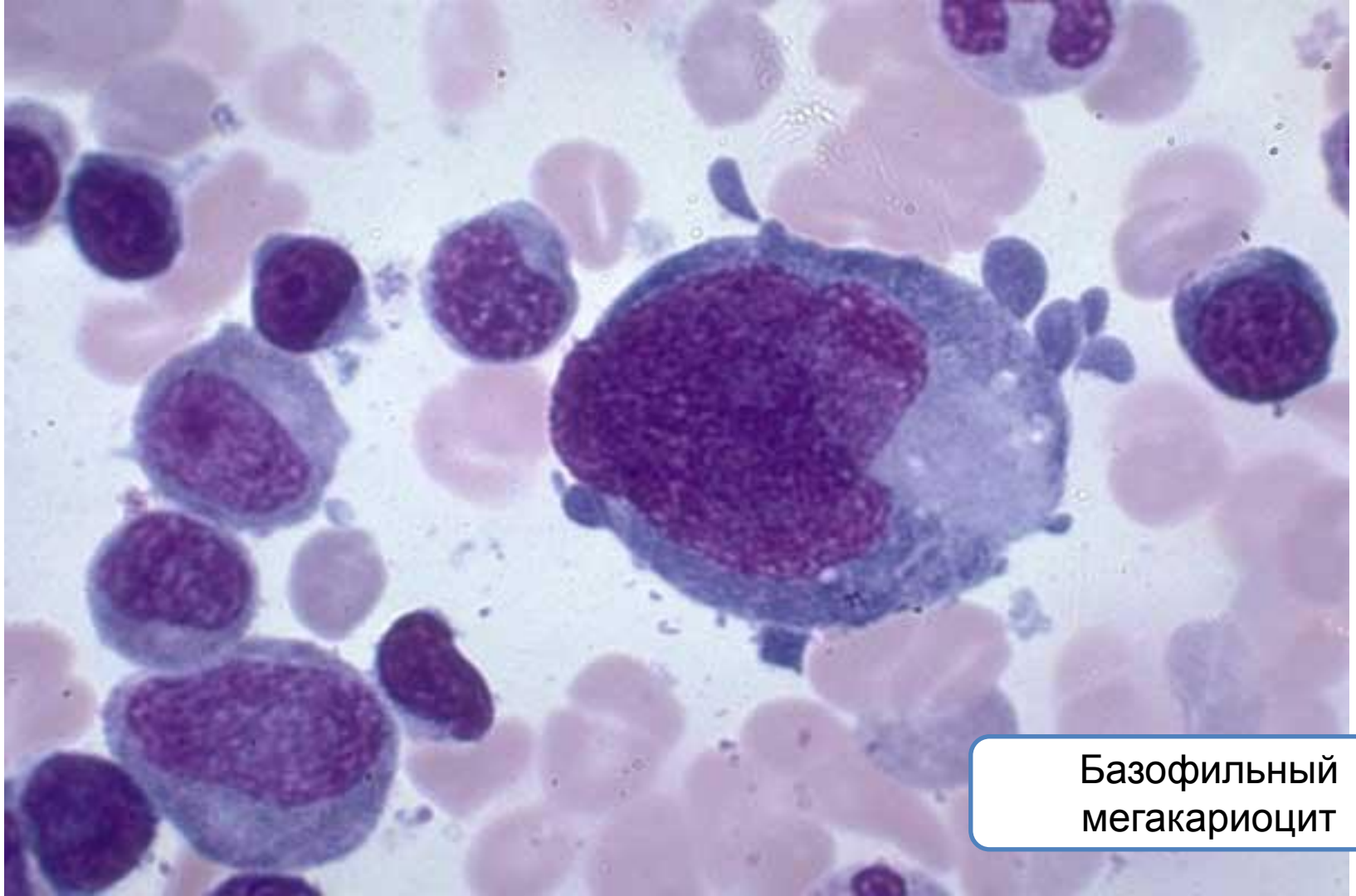


HO!

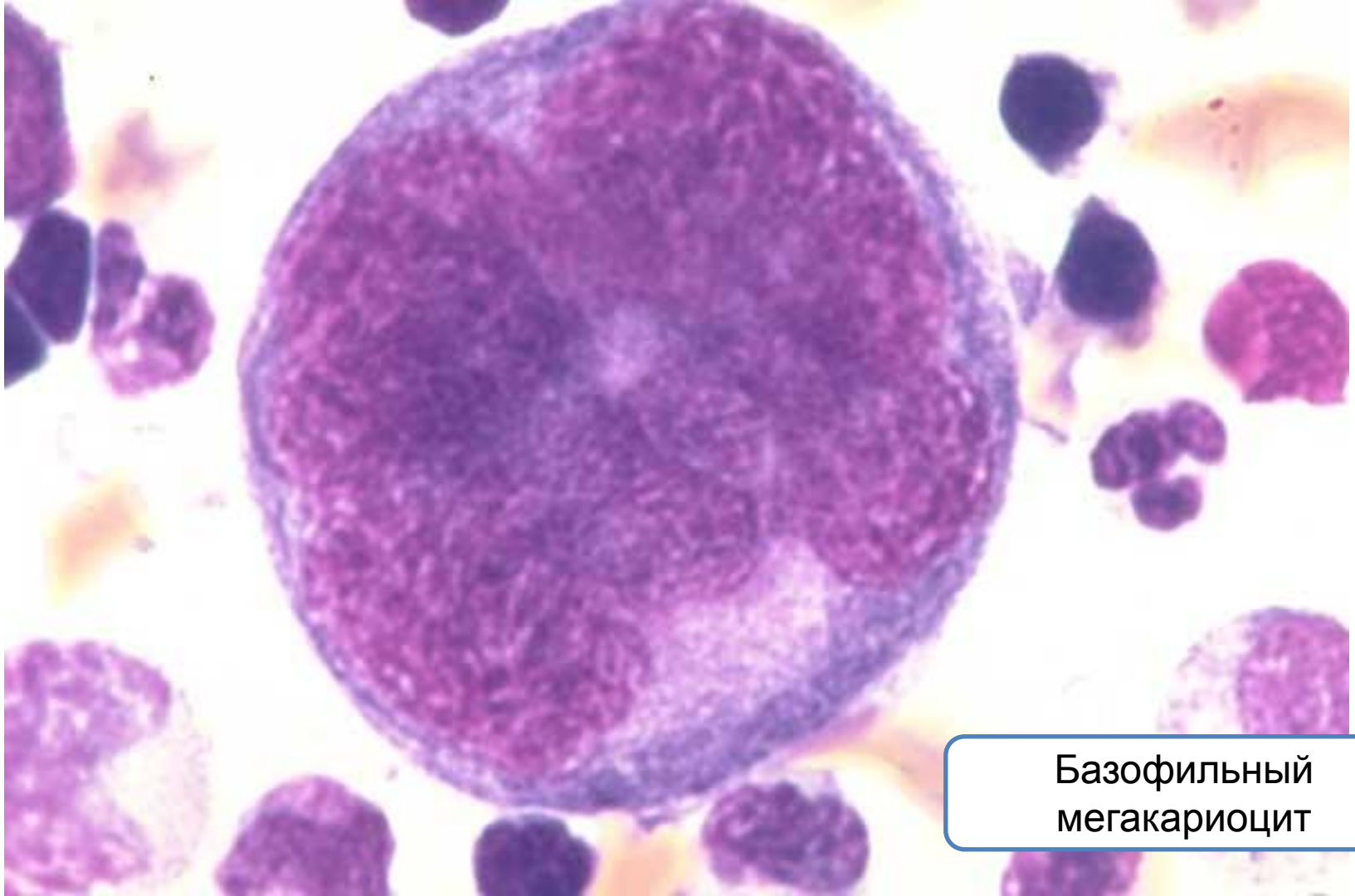
Остеокласты

Ядра в остеокласте являются отдельными и не связаны между собой

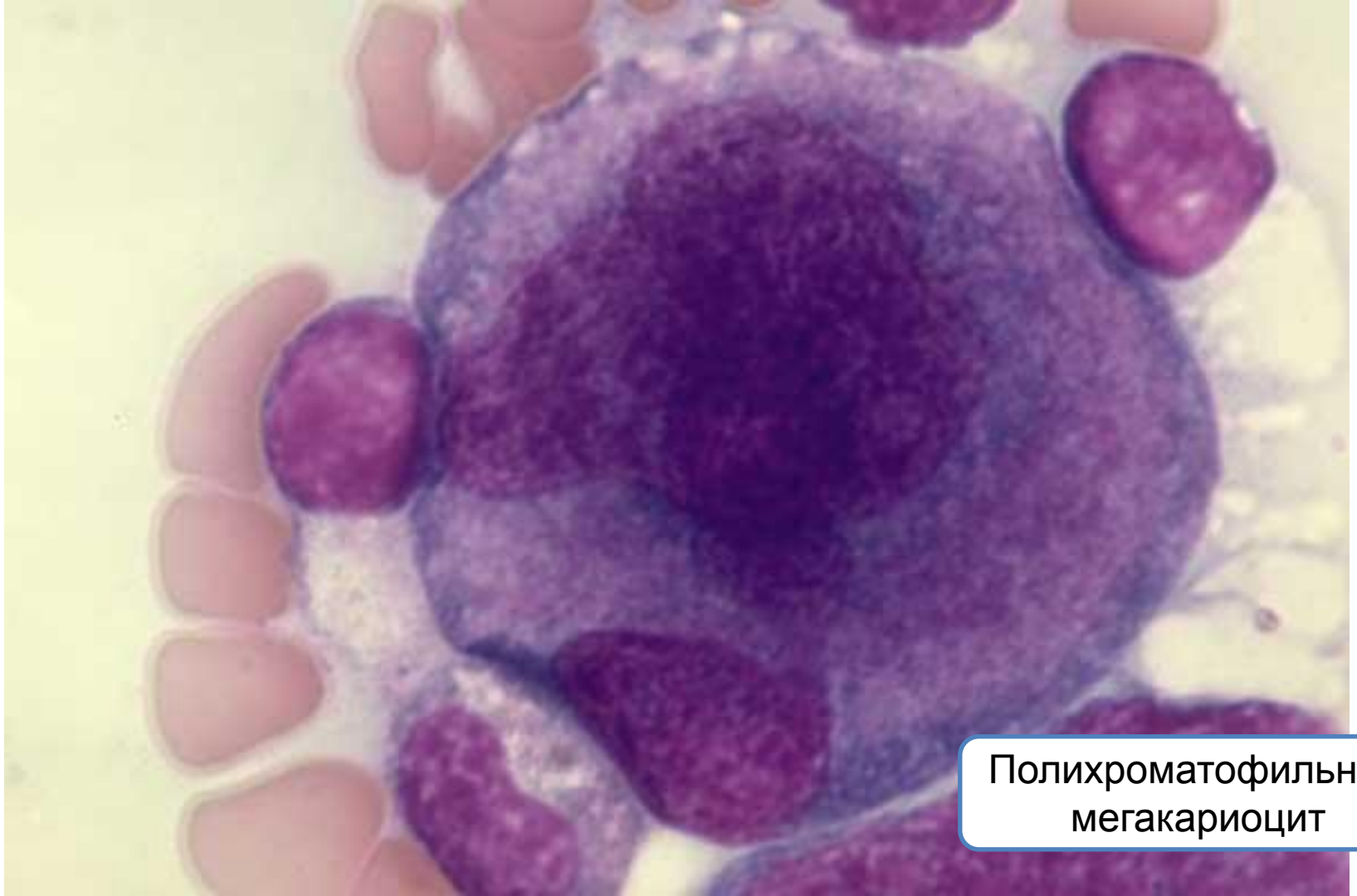
Остеокласты



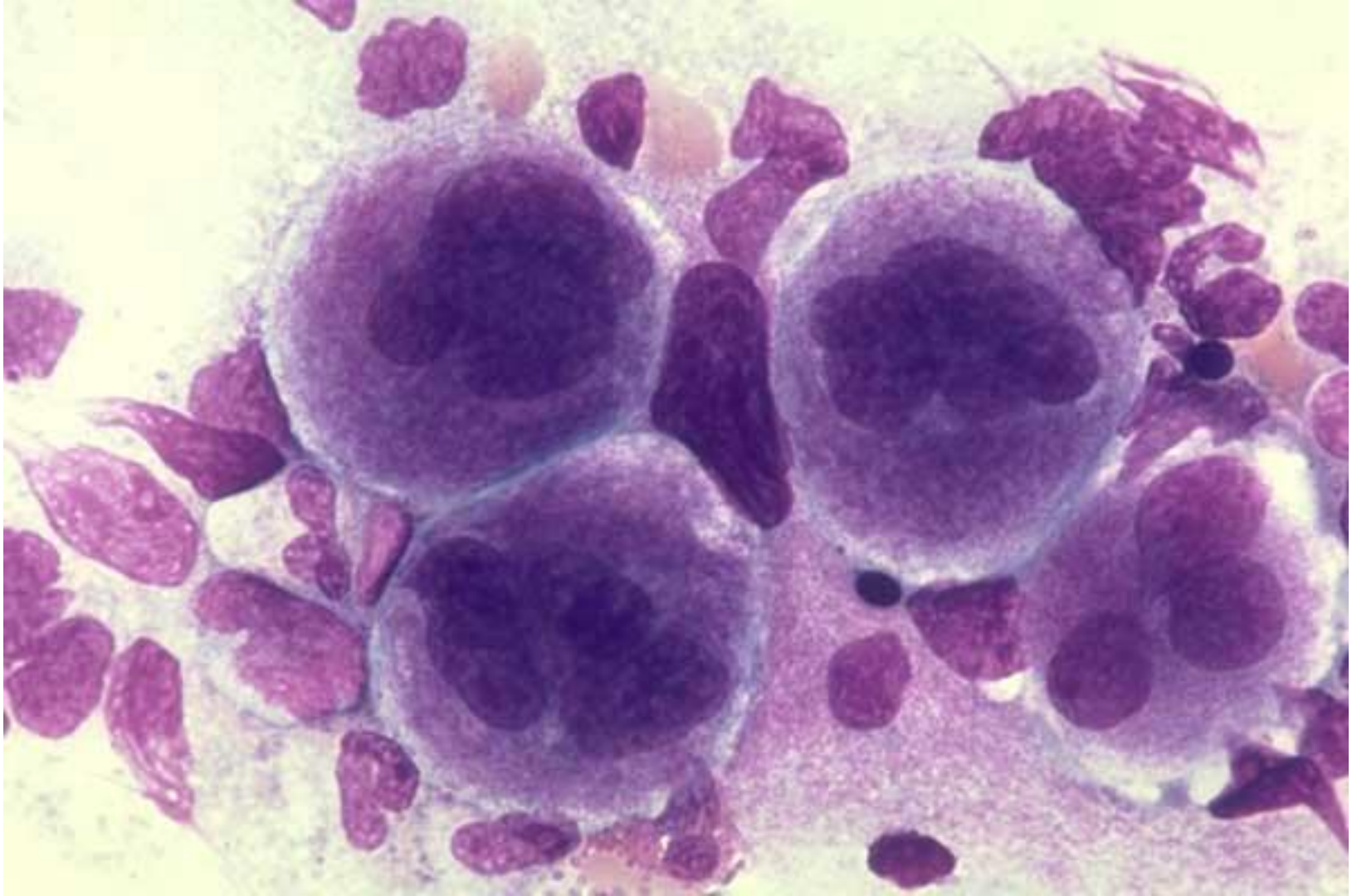
Базофильный мегакариоцит

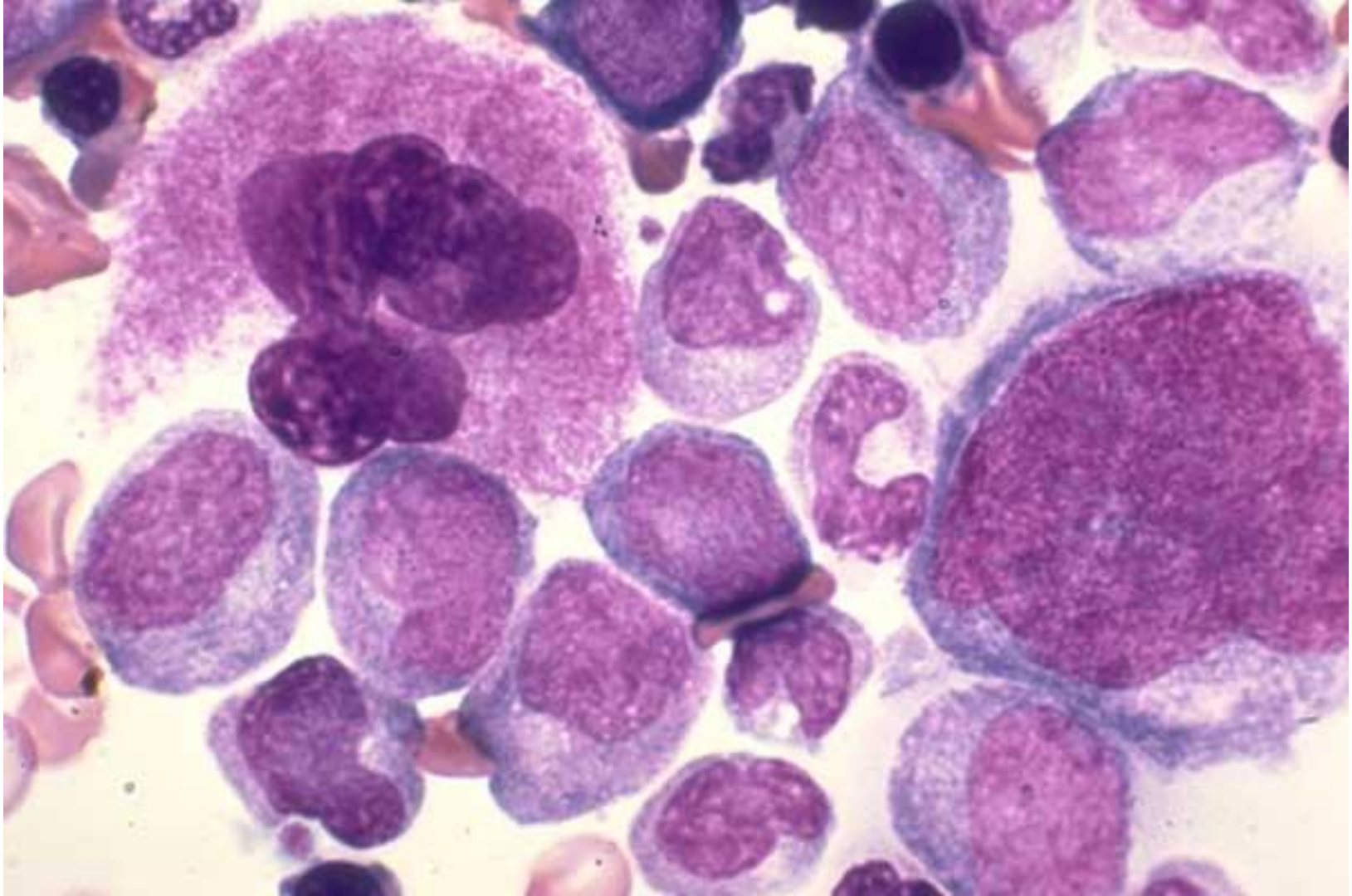


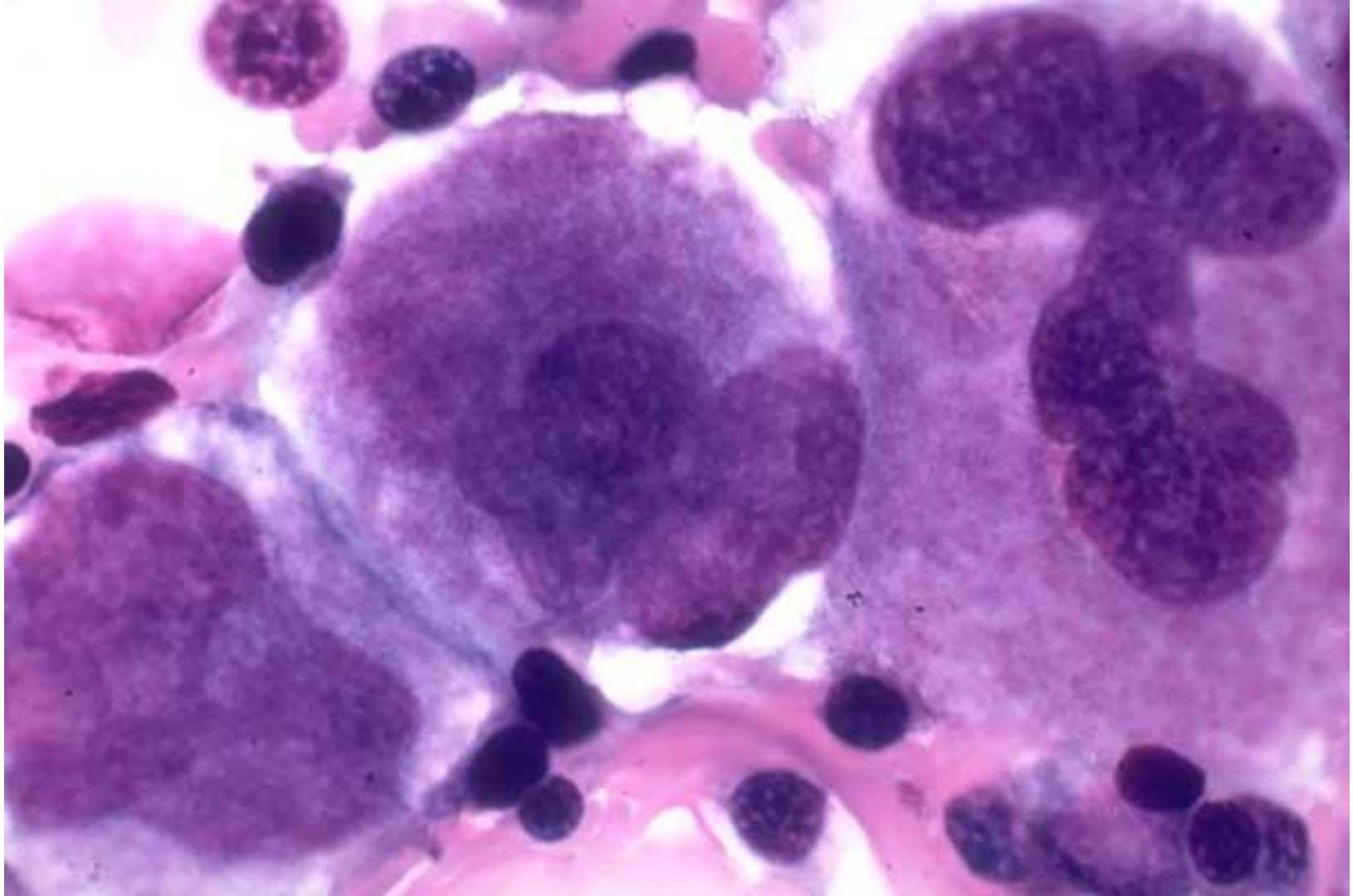
Базофильный мегакариоцит



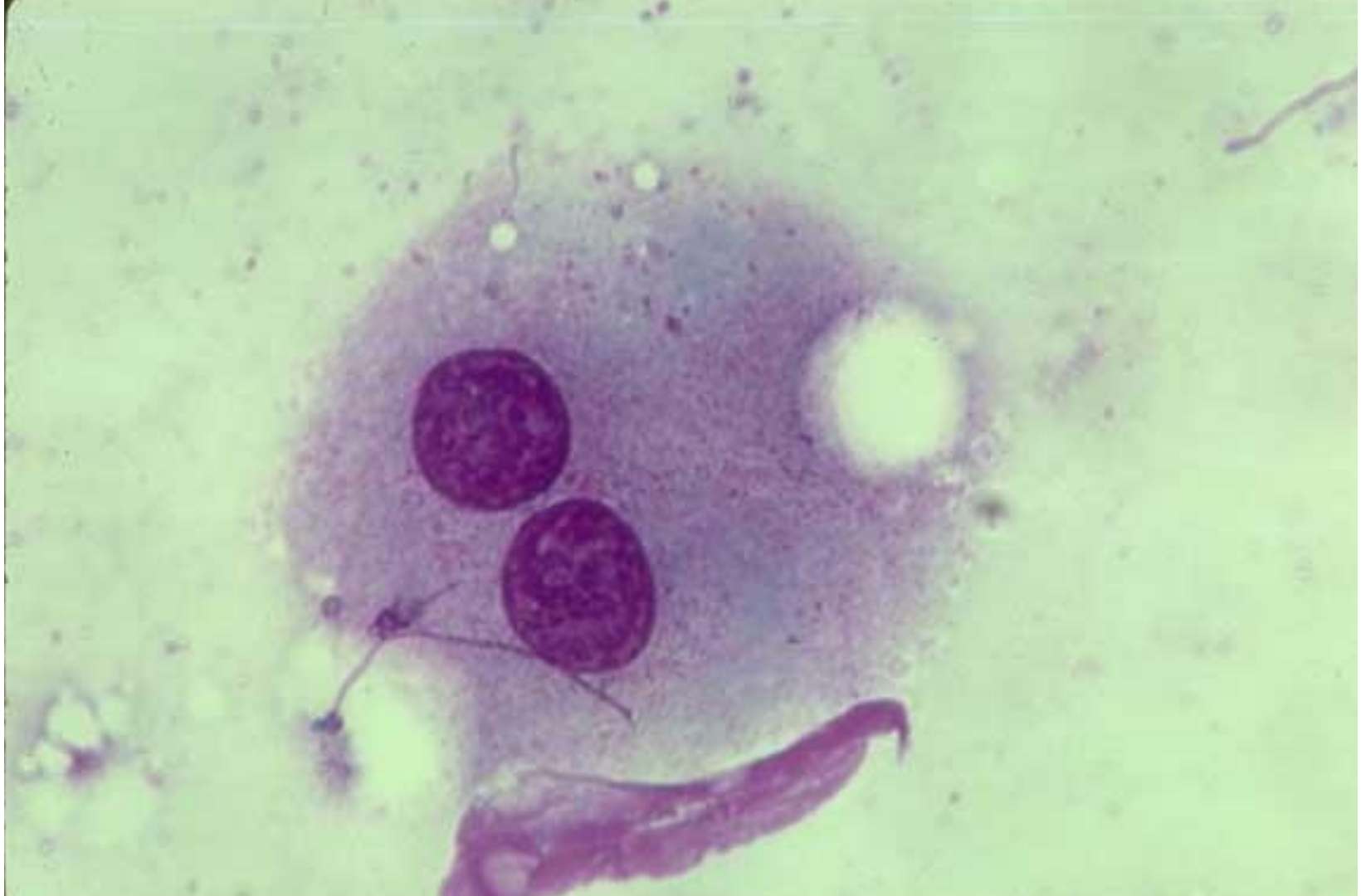
Полихроматофильный мегакариоцит

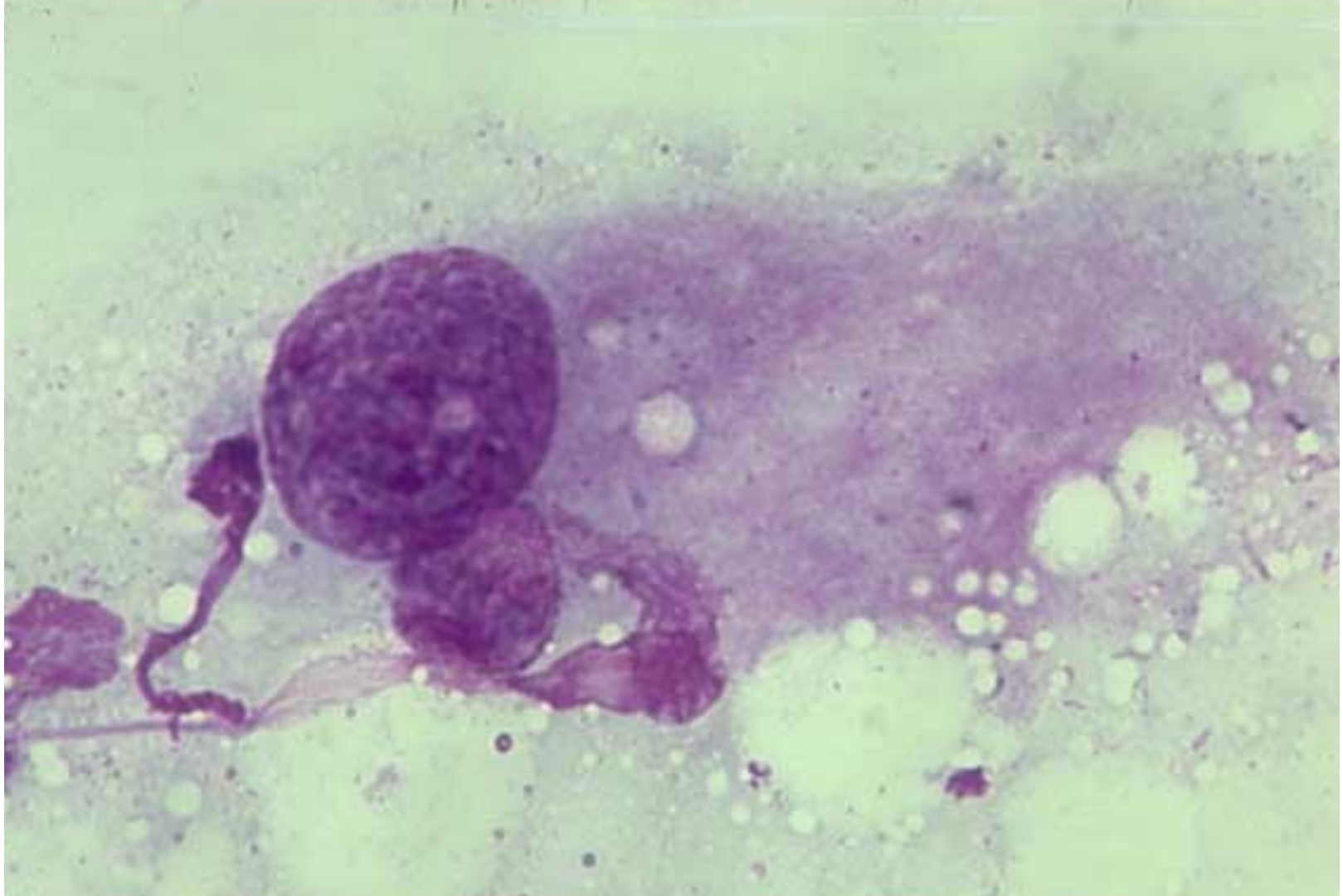


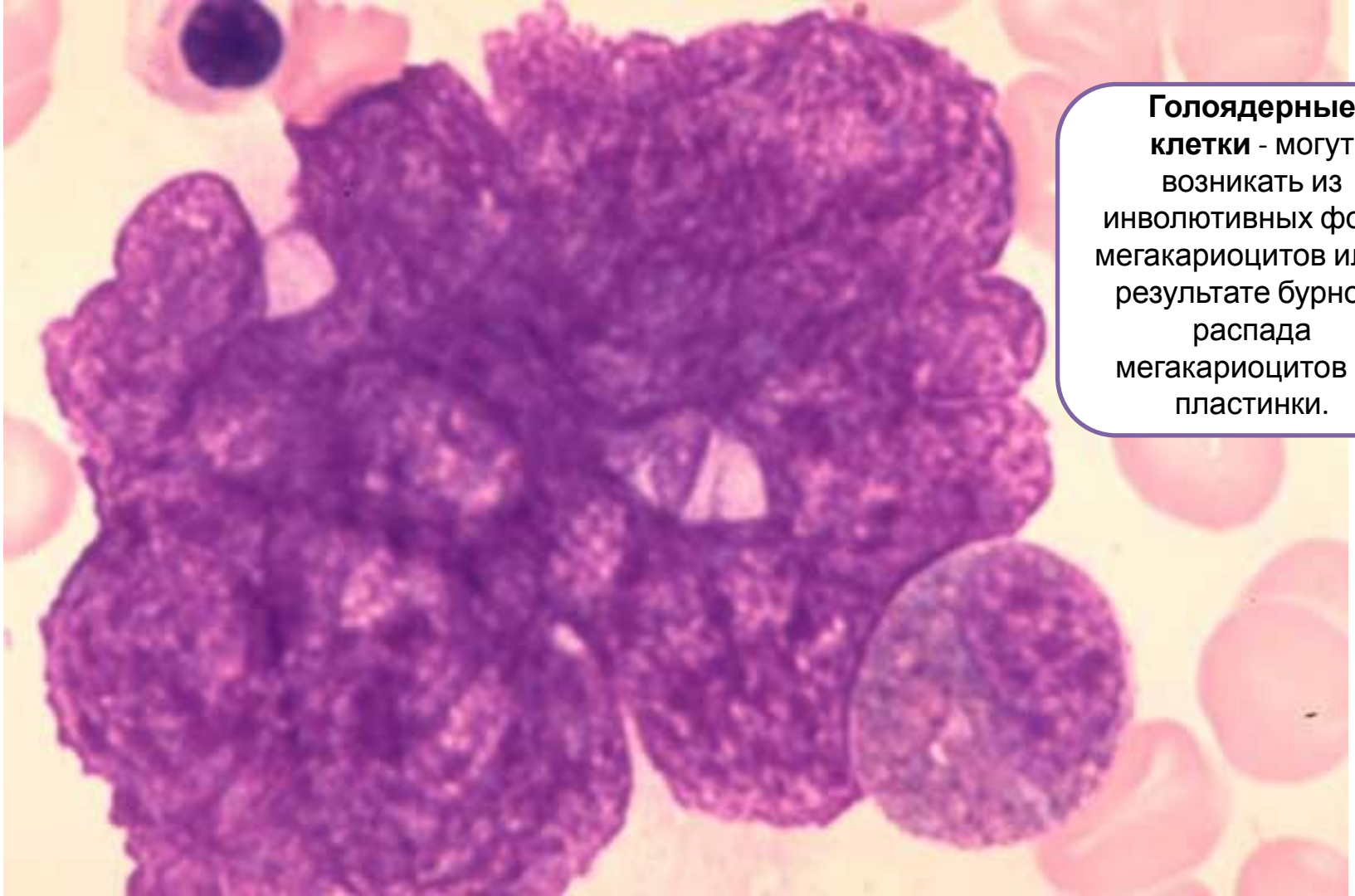




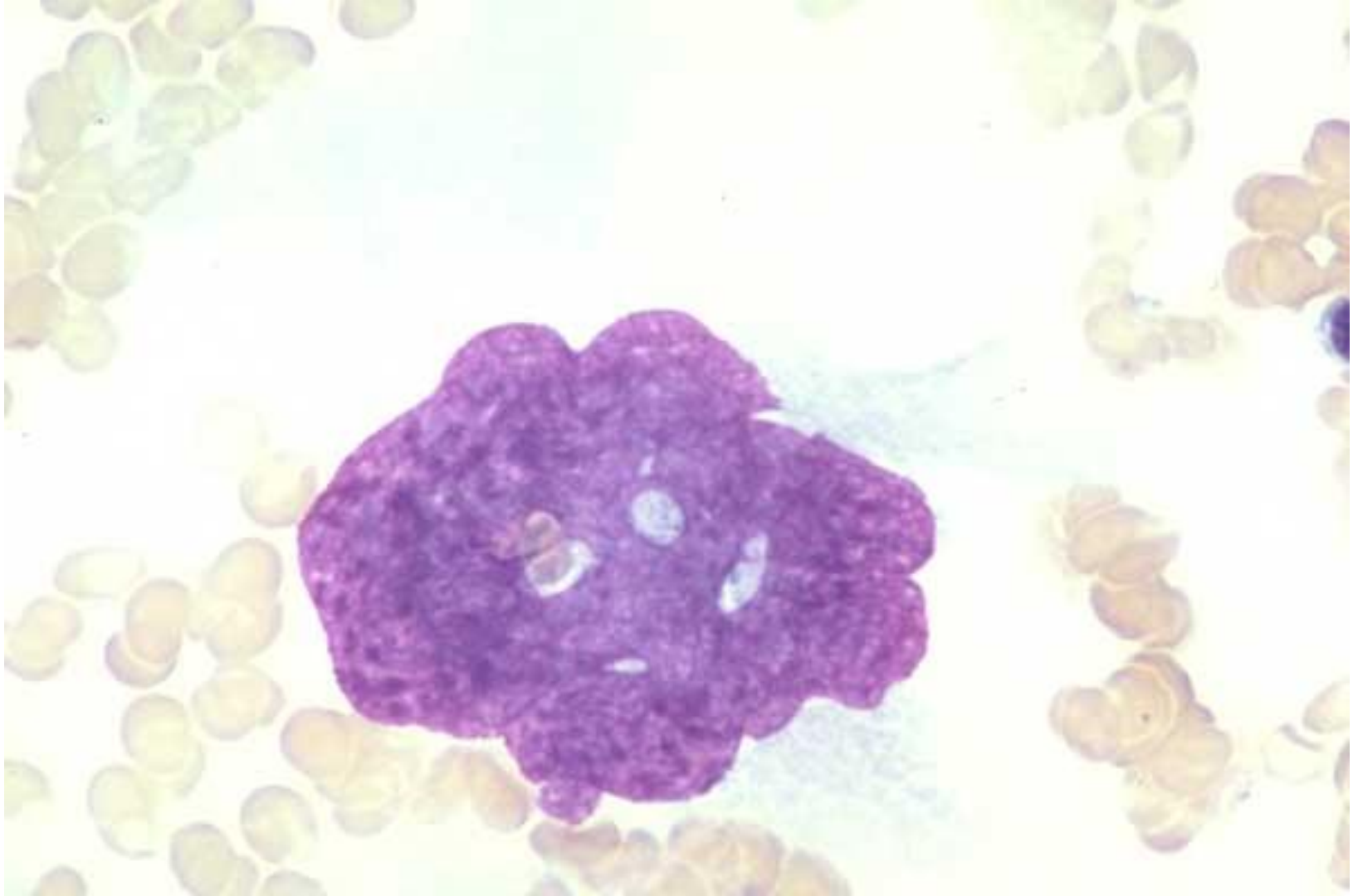
- **Инволютивные формы мегакариоцитов** - образуются в результате вызревания мегакариоцитов с постепенным отторжением вещества цитоплазмы и ядра в процессе образования пластинок. Эти формы имеют полисегментированное разреженное ядро и большую зону бледно-розовой цитоплазмы с пылевидной, едва различимой зернистостью.

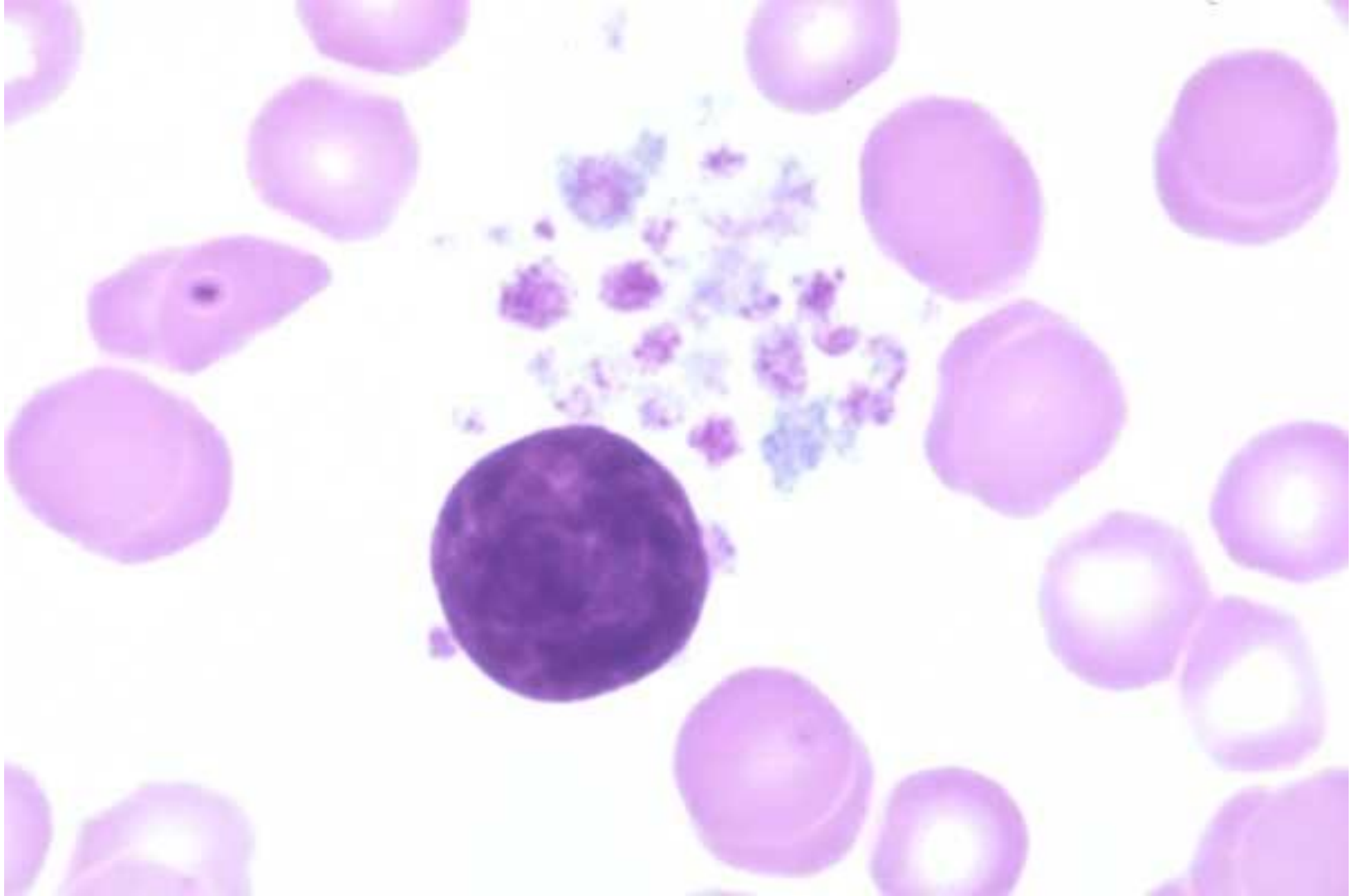


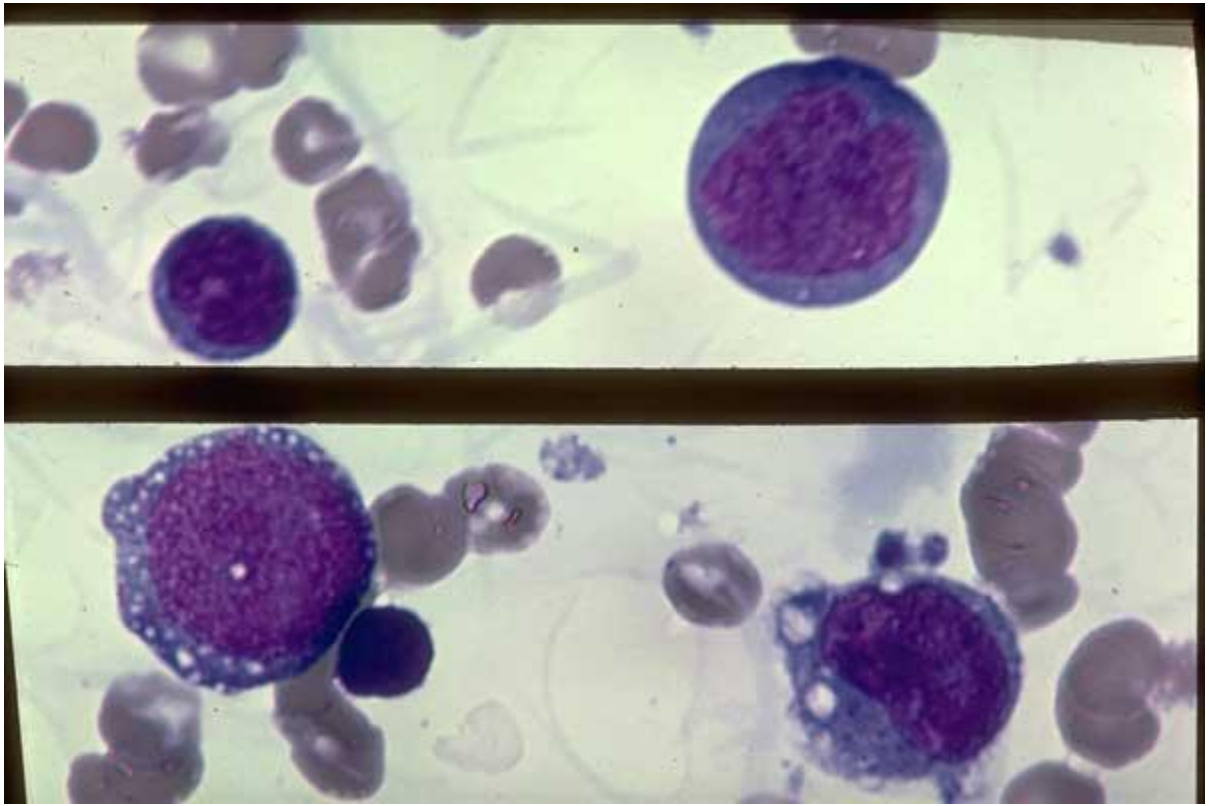




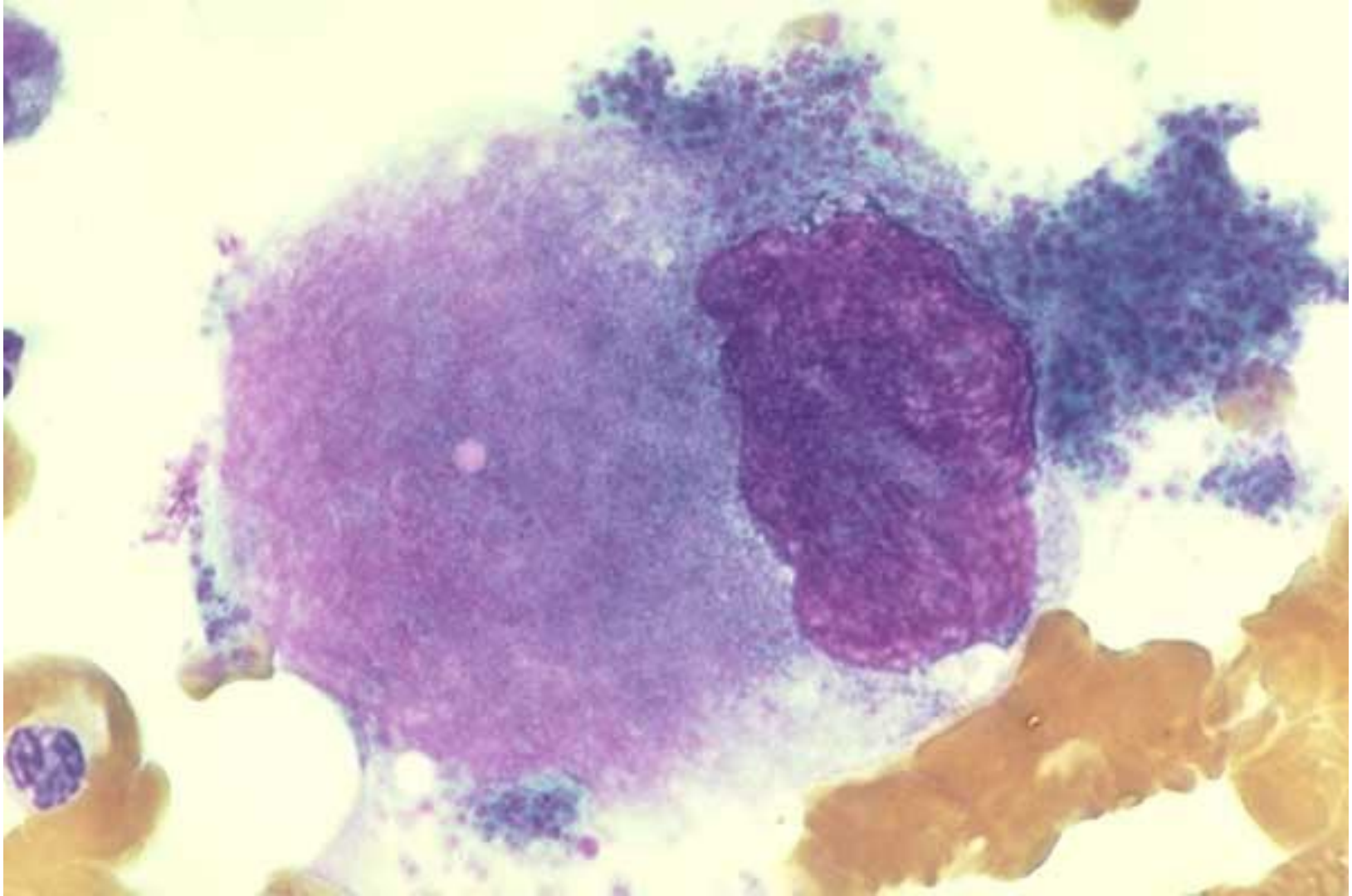
Голоядерные клетки - могут возникать из инволютивных форм мегакариоцитов или в результате бурного распада мегакариоцитов на пластинки.

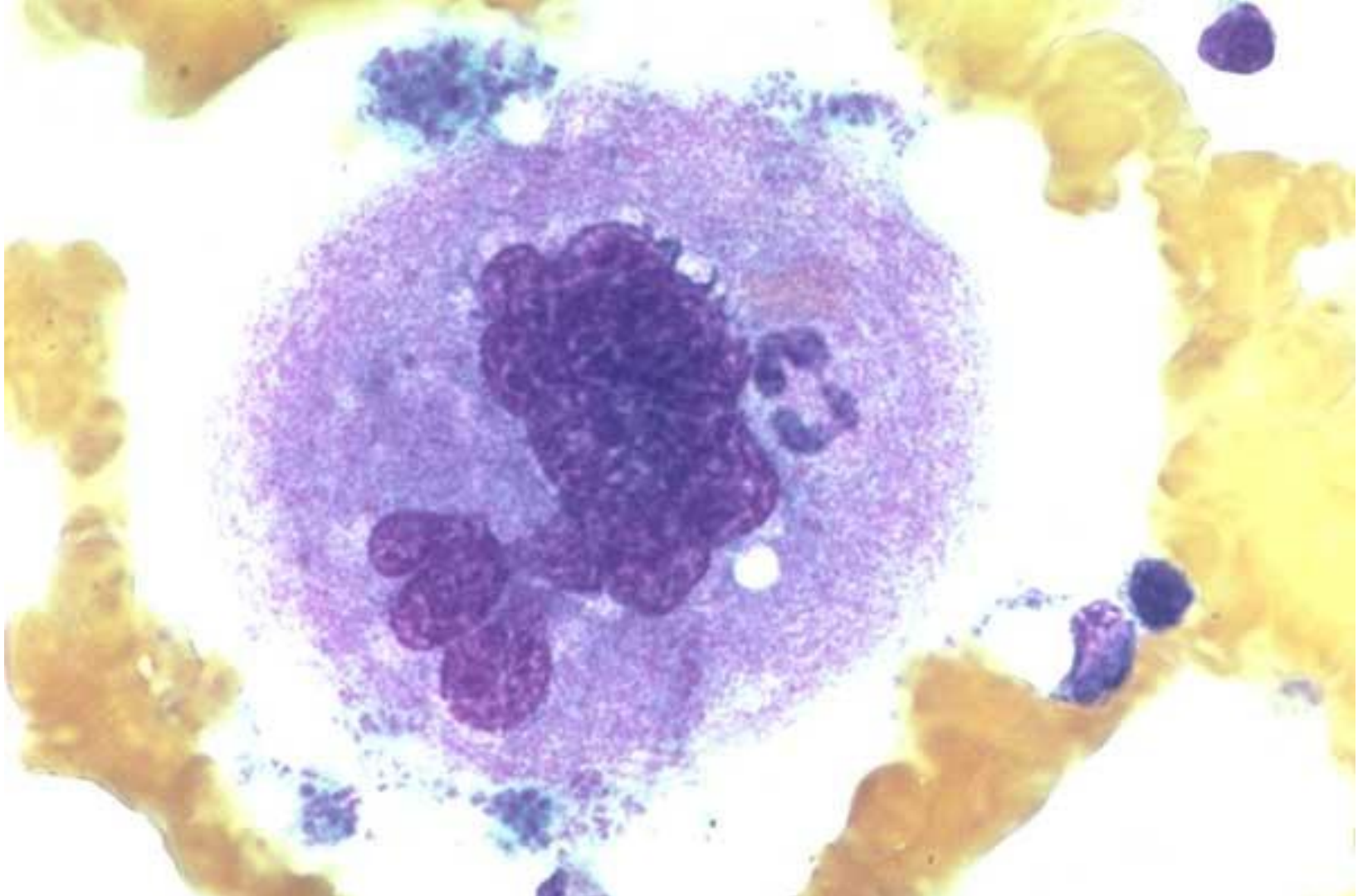


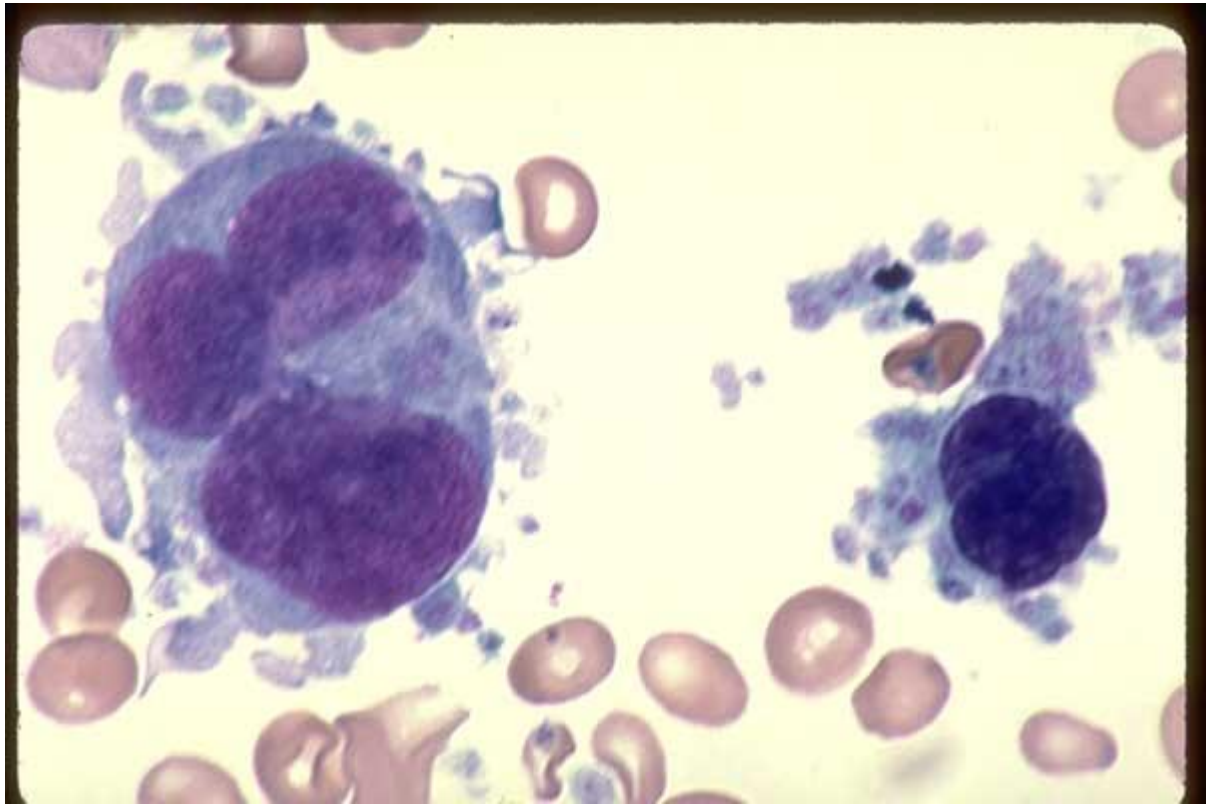


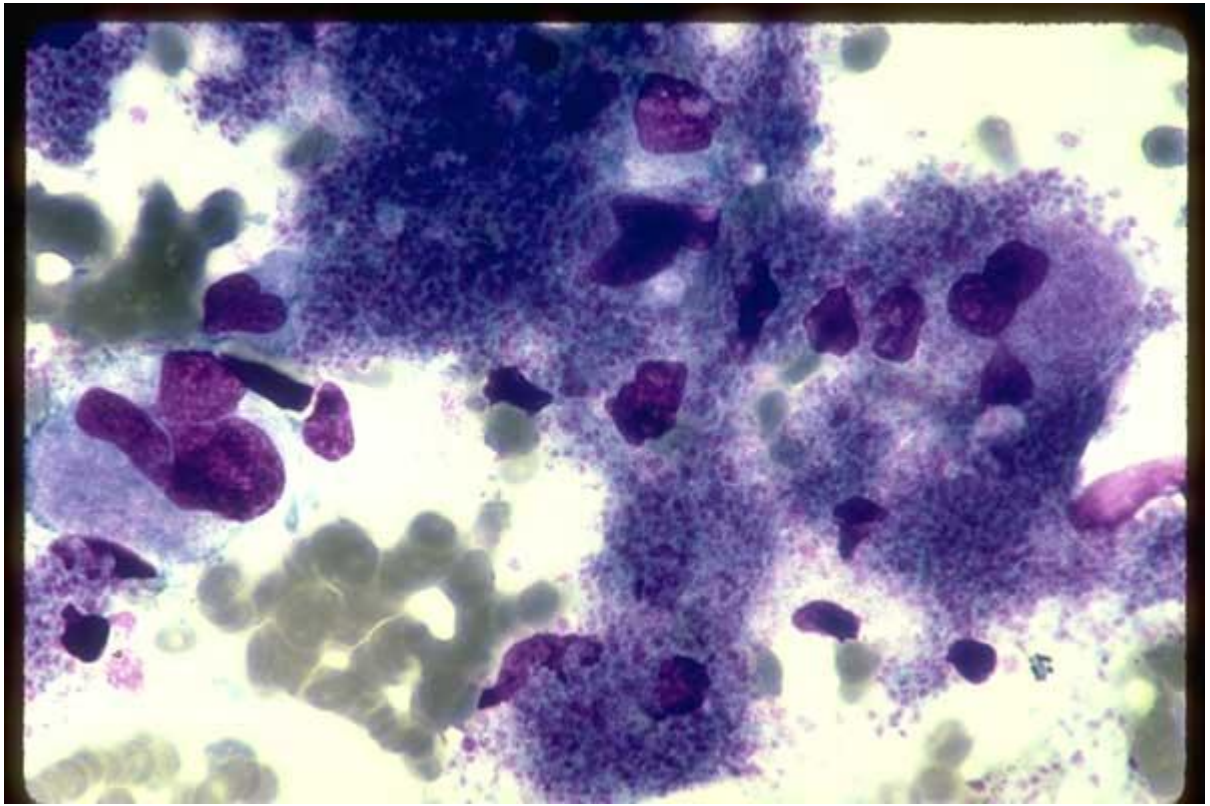


- Мегакариоцитограмма
- Иногда при исследовании костного мозга составляют мегакариоцитограмму. При этом дифференцируют не менее 50 - 100 клеток мегакариоцитарного ростка. Часто приходится сосчитывать их в нескольких мазках пунктата костного мозга. Для более быстрого нахождения клеток мазок просматривают по краям и в конце препарата под малым увеличением. Обнаруженную клетку дифференцируют с иммерсионным объективом. Согласно Г. И. Алексееву, в норме клетки в мегакариоцитограмме представлены следующим образом:
- мегакариобласты и промегакариоциты - 2 - 6%,
- мегакариоциты базофильные - 4 - 8%,
- мегакариоциты полихроматофильные - 42,6 - 65%,
- мегакариоциты оксифильные - 8,3 - 19%,
- инволютивные формы - 3,6 - 9,2%,
- голоядерные клетки - 6 - 13,2%,
- дегенеративные формы - 3,5 - 7,8%.
- Сдвиг мегакриоцитограммы влево с увеличением молодых форм может наблюдаться при различных состояниях, характеризующихся пролиферацией мегакариоцитов, в частности при тромбоцитопенической пурпуре (болезнь Верльгофа), постгеморрагической анемии, хроническом миелолейкозе, циррозе печени с гиперспленизмом и др. При этом образование пластинок наблюдается не только у зрелых форм, но и на ранних стадиях мегакариоцитопоэза. Резкая диссоциация в развитии ядра и цитоплазмы мегакариоцитов с плазматизацией цитоплазмы наблюдается при злокачественных новообразованиях, септических состояниях, абсцессе легкого. При этом дегенеративные изменения наблюдаются и в тромбоцитах (старые формы, вакуолизация и пикноз грануломера и др.).
- По морфологическим особенностям мегакариоцитов можно косвенно судить и об их функциональном состоянии. При этом мегакариоциты делят на две группы: пластинкосодержащие и пластинкообразующие.









2.

ЭРИТРОИДНЫЙ РОСТОК

Морфологически идентифицируемые клетки эритроидного ряда

эритробласт

↓

пронормобласт

↓

нормобласт базофильный

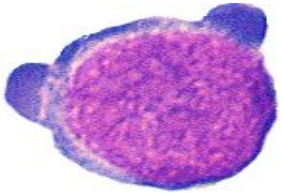
↓

нормобласт полихроматофильный

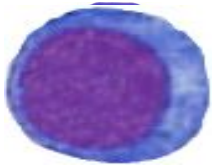
↓

нормобласт оксифильный

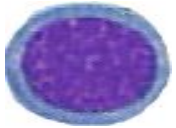
↓ ретикулоцит → эритроцит



Эритробласт

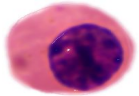


Пронормобласт



Базофильный нормобласт

Полихроматофильный нормобласт

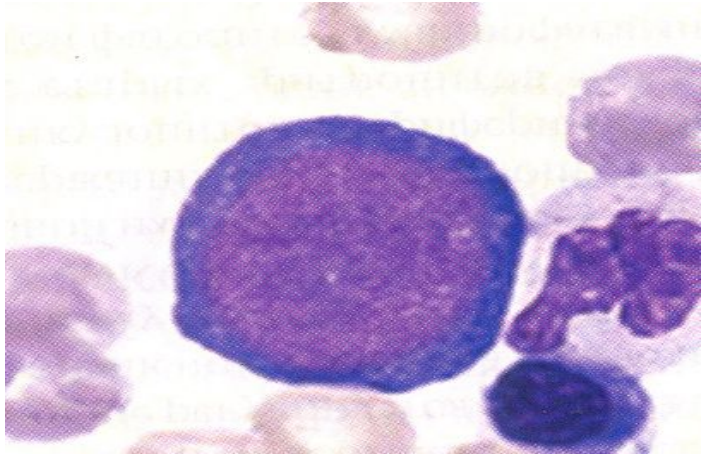


Оксифильный нормобласт

Ретикулоцит

Эритроцит

Эритробласт

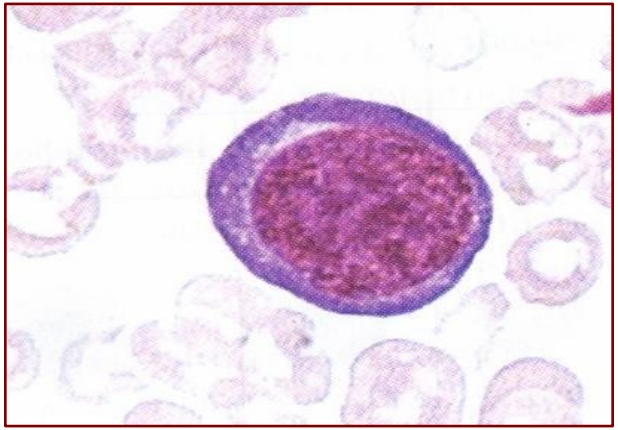


Клетка диаметром 20-25 мкм с высоким ядерно-цитоплазматическим соотношением

Ядро круглое с нежно-сетчатой структурой хроматина и 1-3 ядрышками, окруженное узким ободком резко **базофильной цитоплазмы** без зернистости

Пронормобласт

Отличается от эритробласта меньшими размерами, отсутствием ядрышек в ядре и наличием перинуклеарной зоны просветления



Нормобласт базофильный

Клетка диаметром 16-18 мкм с центрально размещенным крупным округлым ядром насыщенно фиолетового цвета.

Ядрышек нет.

Хроматин имеет тенденцию к радиальному расположению.

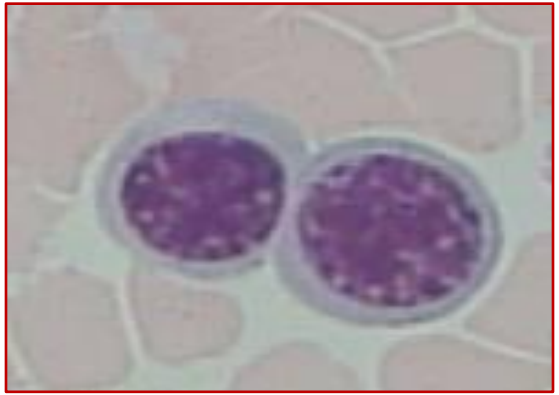
Цитоплазма окружает ядро узким ободком синего цвета.

Нормобласт полихроматофильный

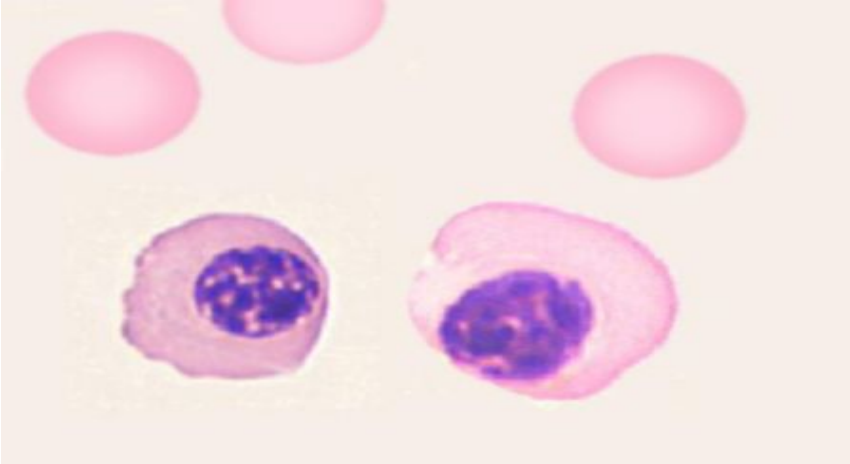
Размер **клеток** 8-12 мкм

Ядро темно-фиолетового цвета, размещается центрально или эксцентрично, имеет колесовидную структуру хроматина (в виде «спиц в колесе»)

Цитоплазма широкая, серовато-голубая



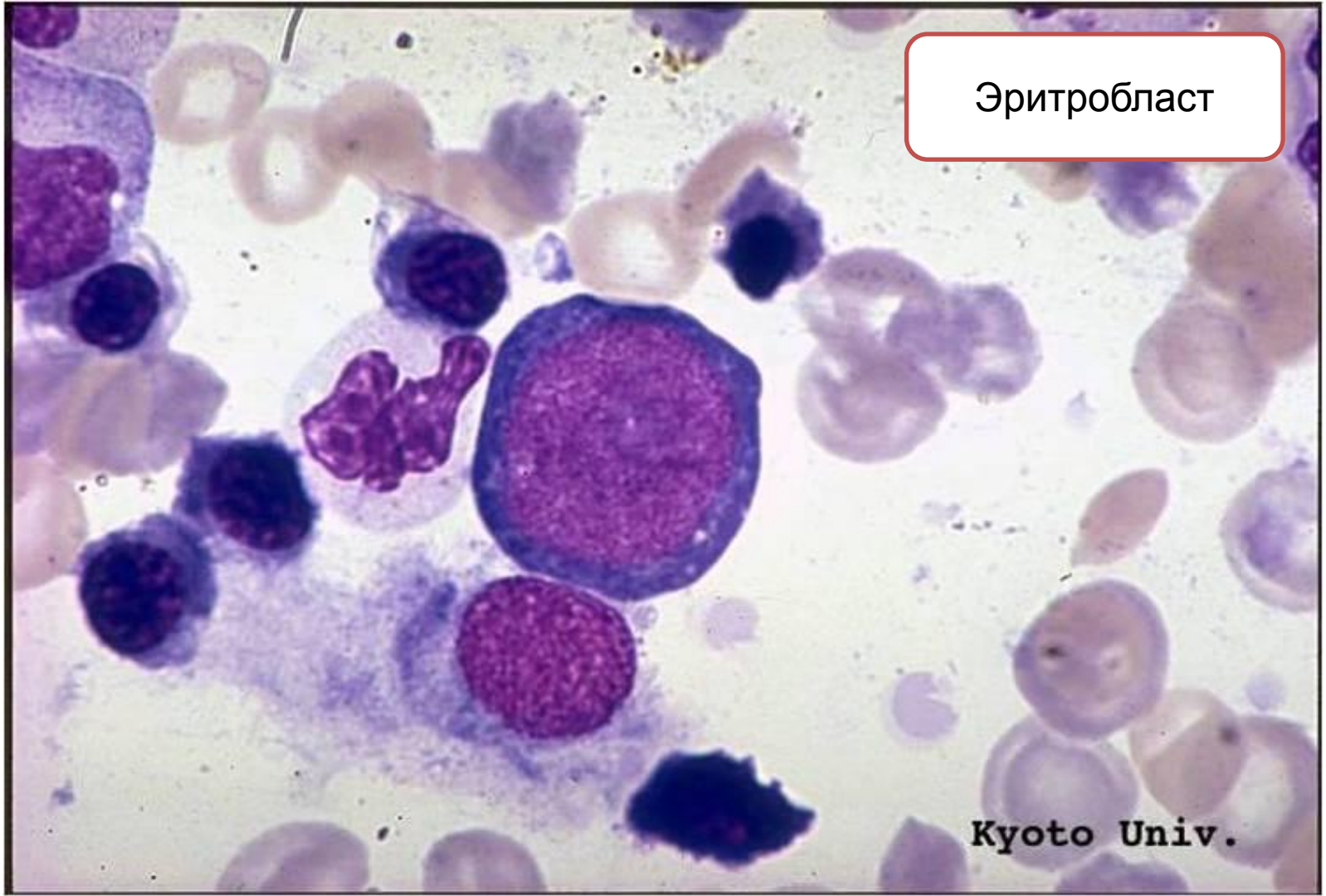
Нормобласт оксифильный

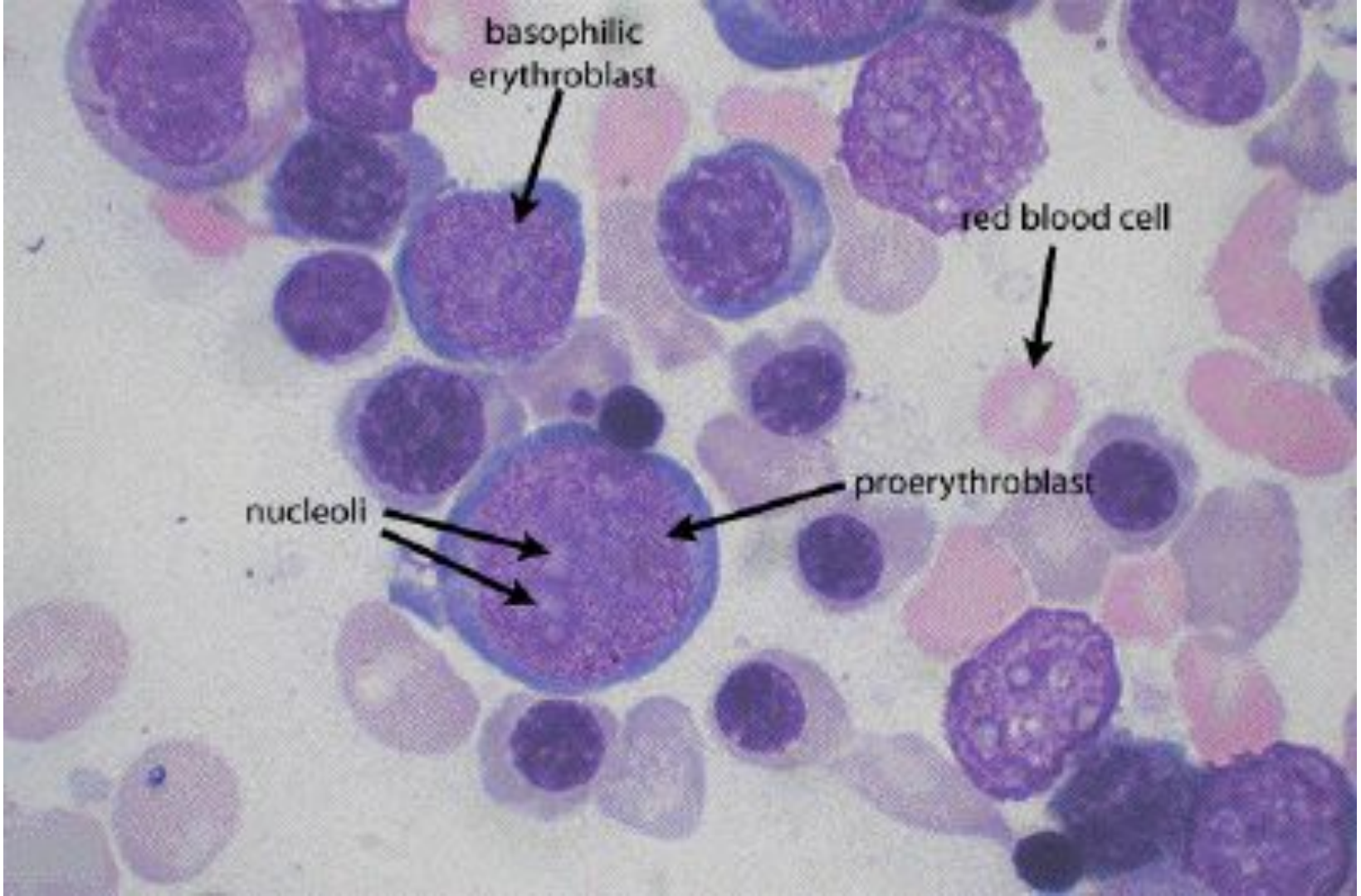


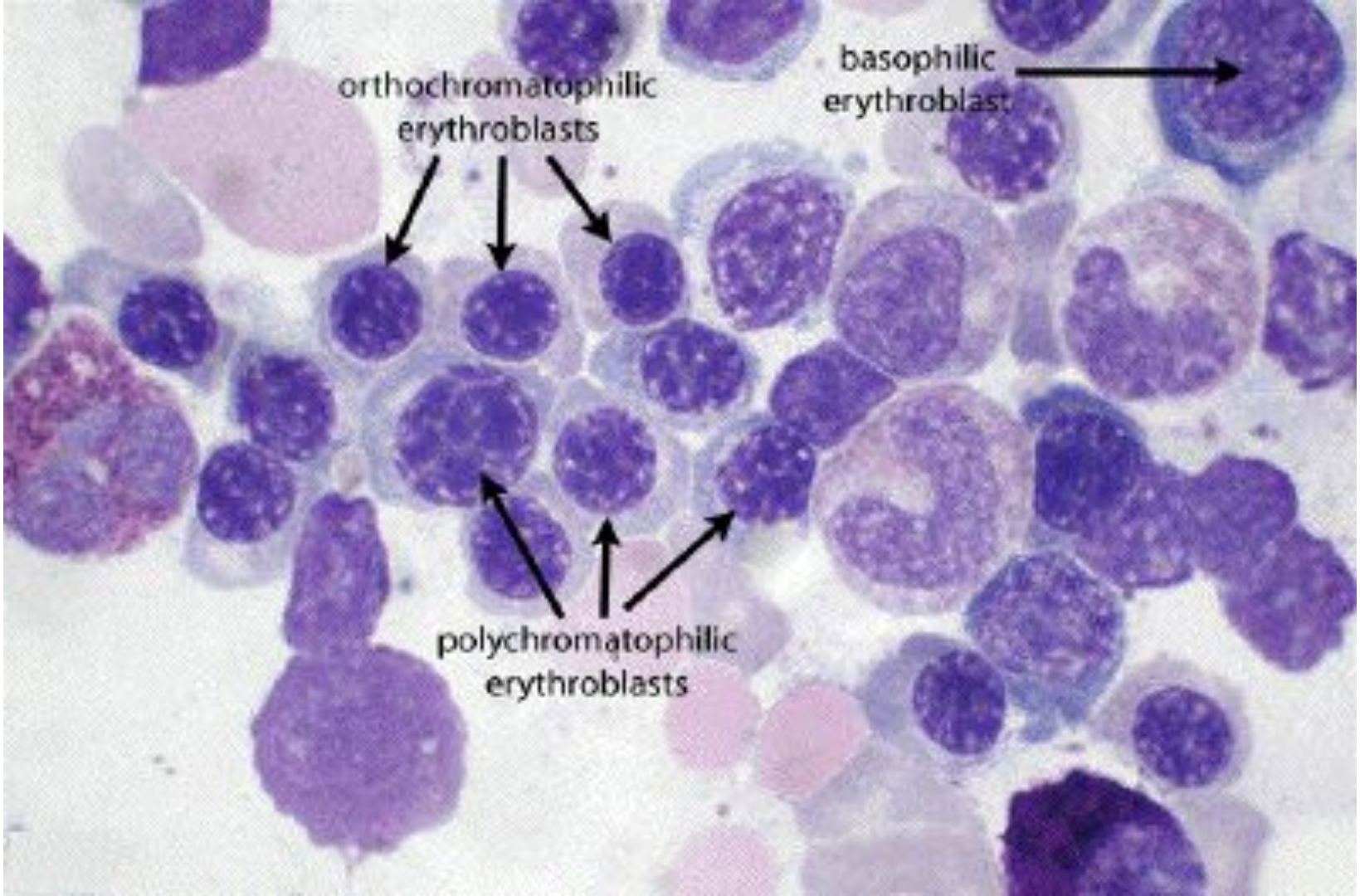
Диаметр 8-11 мкм

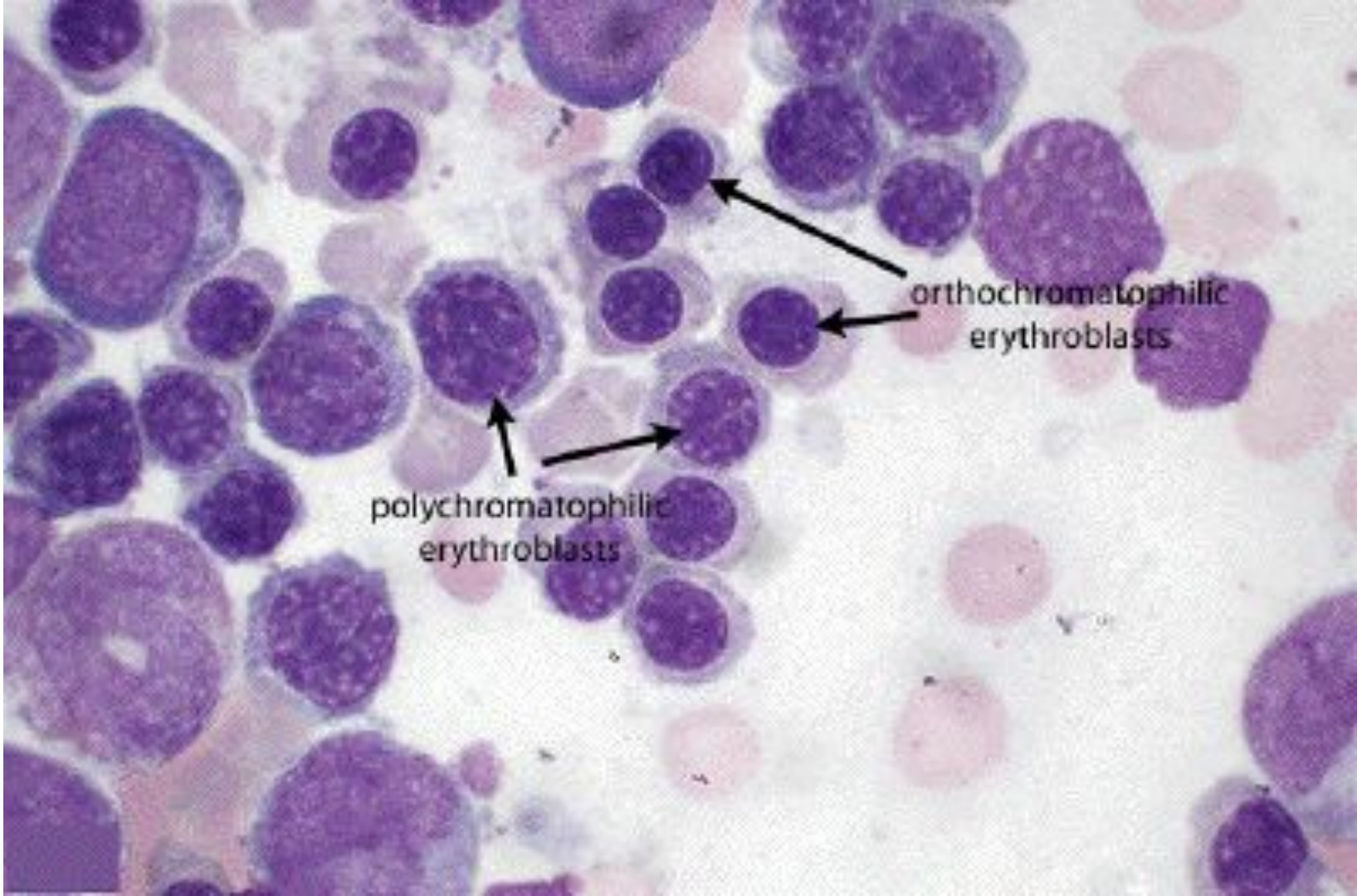
Ядро пикнотичное, темно-фиолетового цвета, размещается эксцентрично

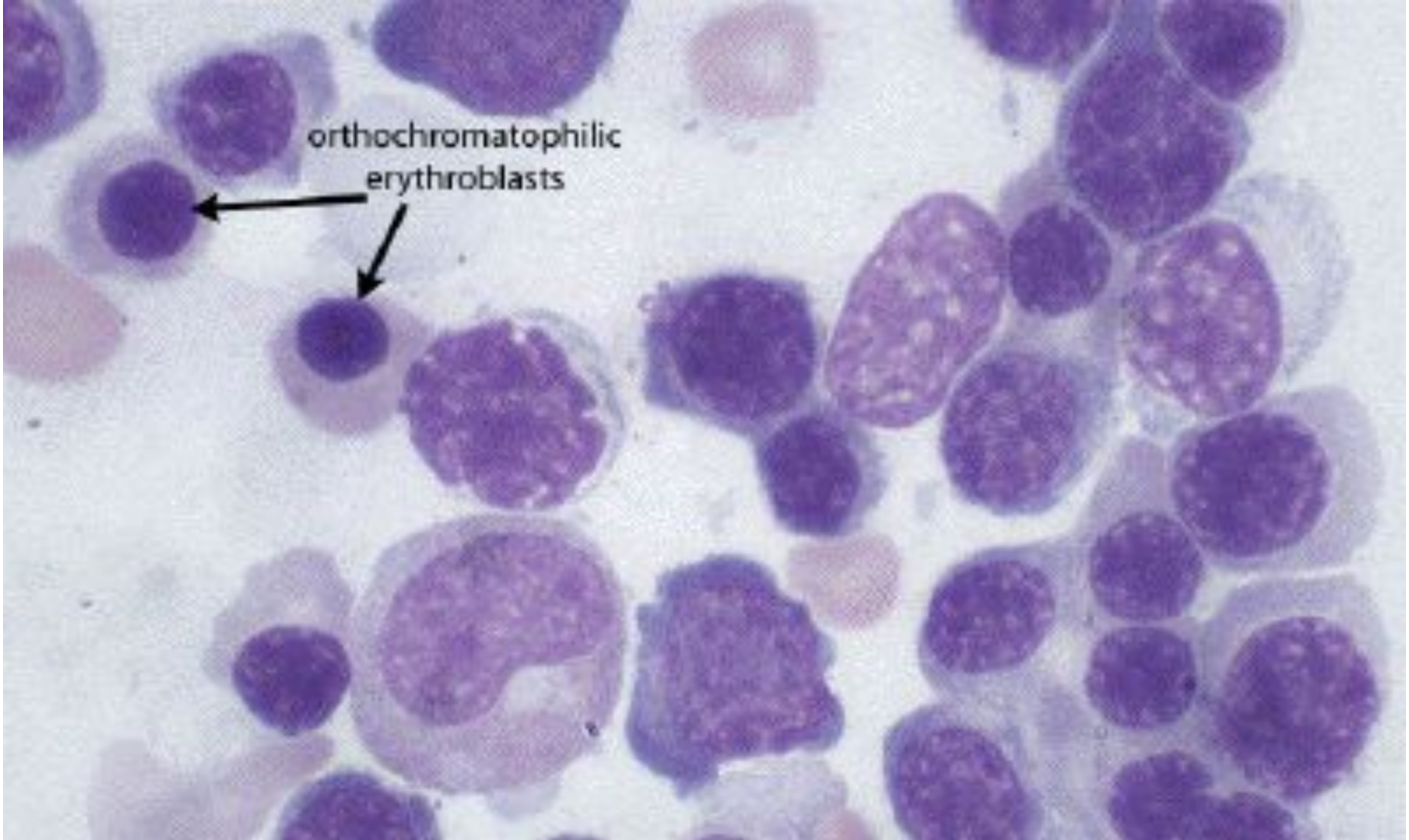
Цитоплзма широкая, бледно-розовая

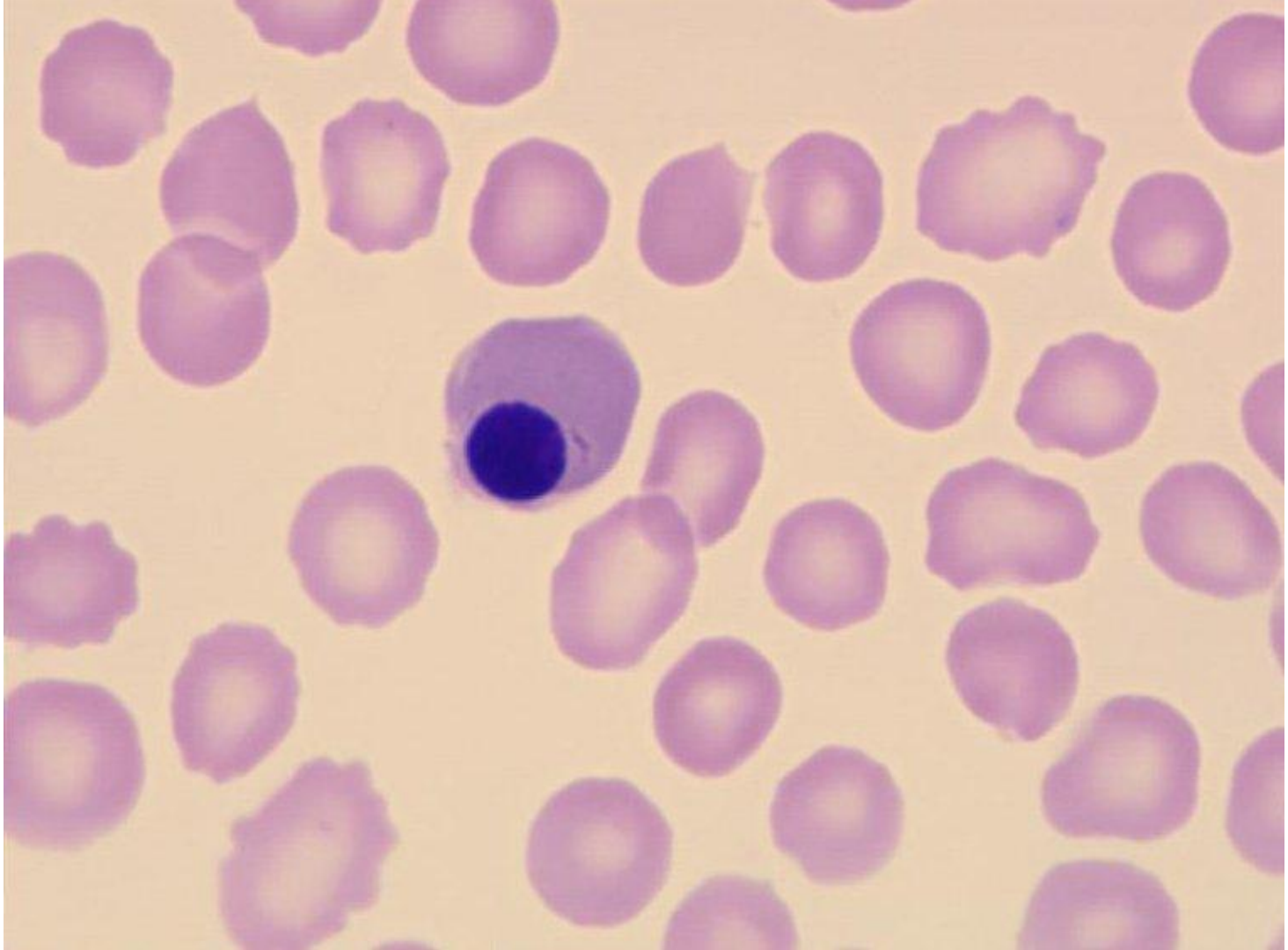

Эритробласт
Kyoto Univ.

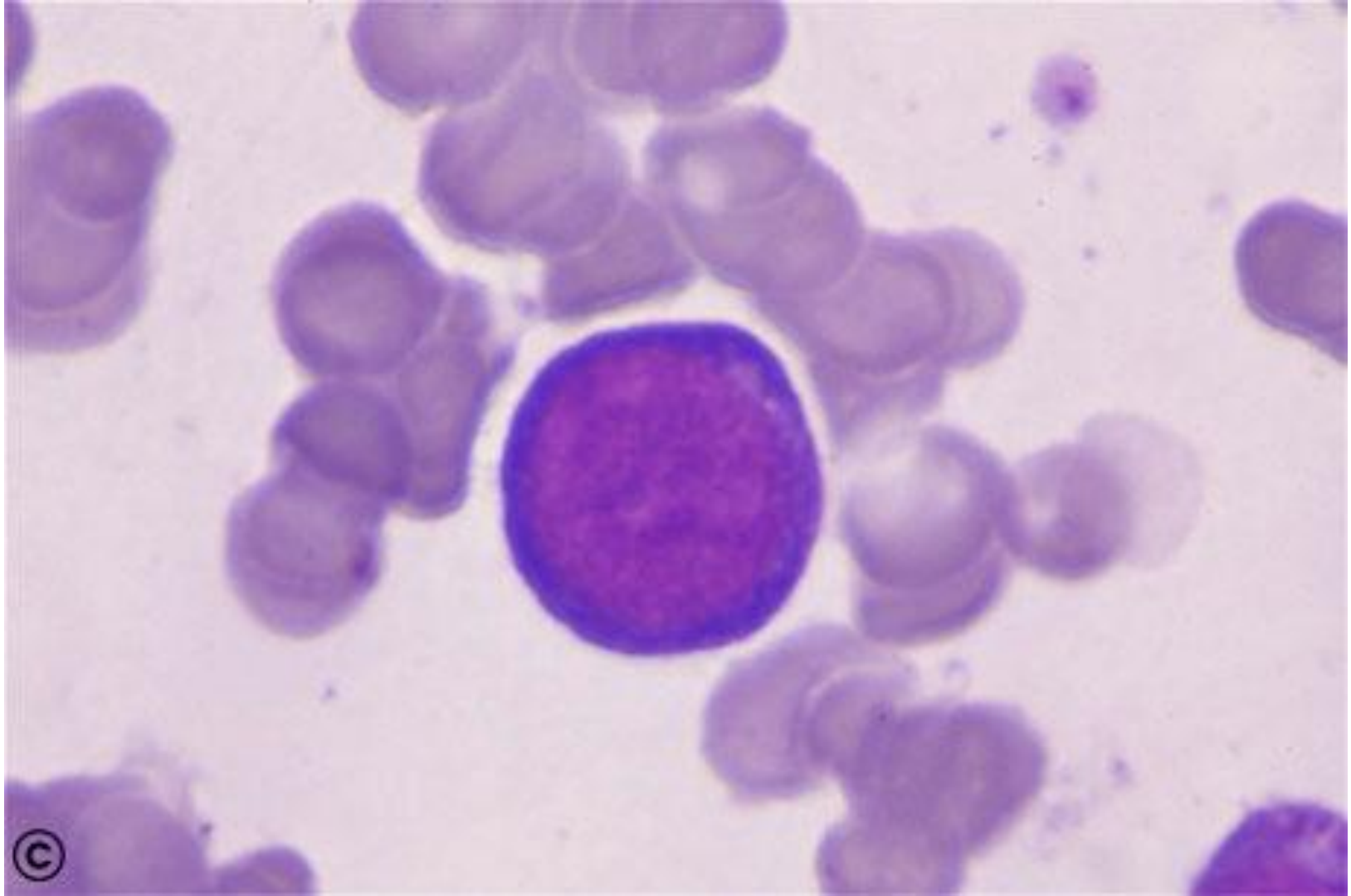

basophilic
erythroblast
red blood cell
proerythroblast
nucleoli

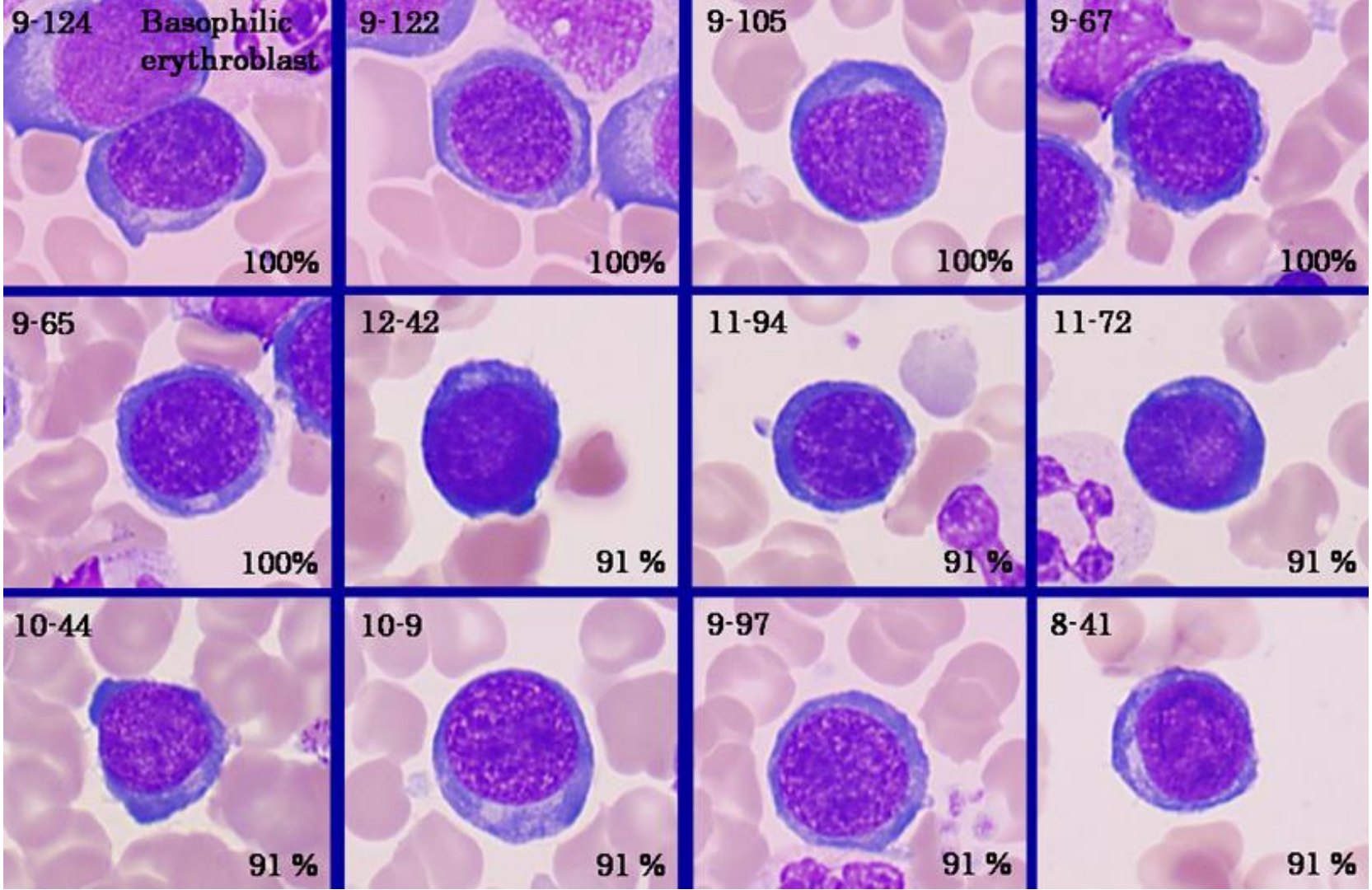

orthochromatophilic
erythroblasts
basophilic
erythroblast
polychromatophilic
erythroblasts

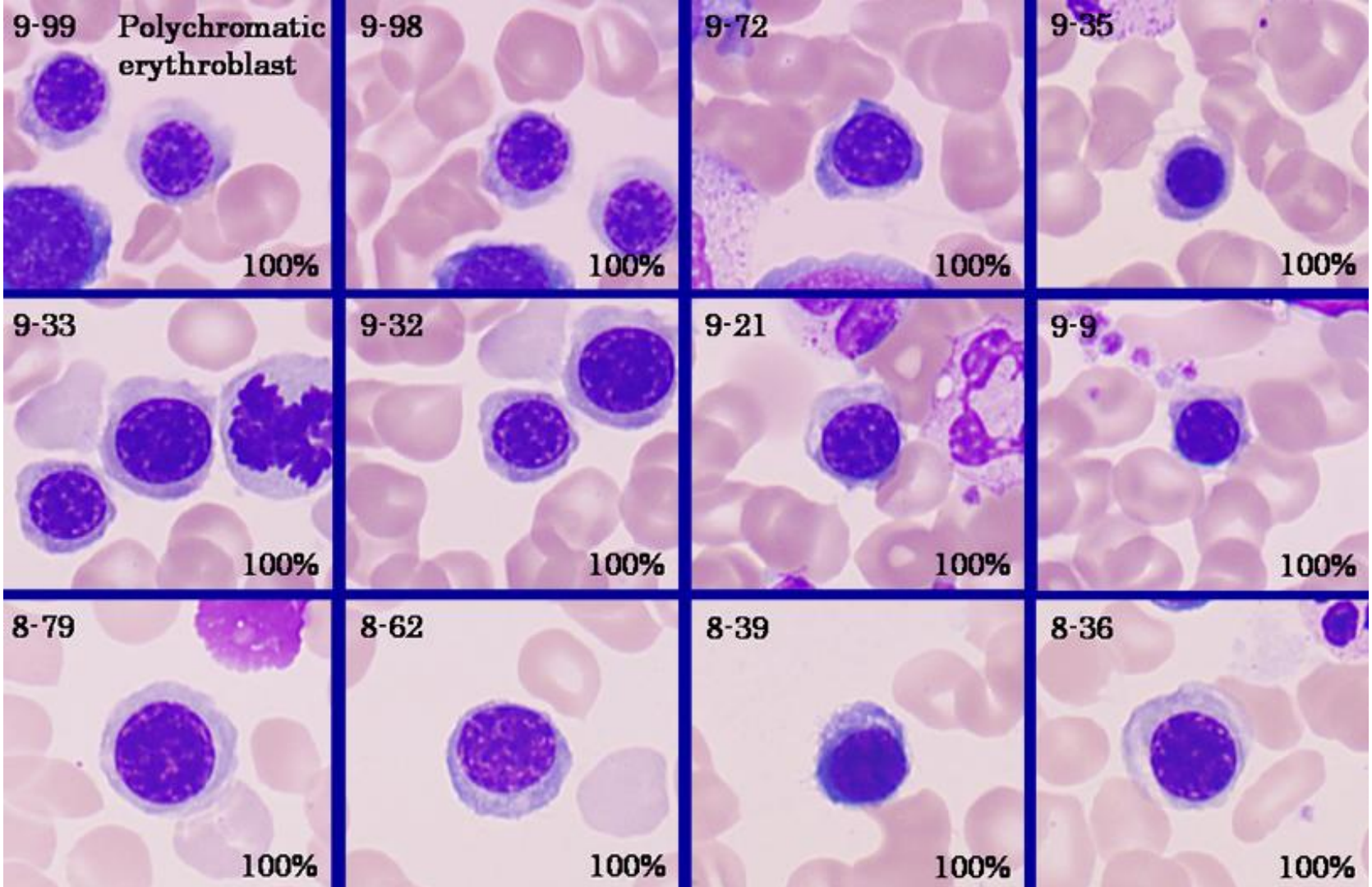

orthochromatophilic
erythroblasts
polychromatophilic
erythroblasts

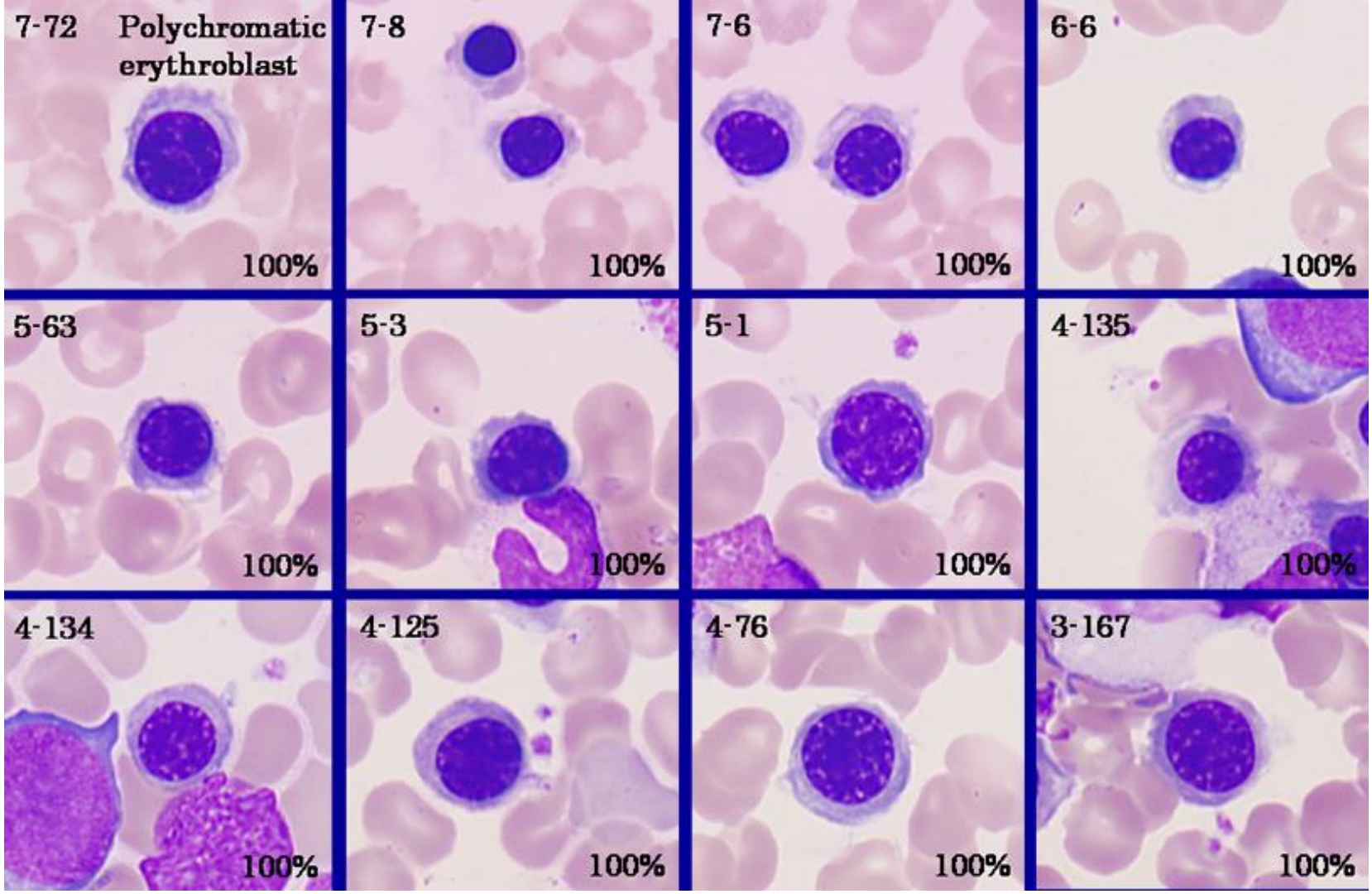

orthochromatophilic
erythroblasts

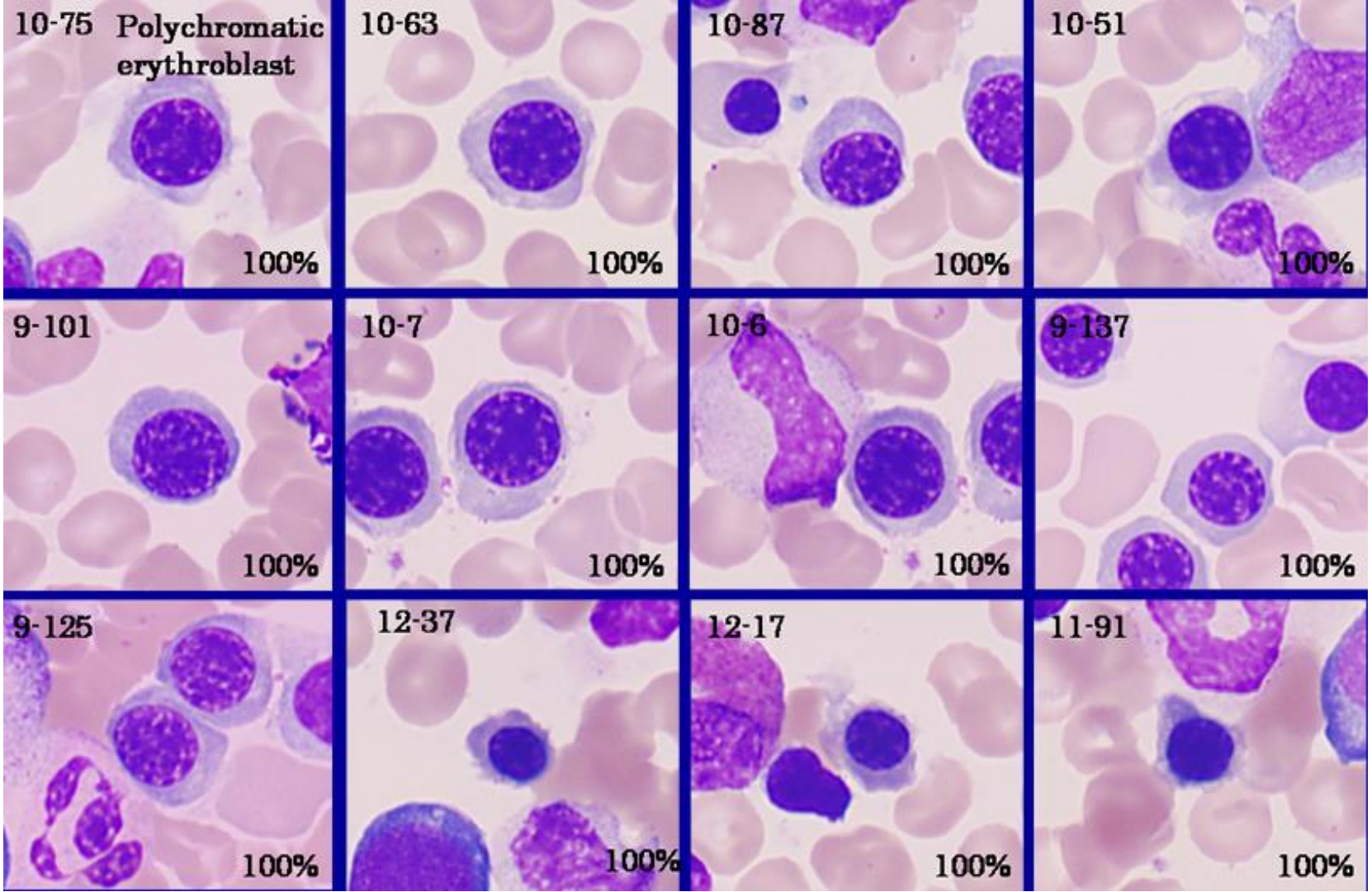





9-124
Basophilic erythroblast
100%
9-122
100%
9-105
100%
9-67
100%
9-65
100%
12-42
91 %
11-94
91 %
11-72
91 %
10-44
91 %
10-9
91 %
9-97
91 %
8-41
91 %


9-99 Polychromatic erythroblast
100%
9-98
100%
9-72
100%
9-35
100%
9-33
100%
9-32
100%
9-21
100%
9-9
100%
8-79
100%
8-62
100%
8-39
100%
8-36
100%


7-72
Polychromatic erythroblast
100%
7-8
100%
7-6
100%
6-6
100%
5-63
100%
5-3
100%
5-1
100%
4-135
100%
4-134
100%
4-125
100%
4-76
100%
3-167
100%


10-75 Polychromatic erythroblast
100%
10-63
100%
10-87
100%
10-51
100%
9-101
100%
10-7
100%
10-6
100%
9-137
100%
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100%
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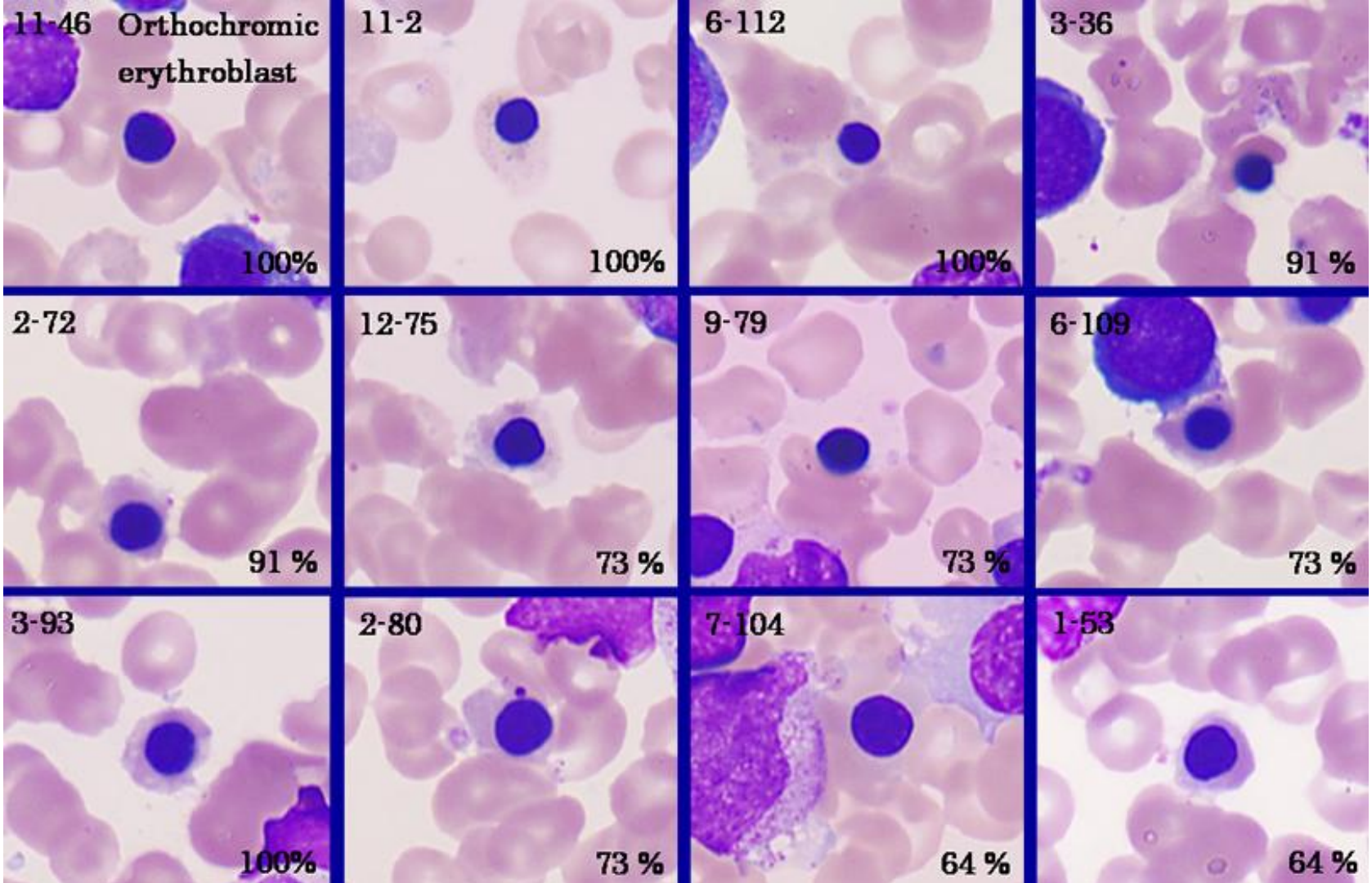
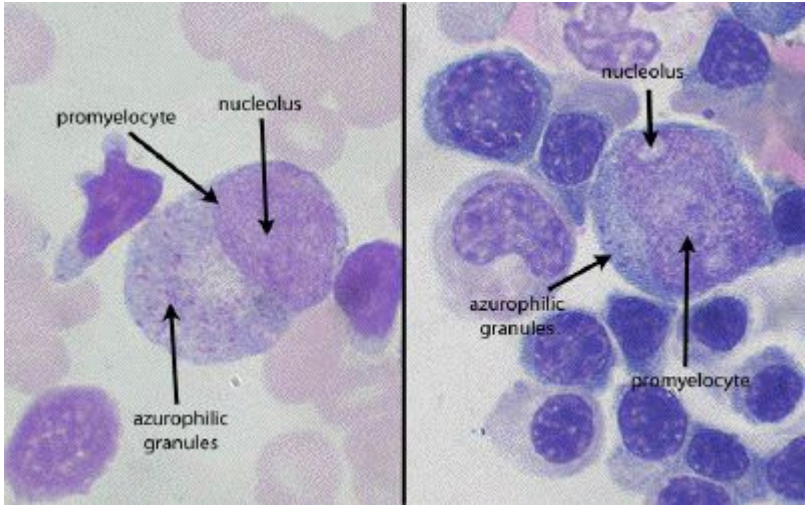
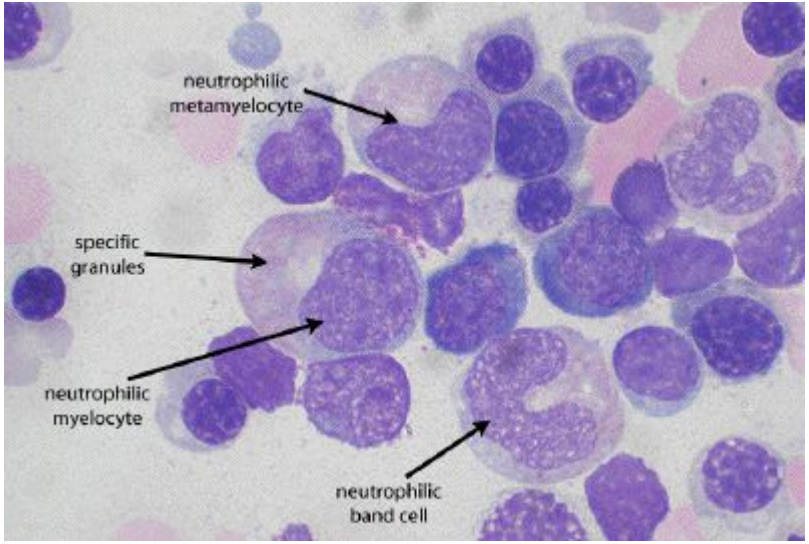
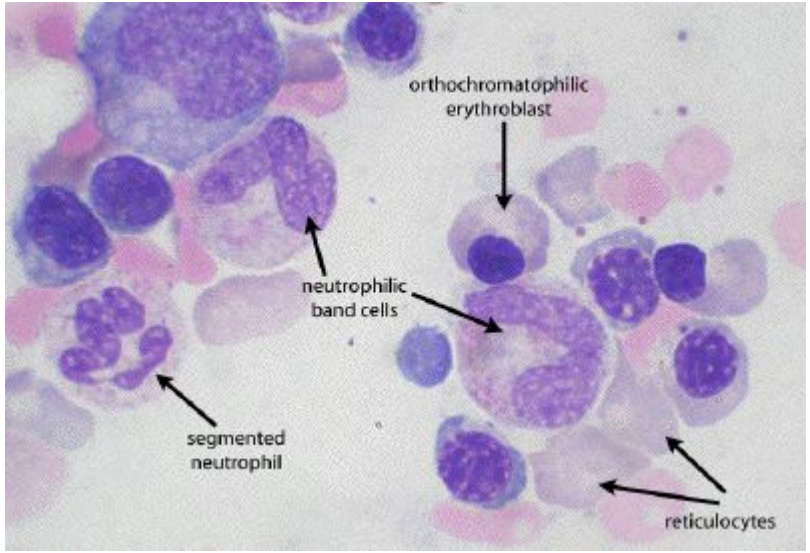
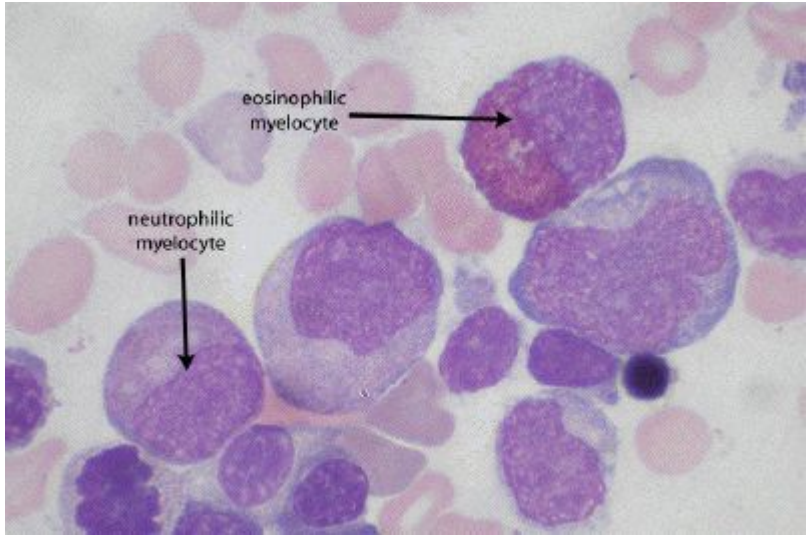
100%
12-17
100%
11-91
100%

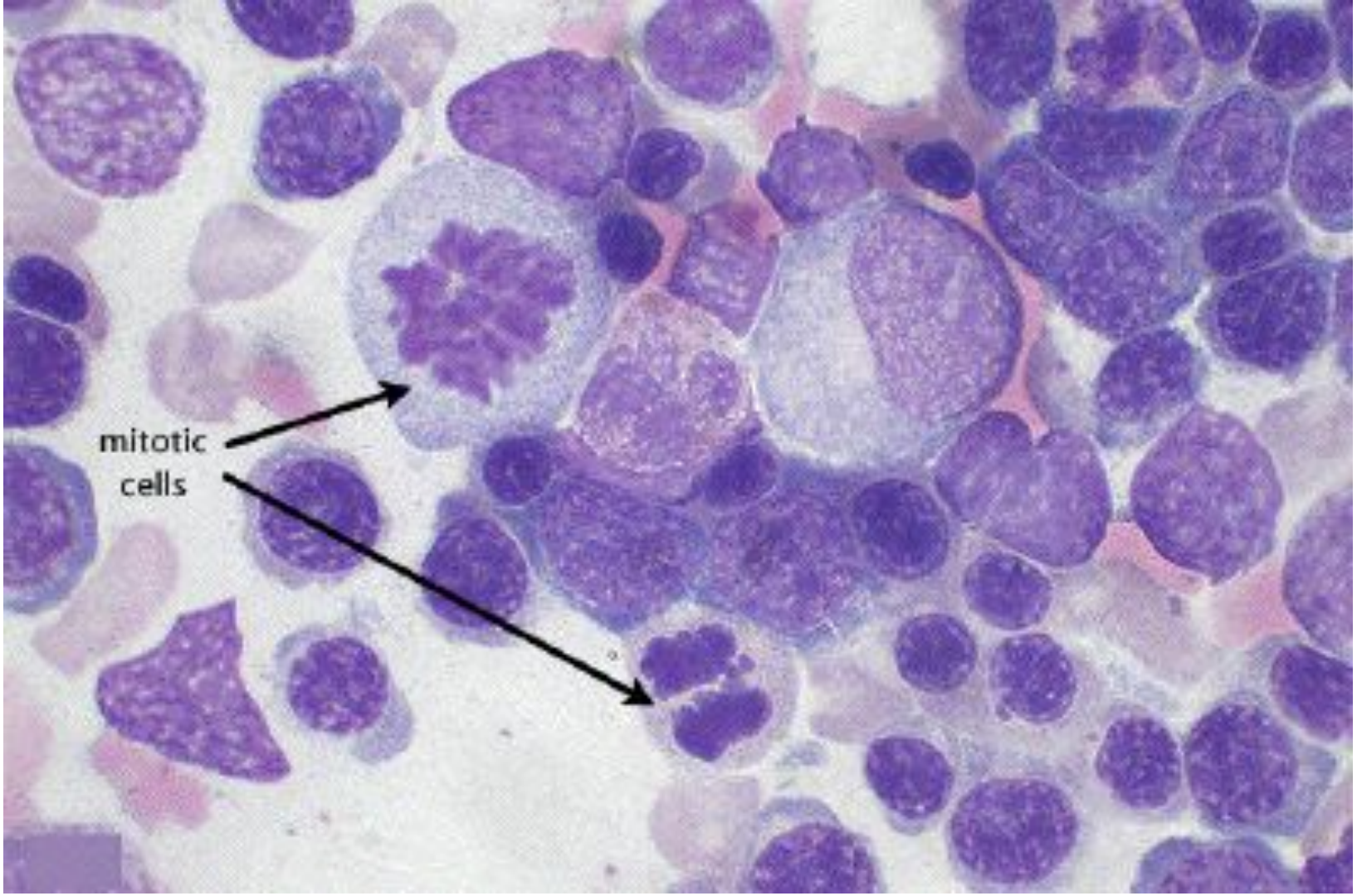

11-46 Orthochromic erythroblast
100%
11-2
100%
6-112
100%
3-36
91 %
2-72
91 %
12-75
73 %
9-79
73 %
6-109
73 %
3-93
100%
2-80
73 %
7-104
64 %
1-53
64 %


promyelocyte
nucleolus
azurophilic
granules
nucleolus
azurophilic
granules
promyelocyte


neutrophilic
metamyelocyte
specific
granules
neutrophilic
myelocyte
neutrophilic
band cell

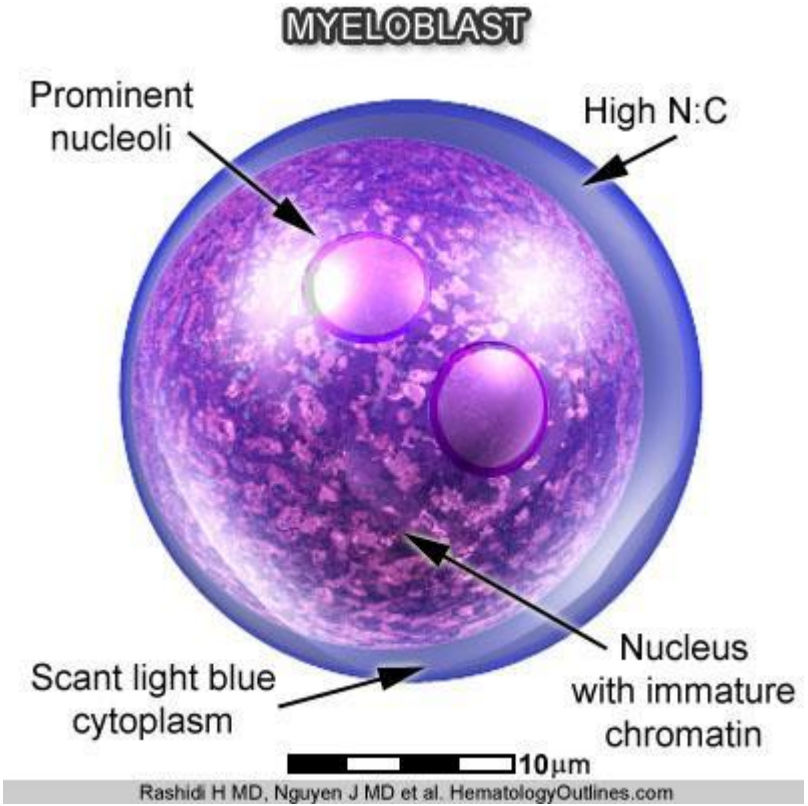

orthochromatophilic
erythroblast
neutrophilic
band cells
segmented
neutrophil
reticulocytes

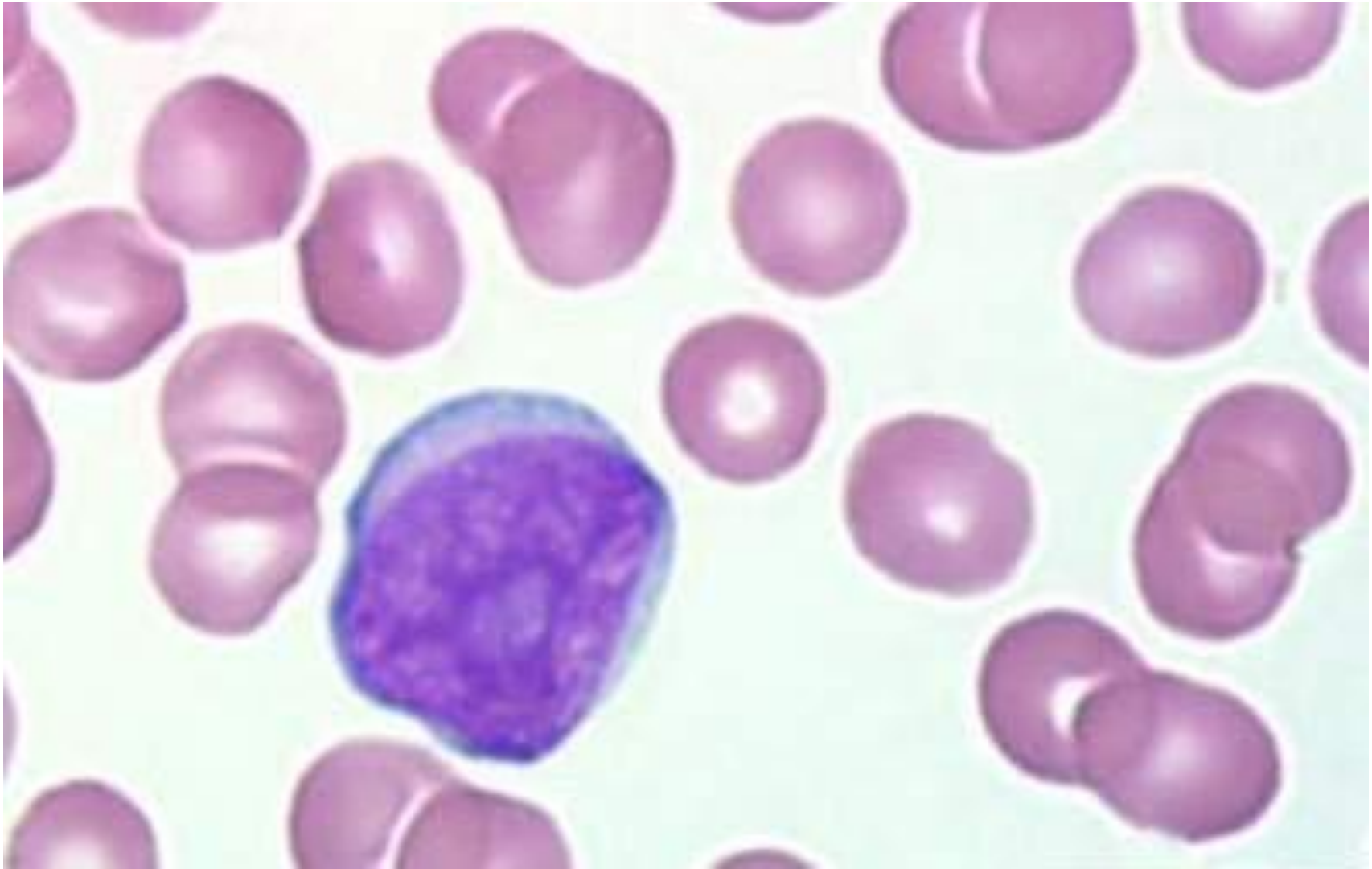

eosinophilic
myelocyte
neutrophilic
myelocyte

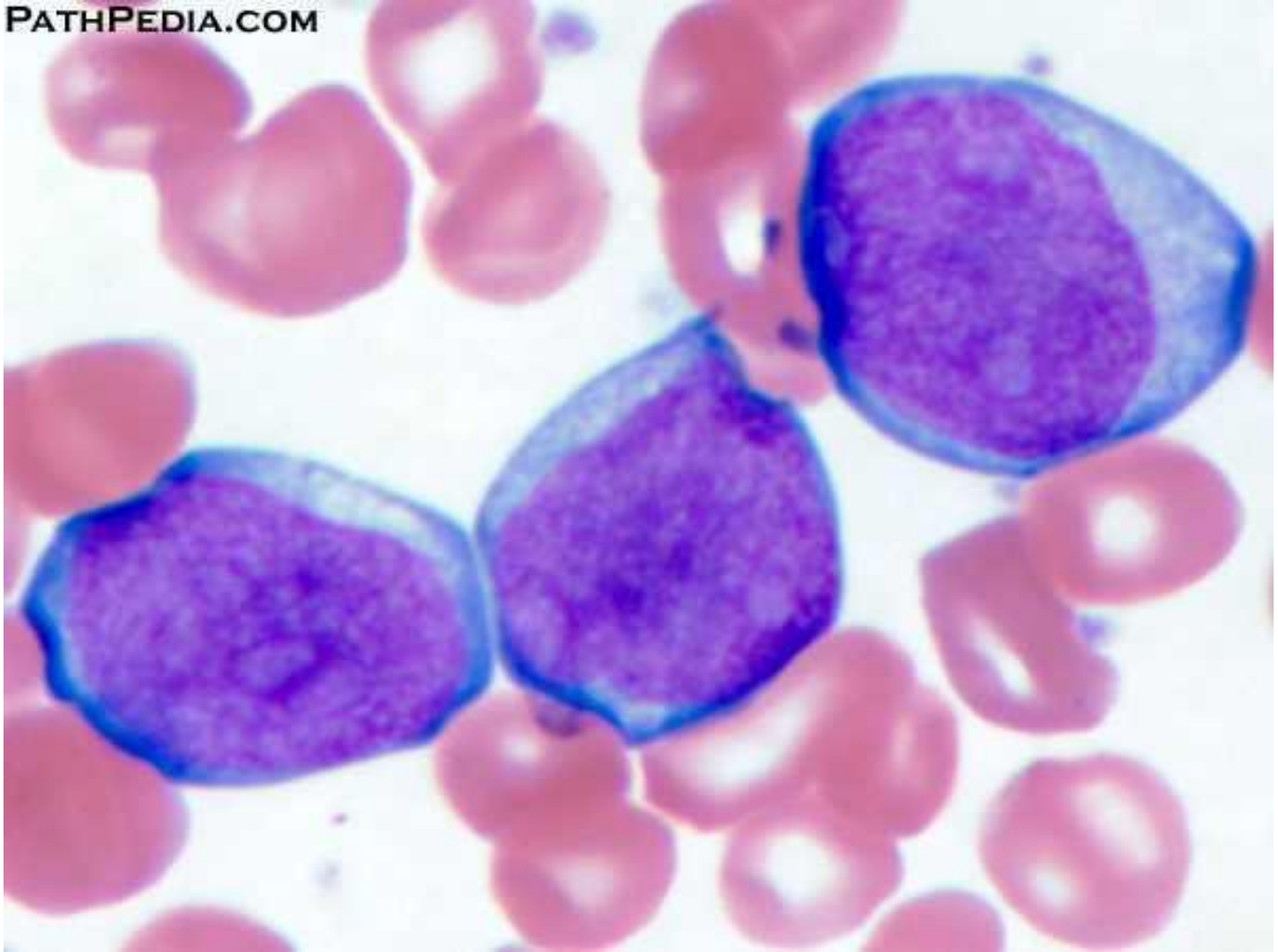

mitotic
cells

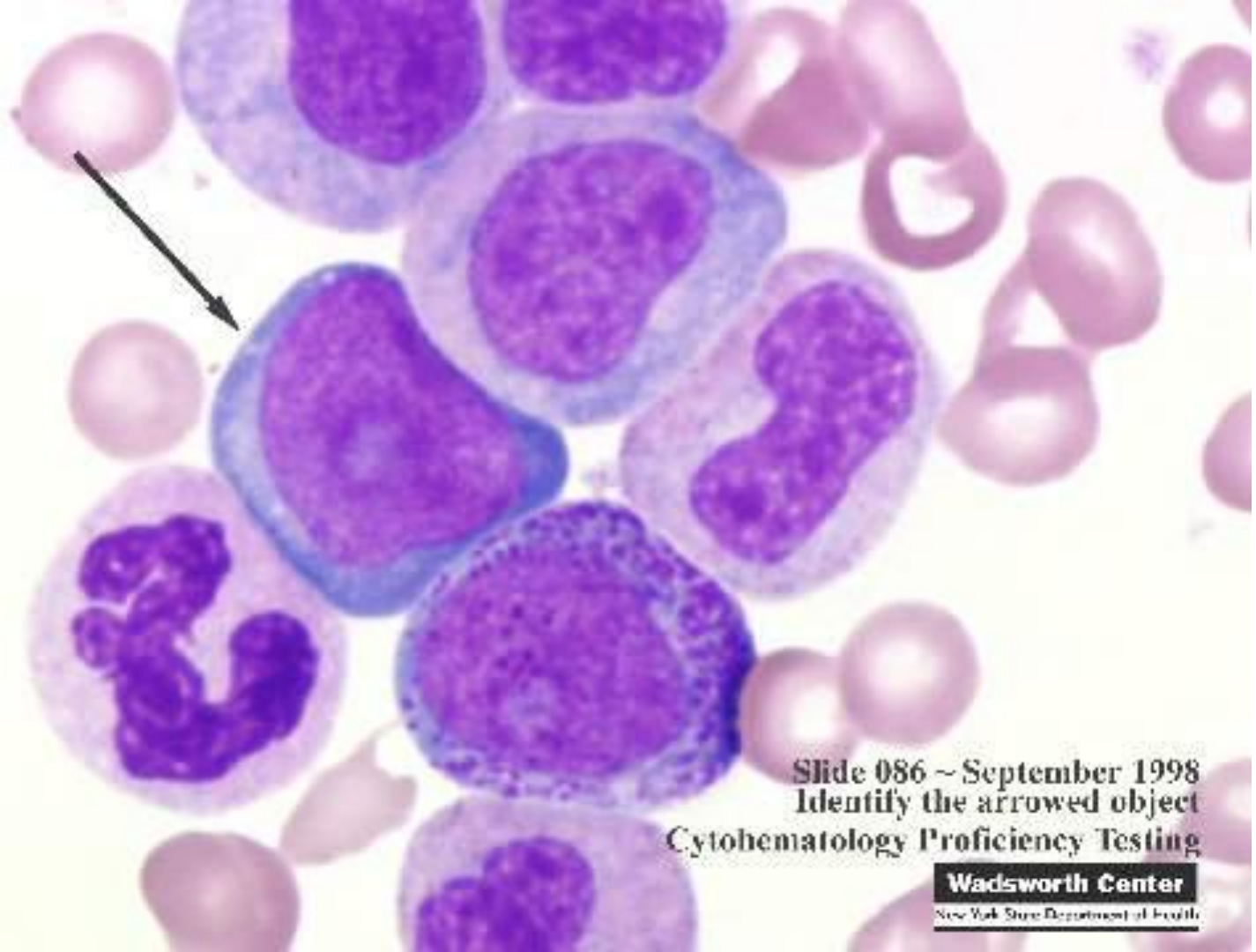
3

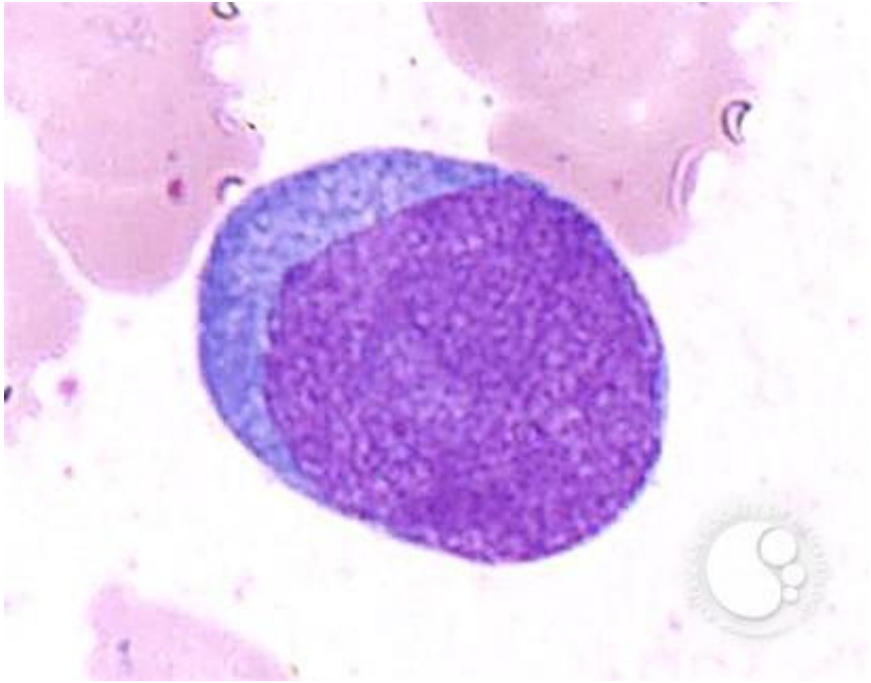
МИЕЛОБЛАСТ

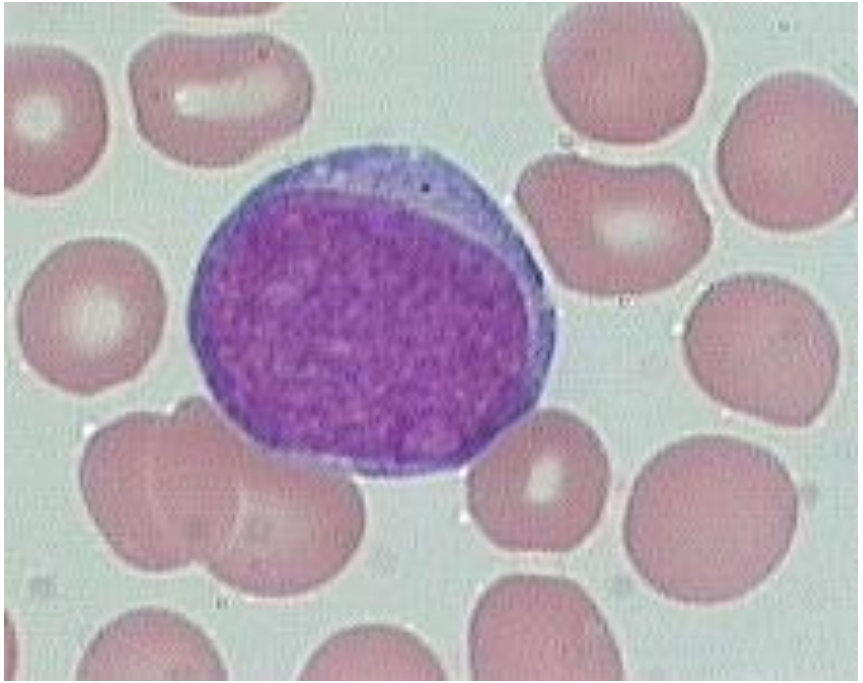


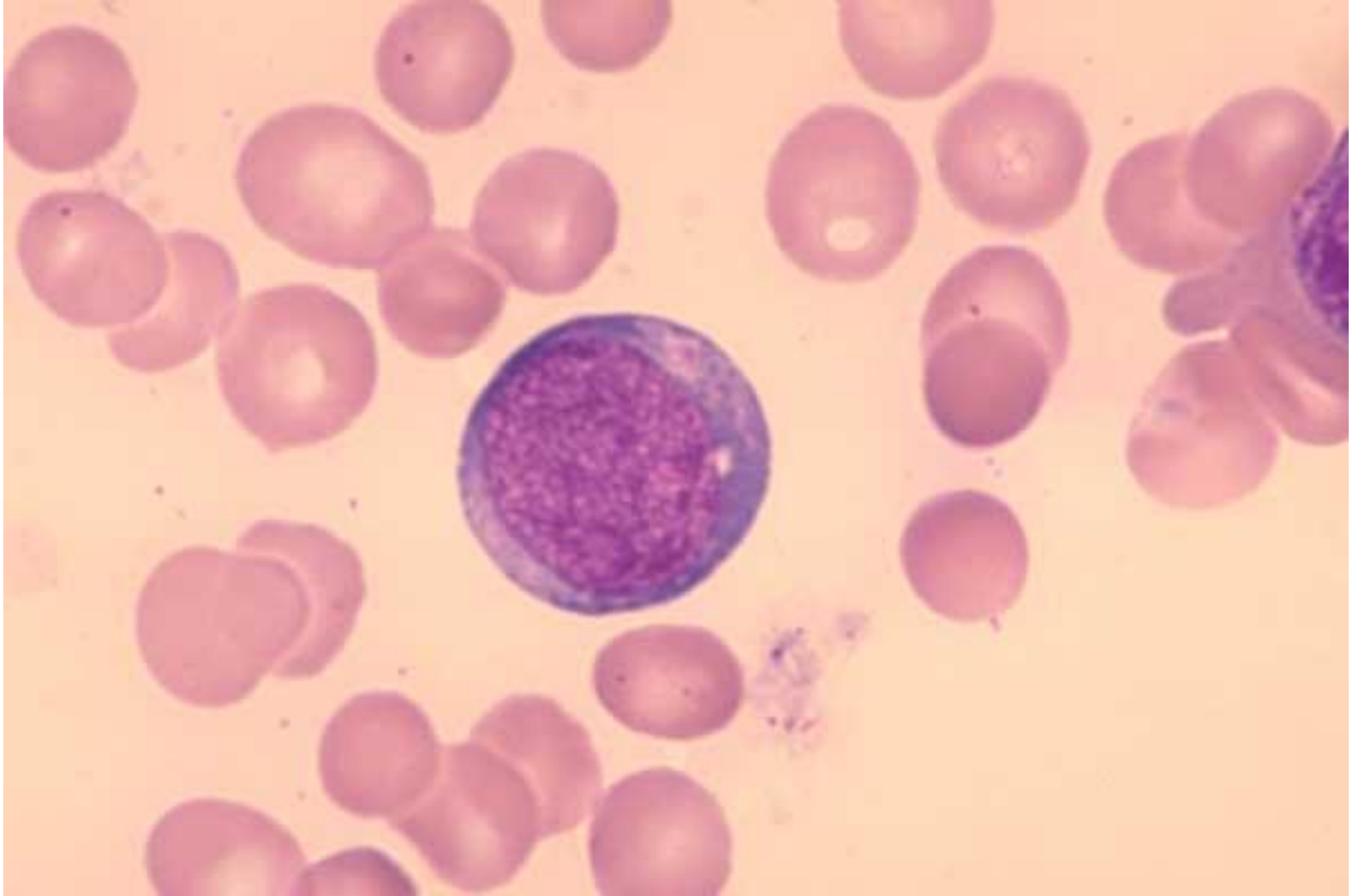


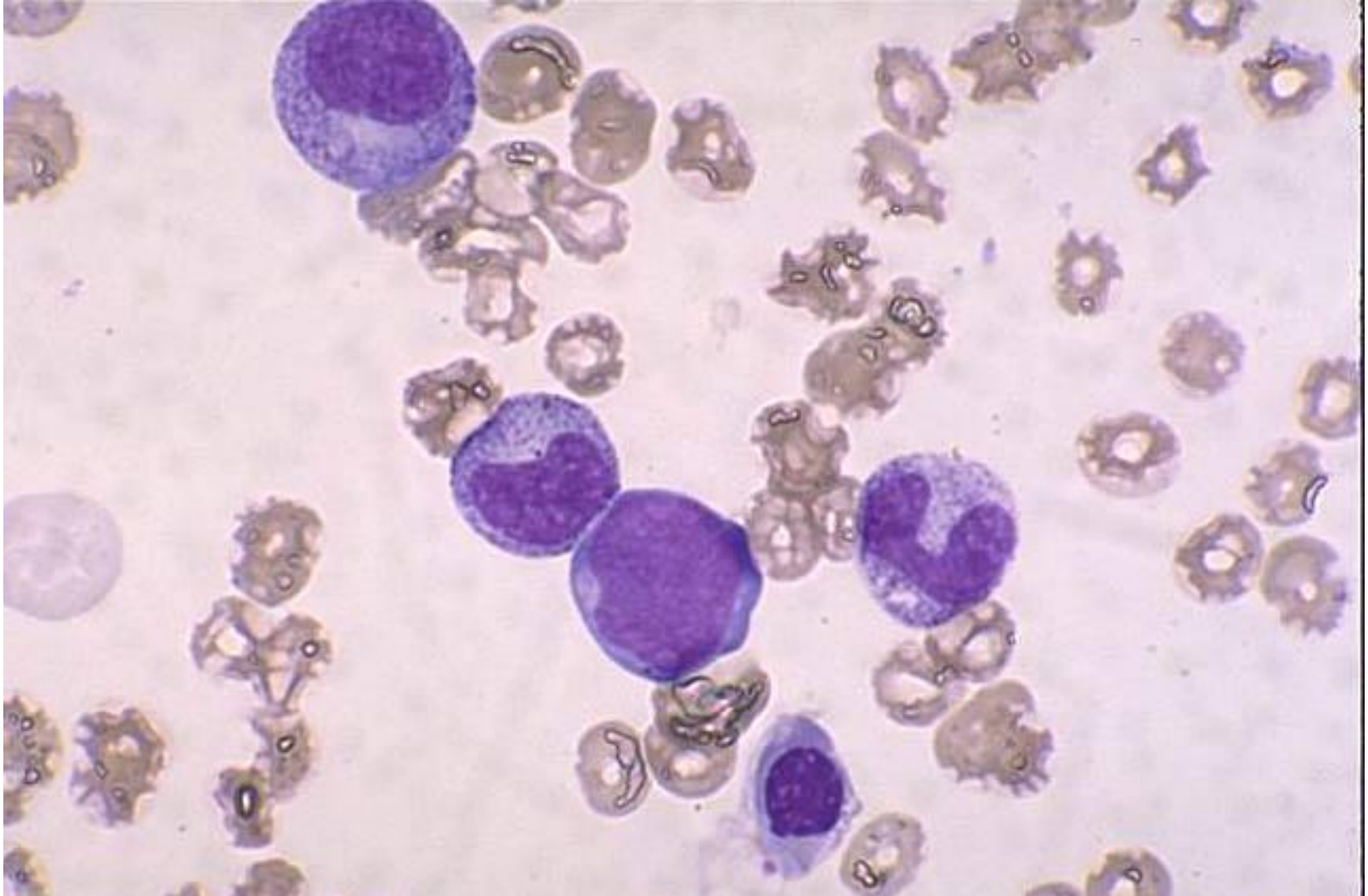

PATHPEDIA.COM

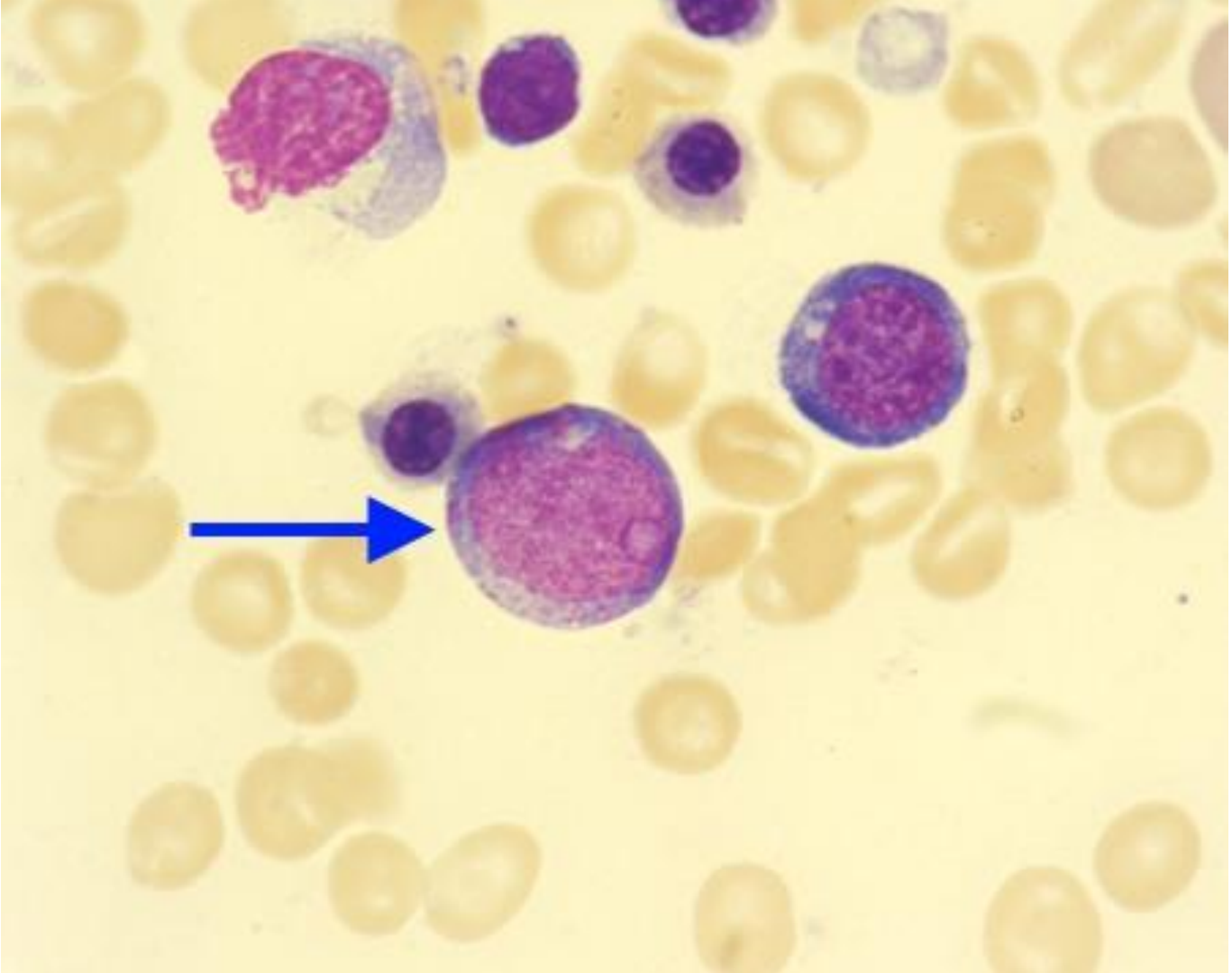

Slide 086 ~ September 1998
Identify the arrowed object
Cytohematology Proficiency Testing
Wadsworth Center

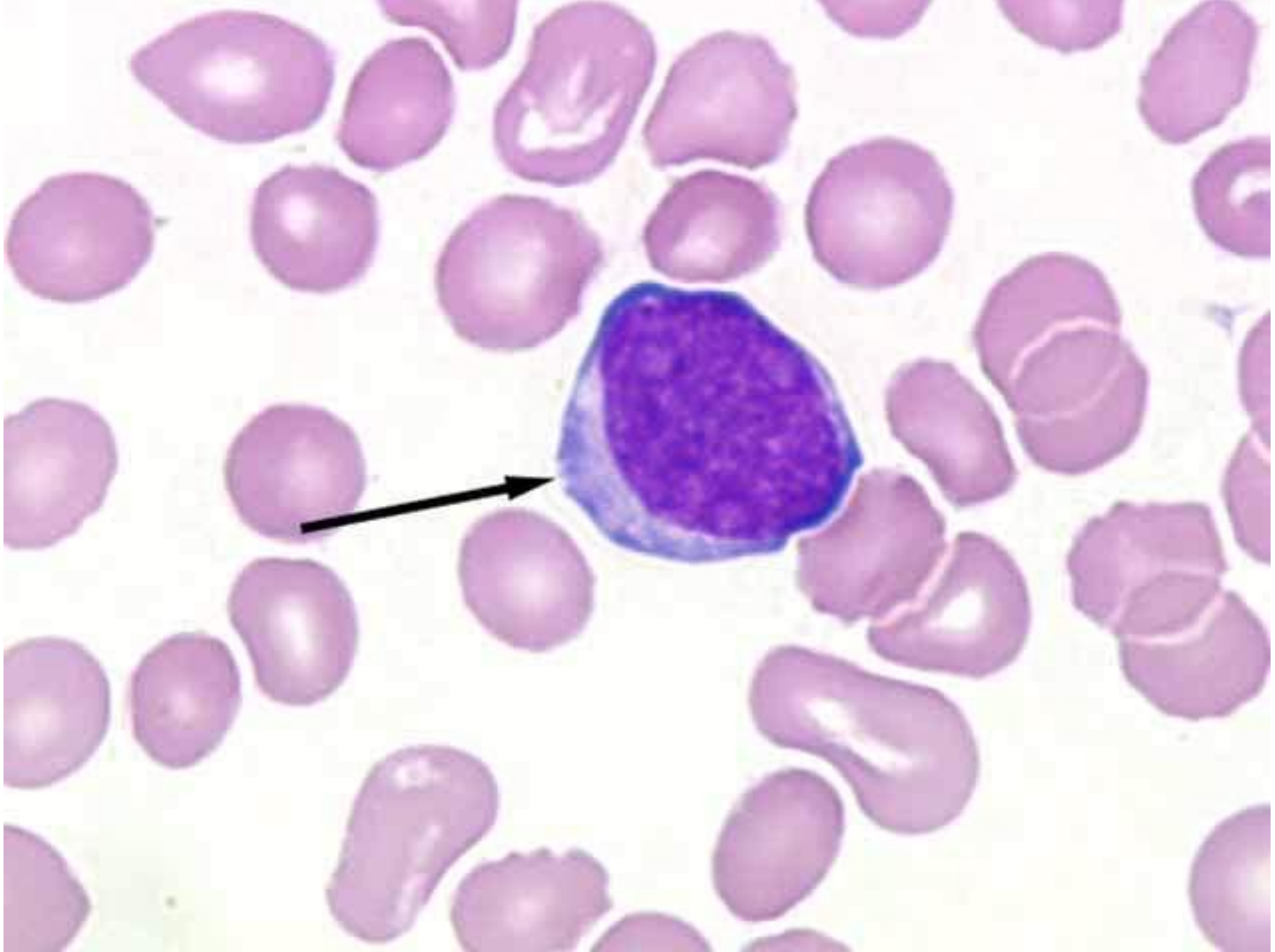


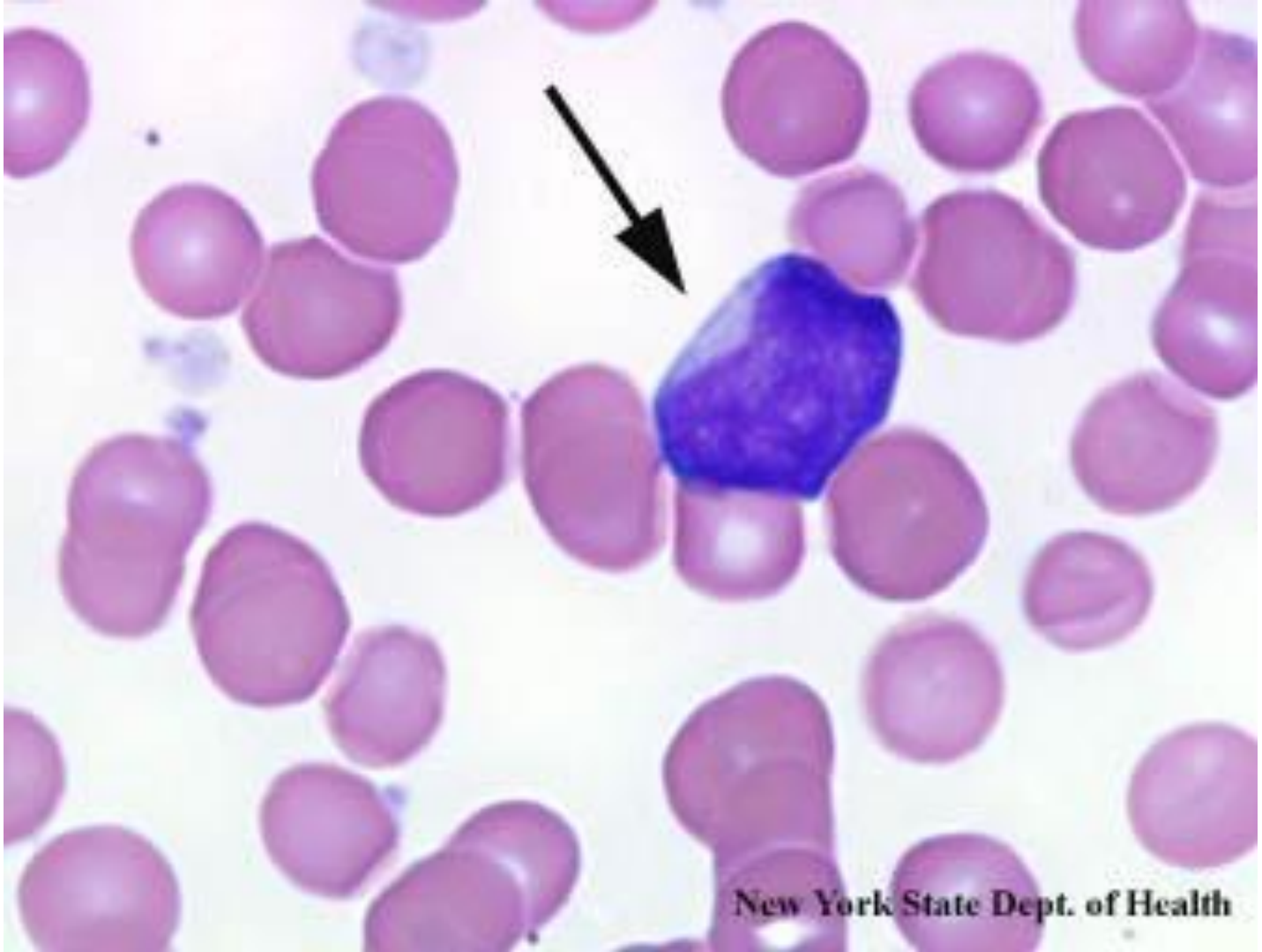


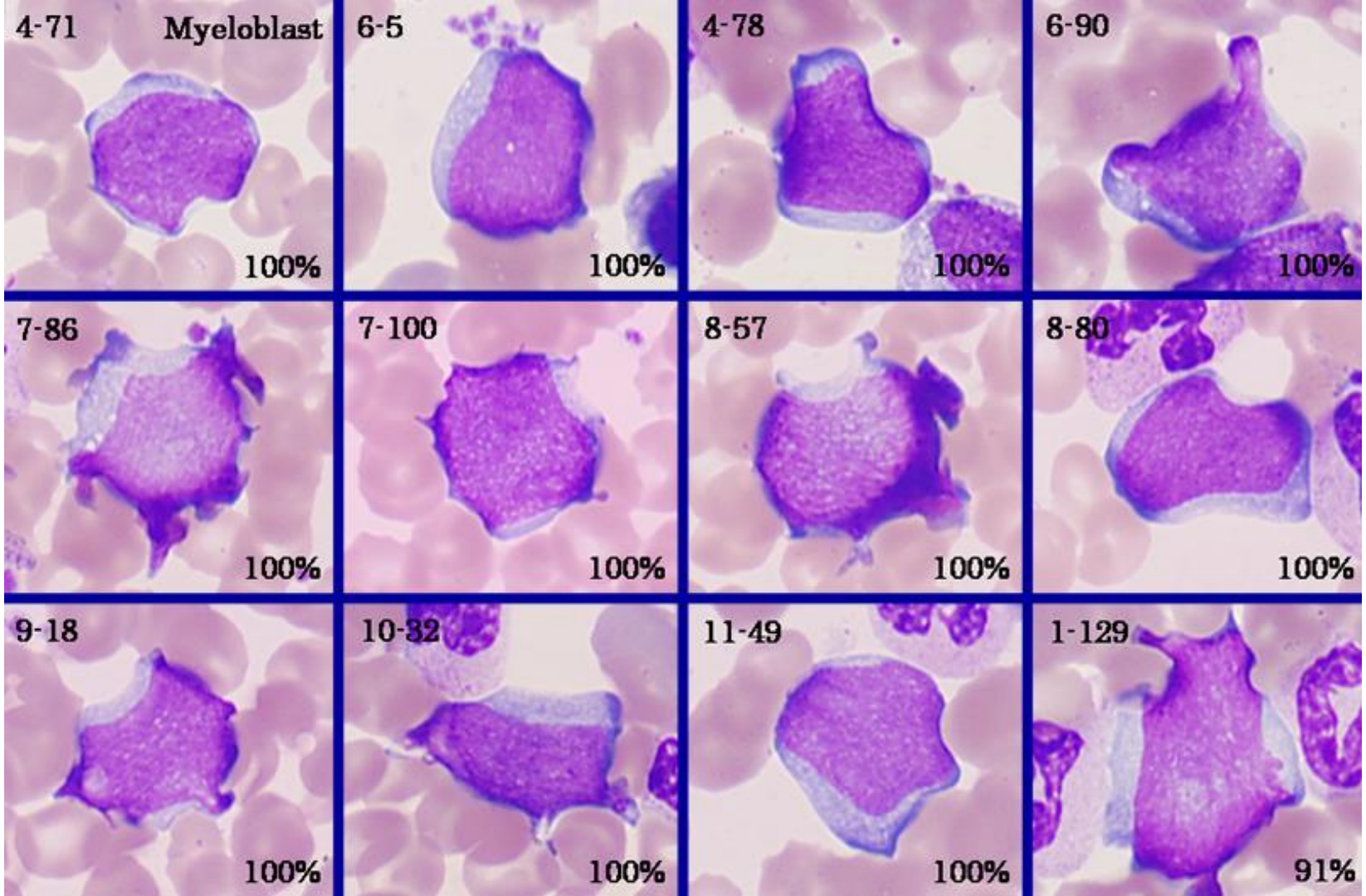






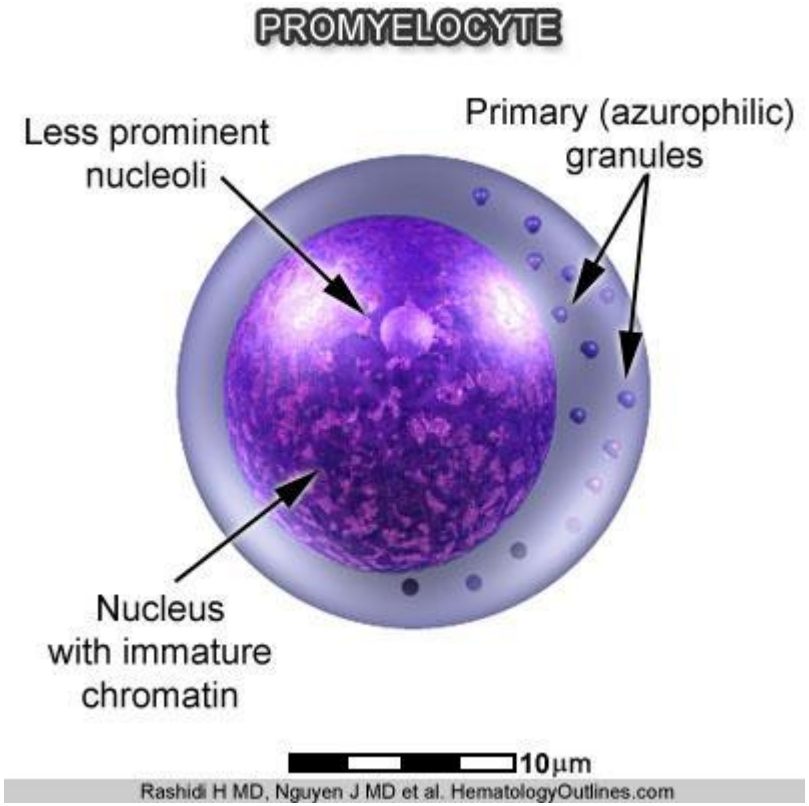


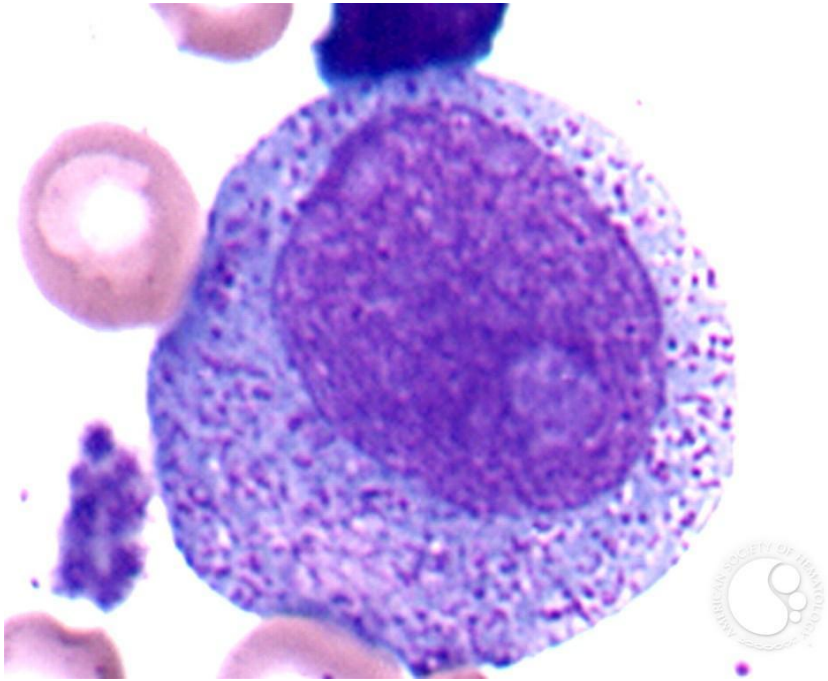

New York State Dept. of Health

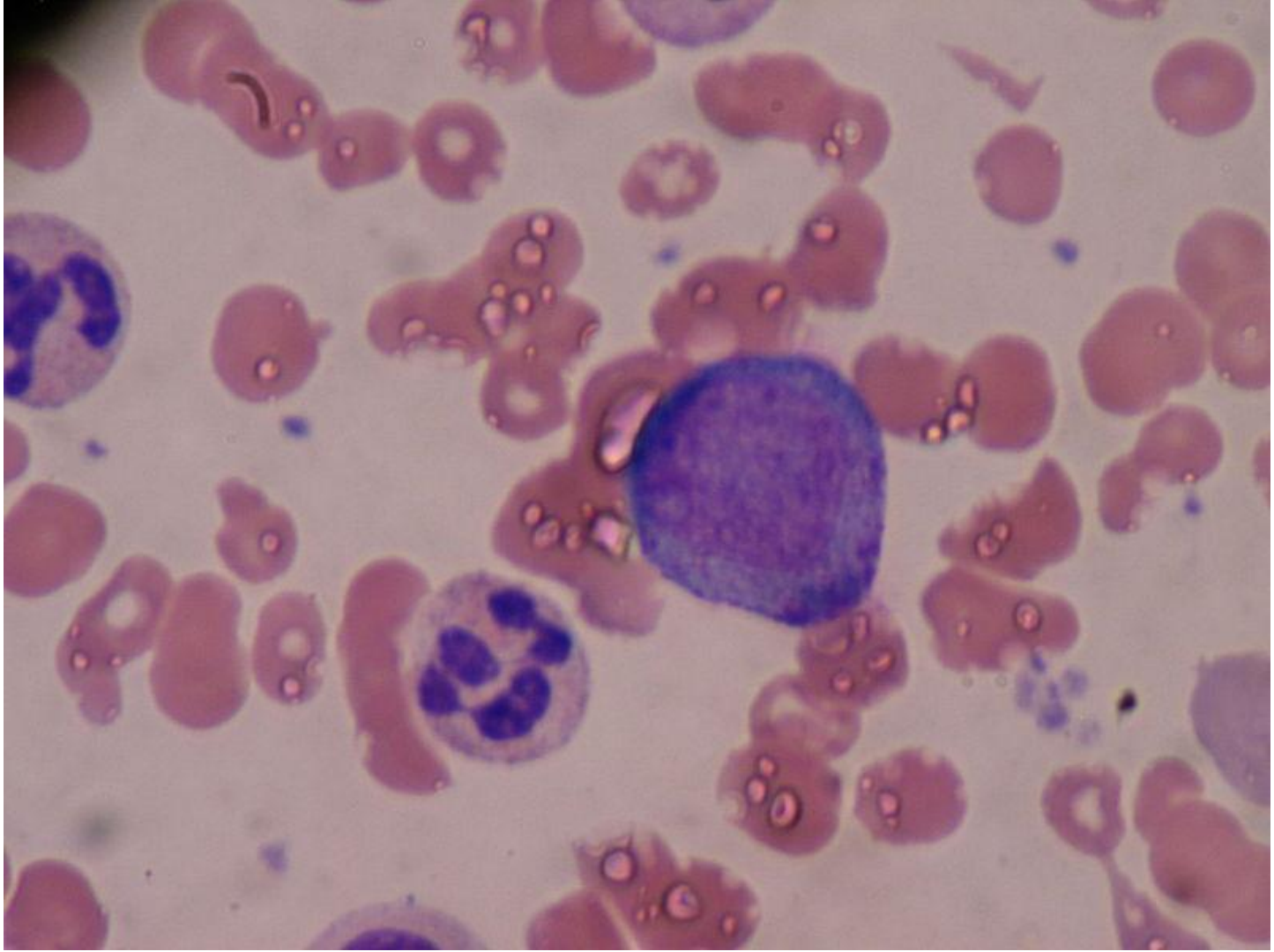

4-71
Myeloblast
100%
6-5
100%
4-78
100%
6-90
100%
7-86
100%
7-100
100%
8-57
100%
8-80
100%
9-18
100%
10-32
100%
11-49
100%
1-129
91%

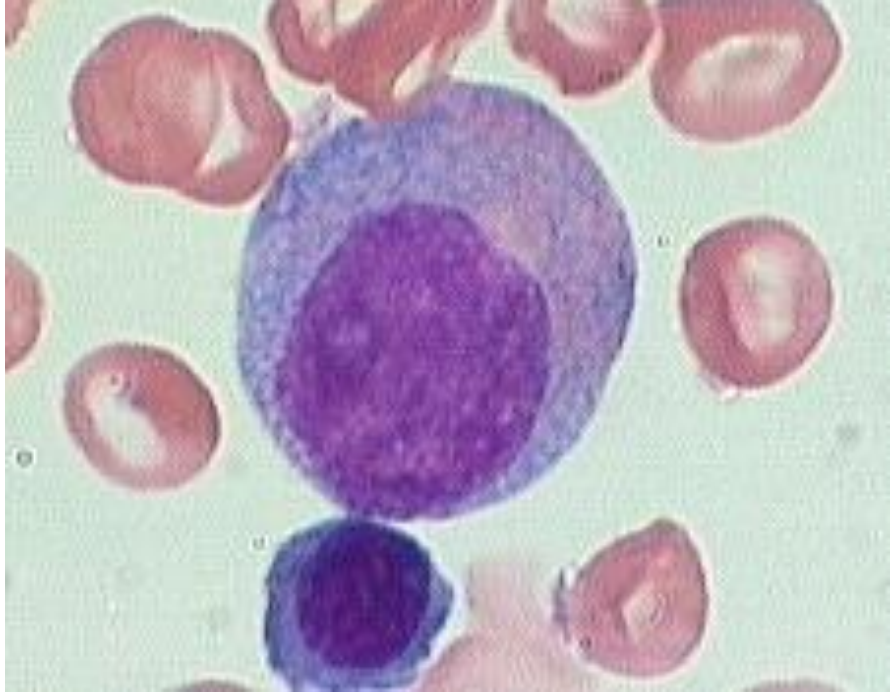
2.

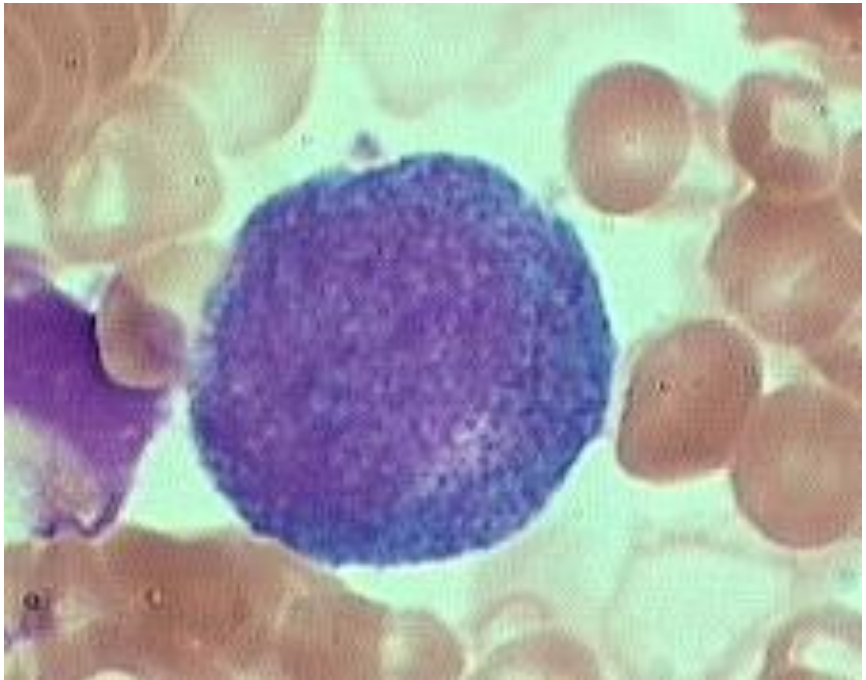
ПРОМИЕЛОЦИТ

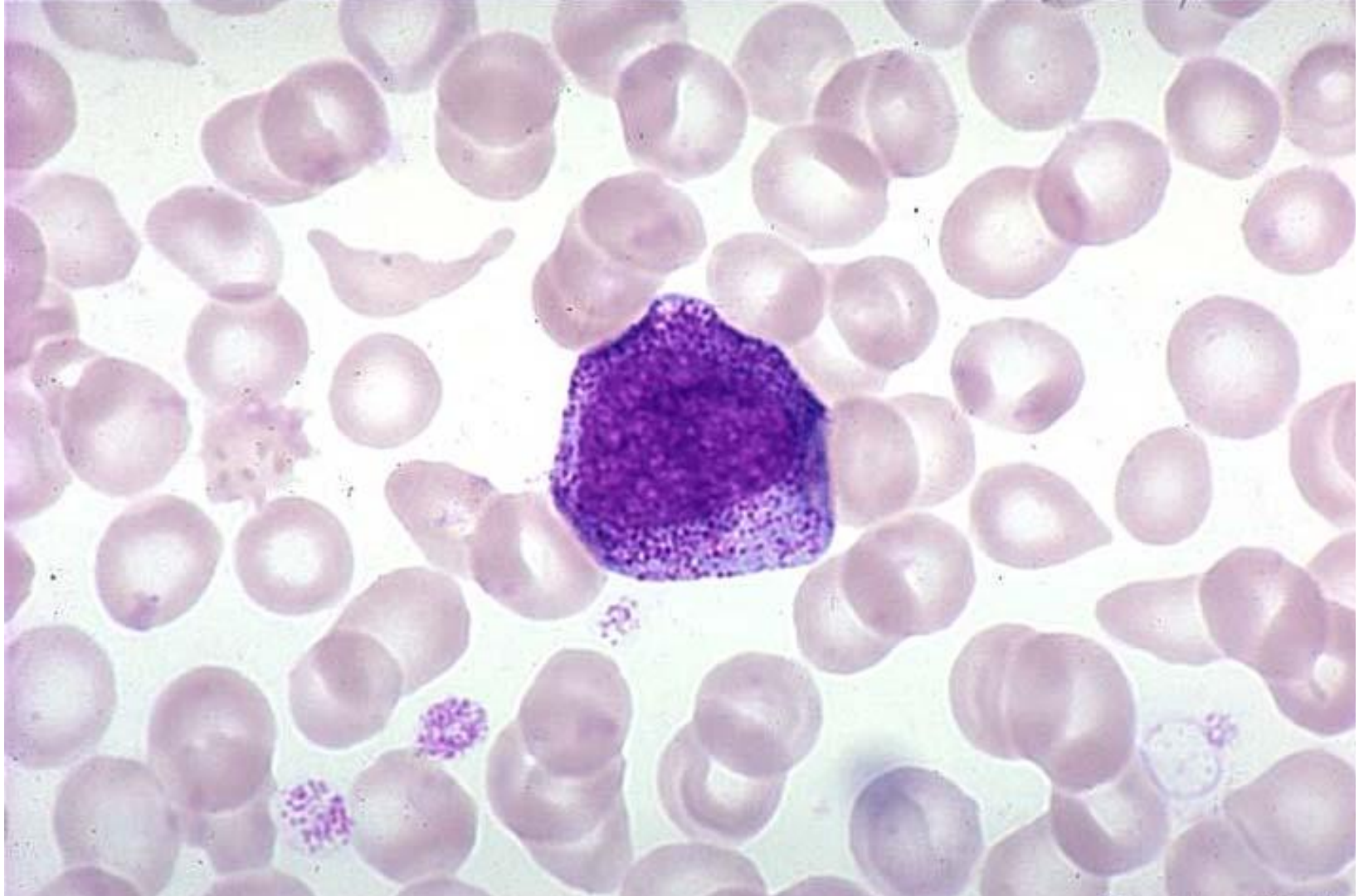


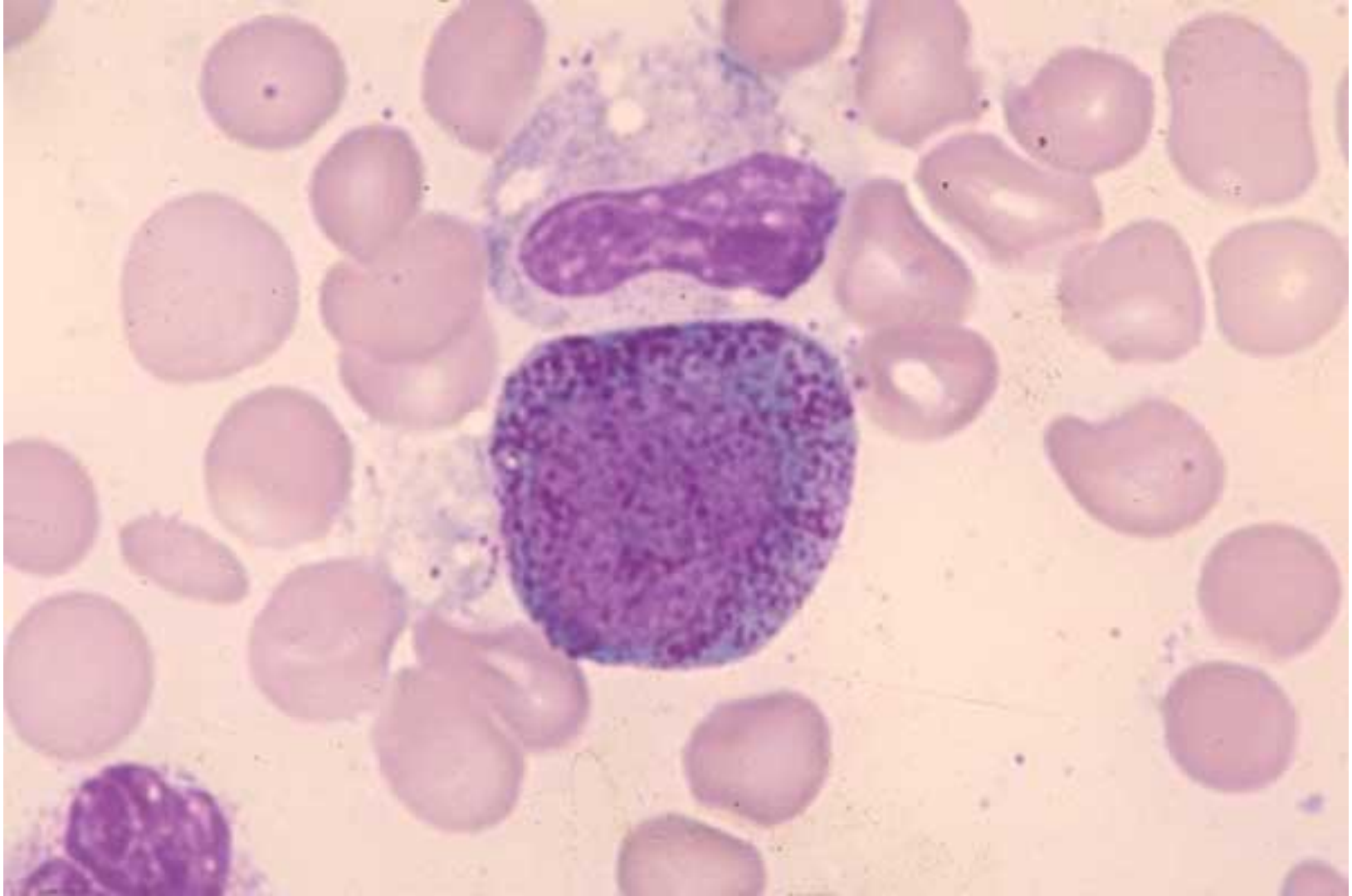


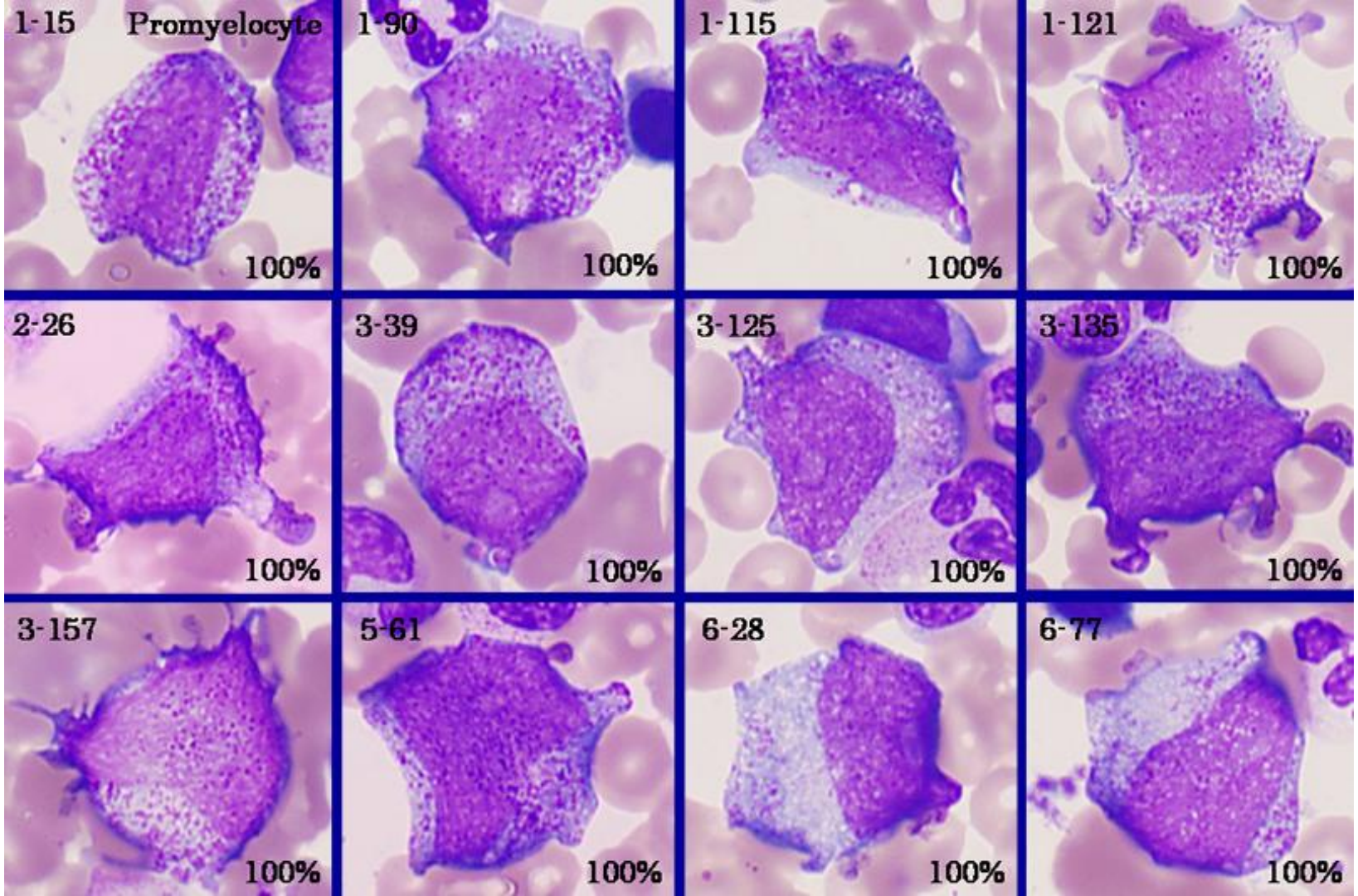


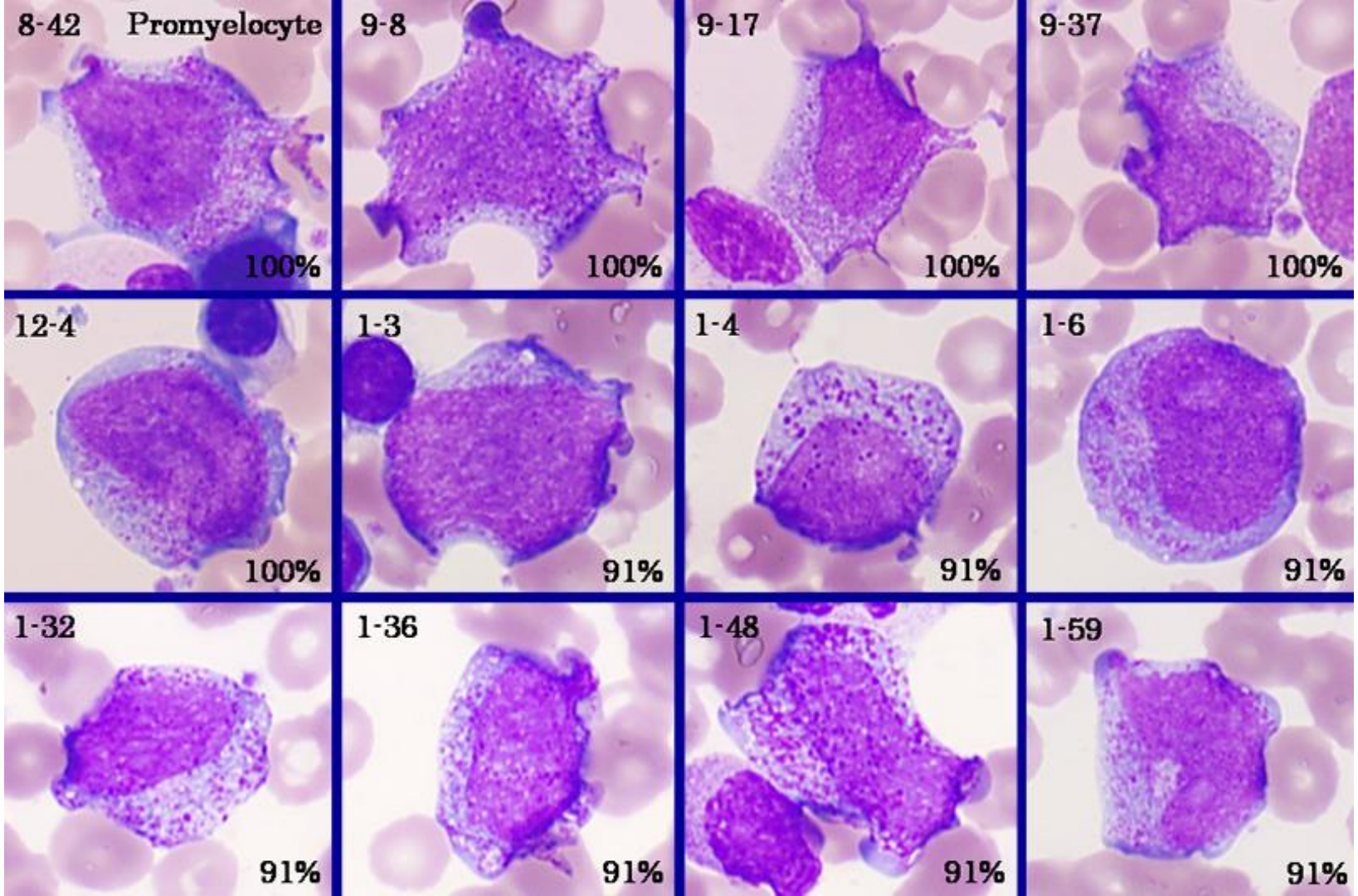


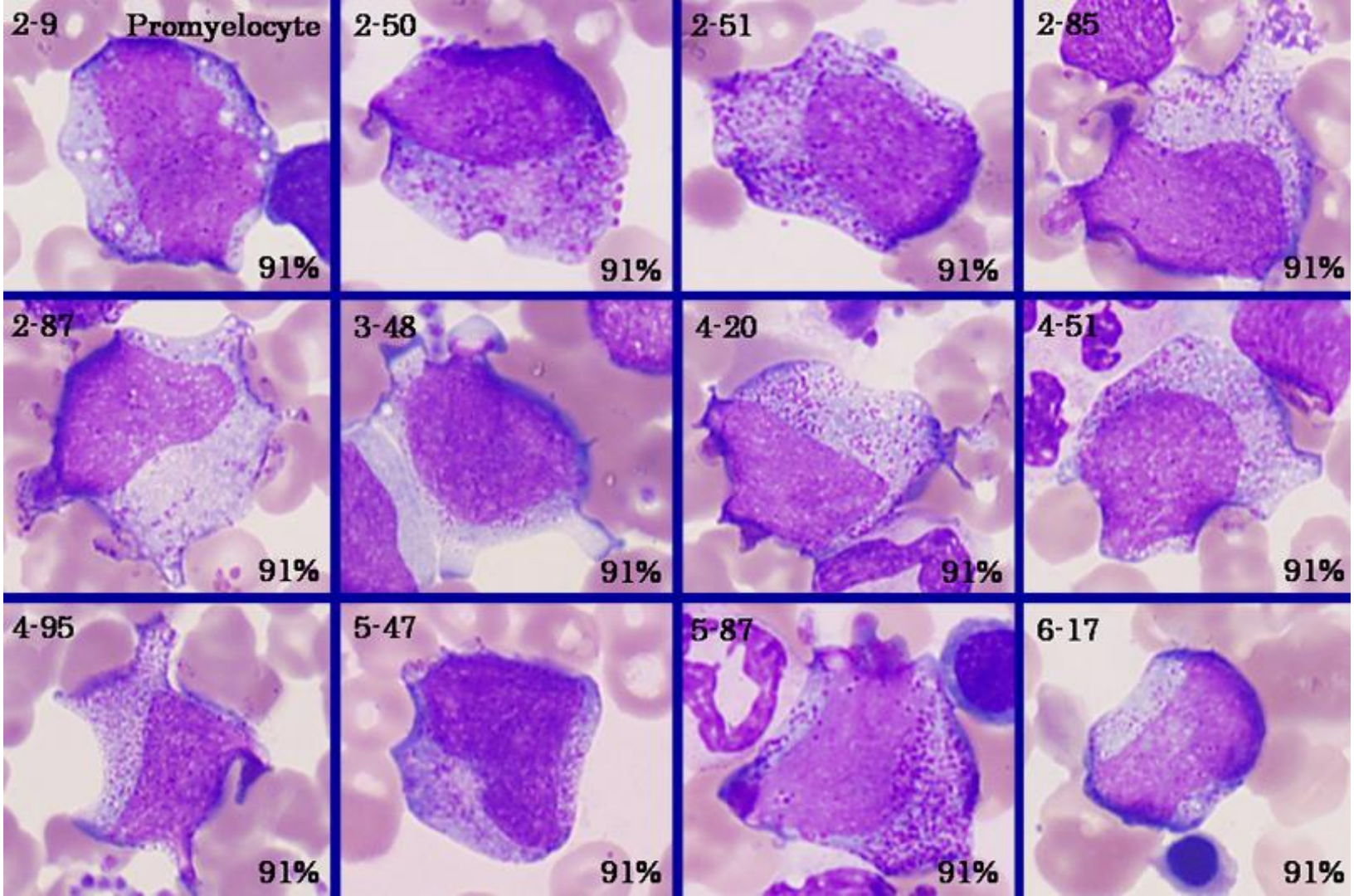




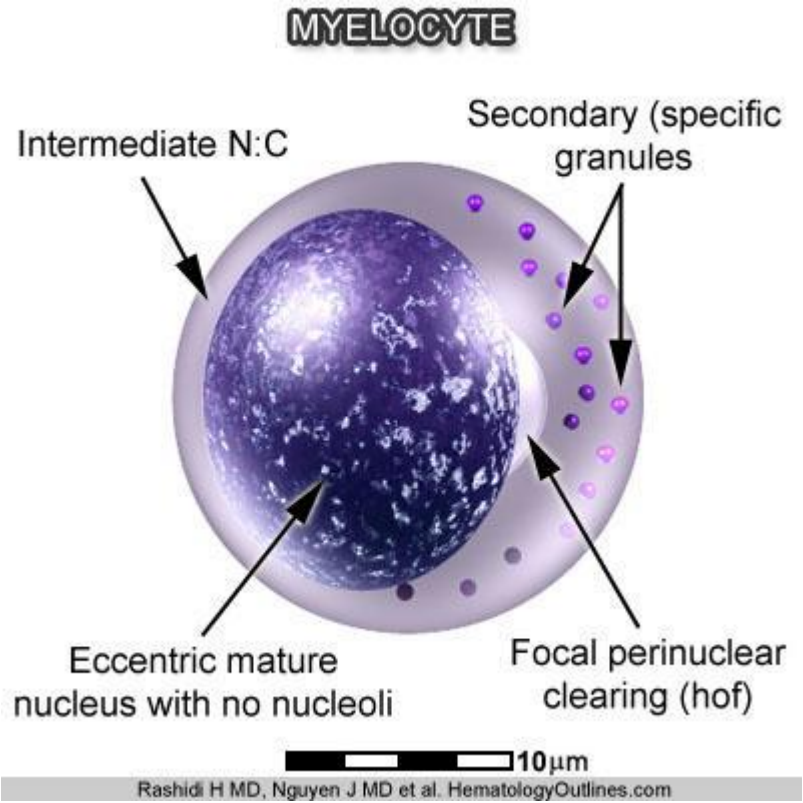


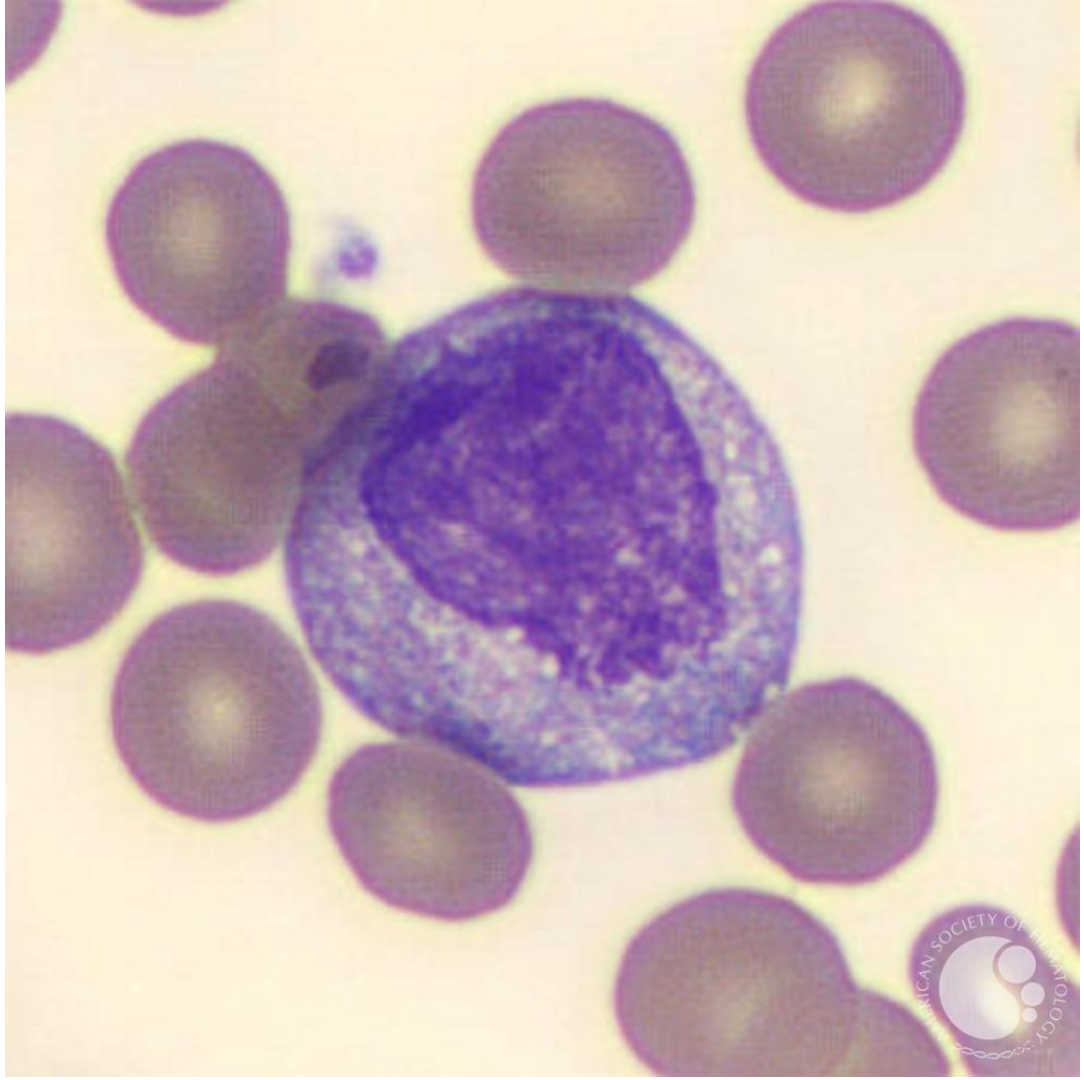

1-15
Promyelocyte
100%
1-90
100%
1-115
100%
1-121
100%
2-26
100%
3-39
100%
3-125
100%
3-135
100%
3-157
100%
5-61
100%
6-28
100%
6-77
100%

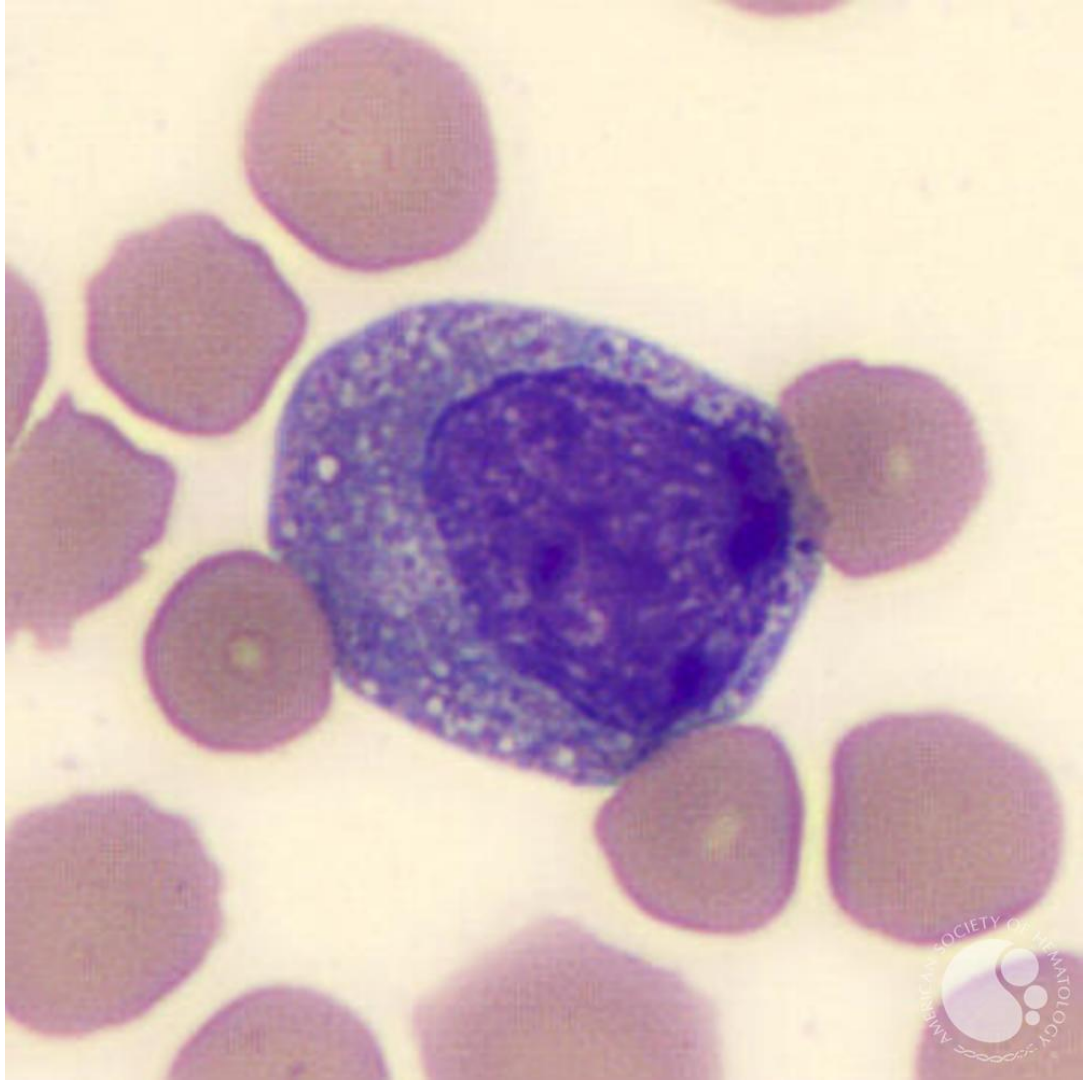

8-42 Promyelocyte
100%
9-8
100%
9-17
100%
9-37
100%
12-4
100%
1-3
91%
1-4
91%
1-6
91%
1-32
91%
1-36
91%
1-48
91%
1-59
91%

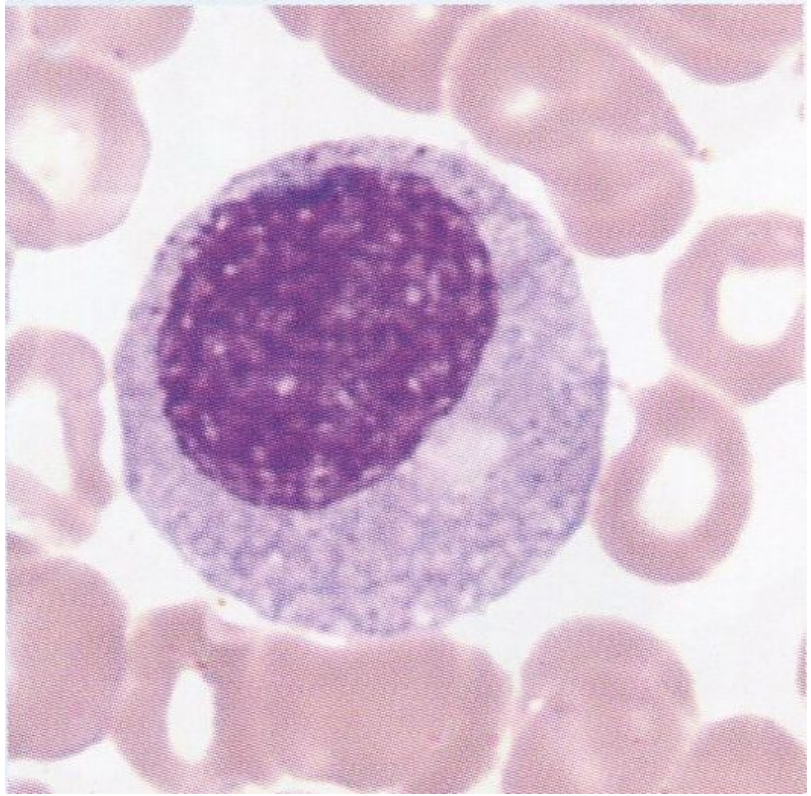

2-9
Promyelocyte
91%
2-50
91%
2-51
91%
2-85
91%
2-87
91%
3-48
91%
4-20
91%
4-51
91%
4-95
91%
5-47
91%
5-87
91%
6-17
91%

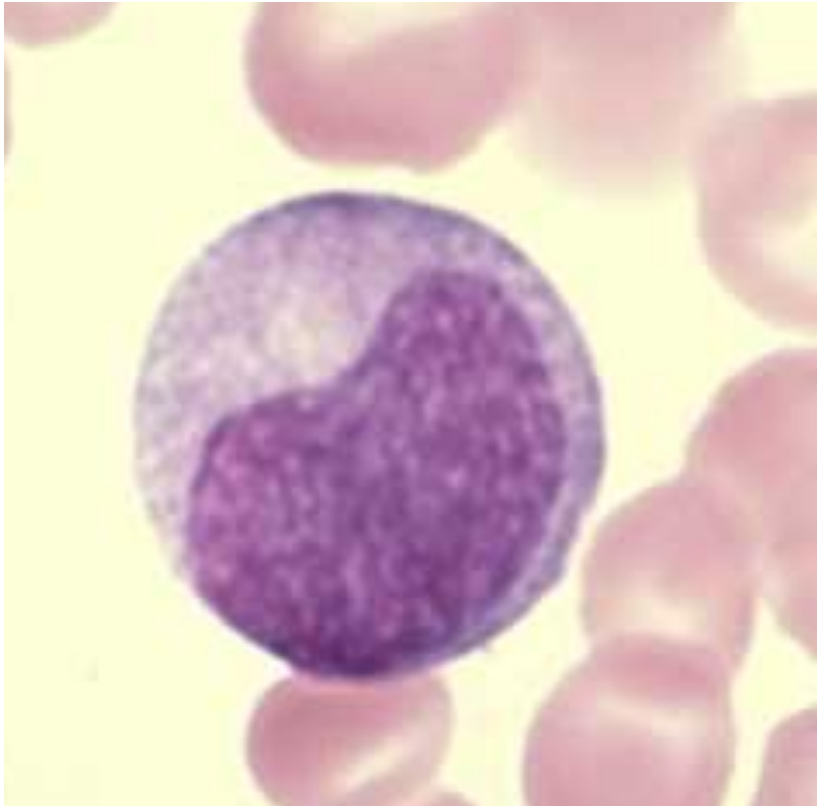
МИЕЛОЦИТ

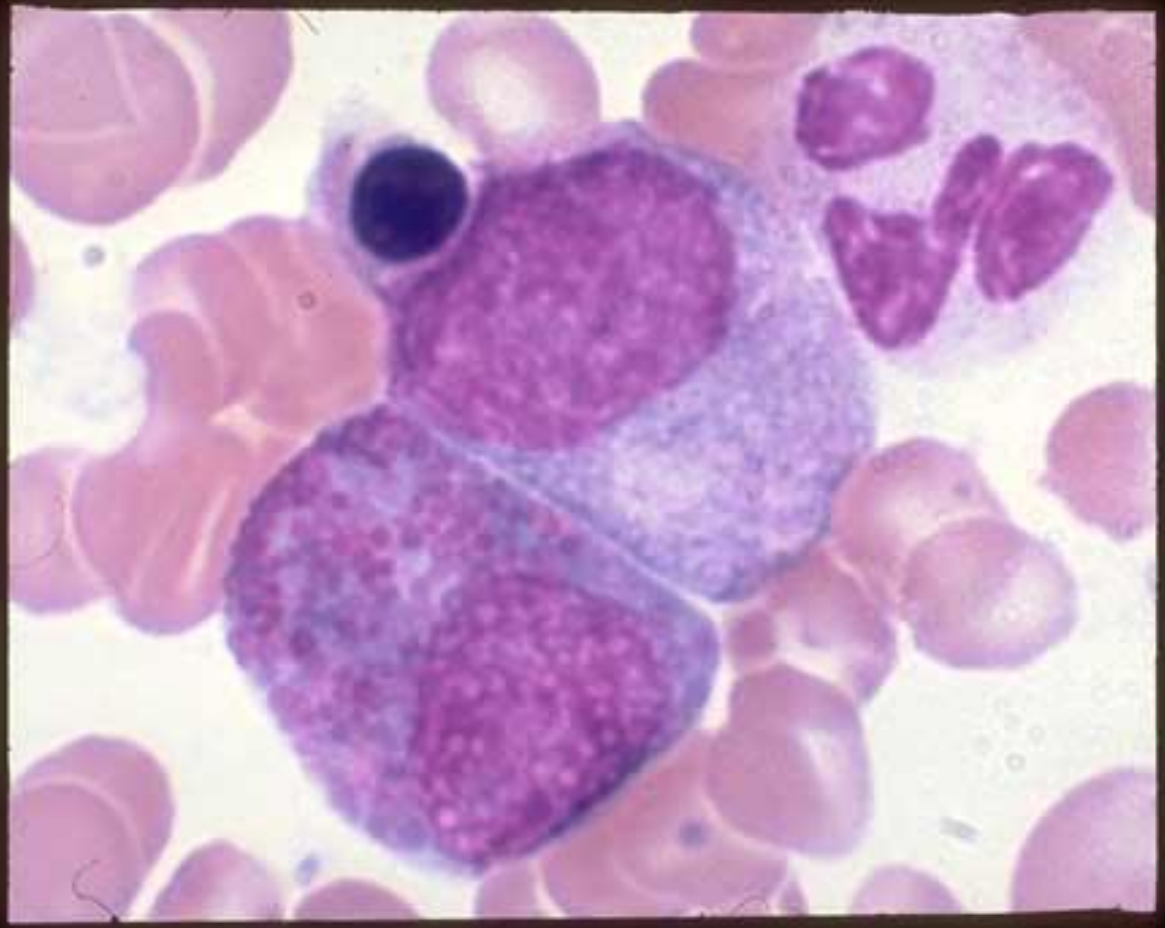

MYELOCYTE
Intermediate N:C
Secondary (specific granules
Eccentric mature nucleus with no nucleoli
Focal perinuclear clearing (hof)
10µm
Rashidi H MD, Nguyen J MD et al. HematologyOutlines.com

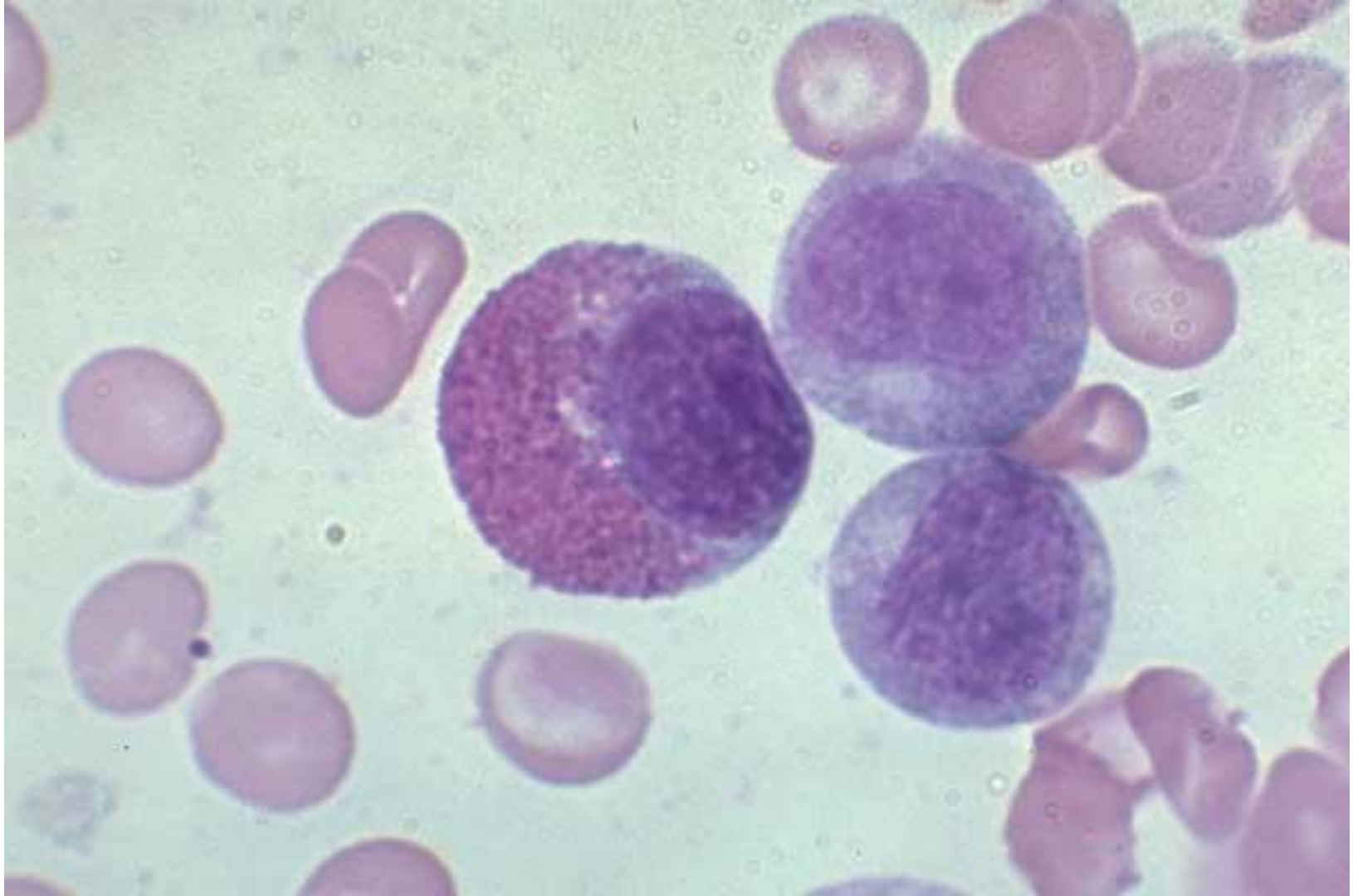

AMERICAN SOCIETY OF HEMATOLOGY

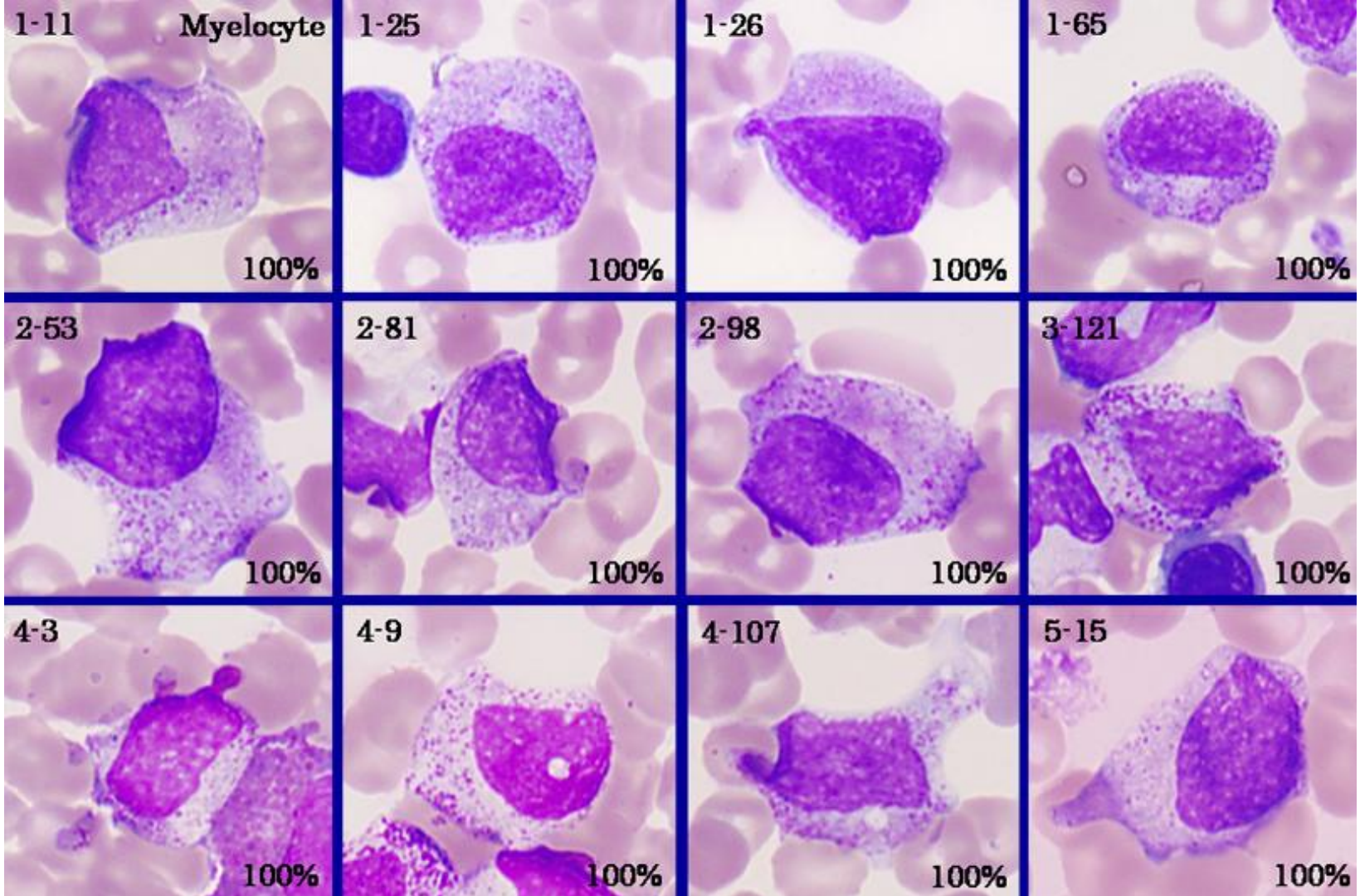

AMERICAN SOCIETY OF HEMATOLOGY

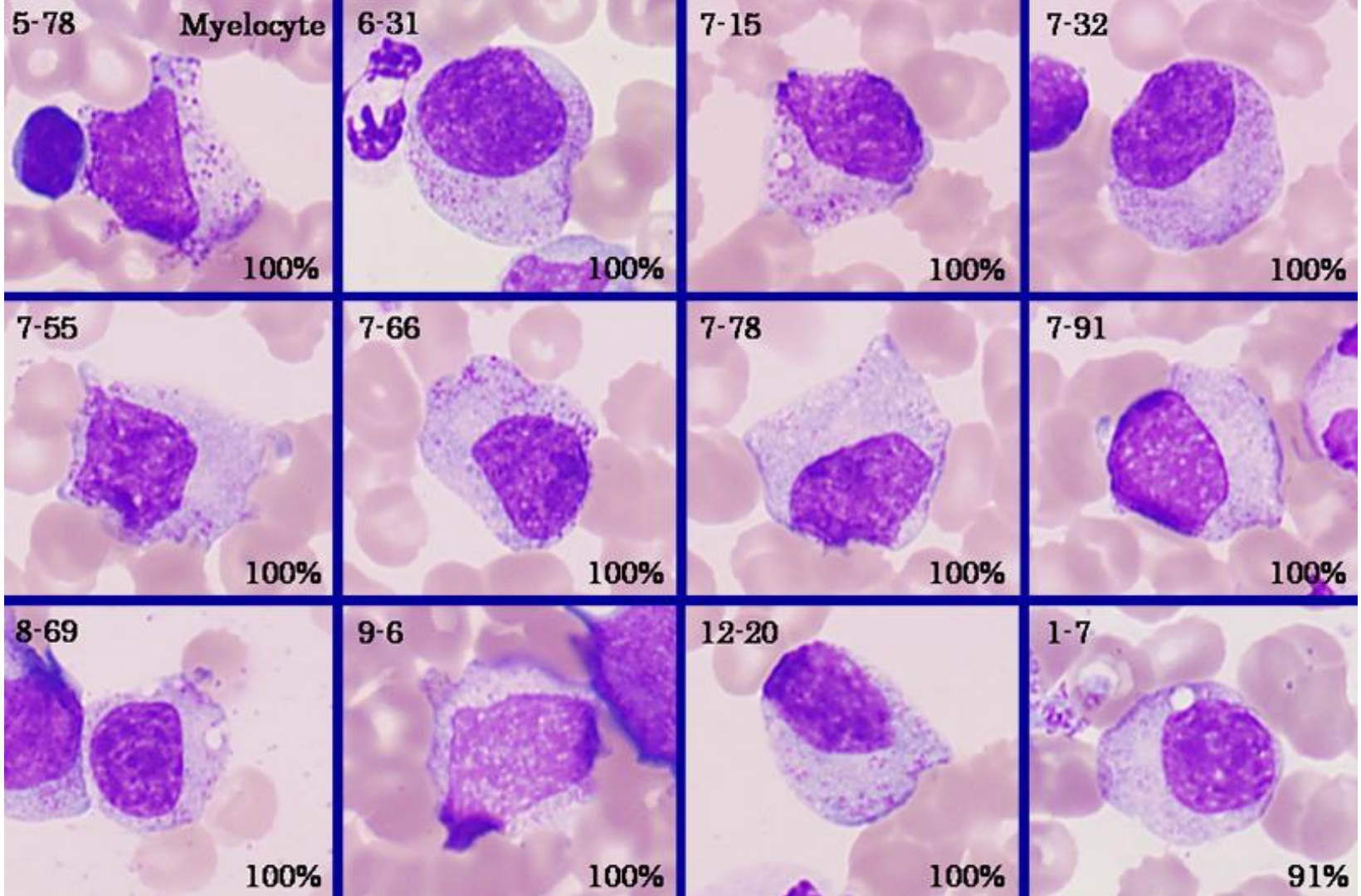


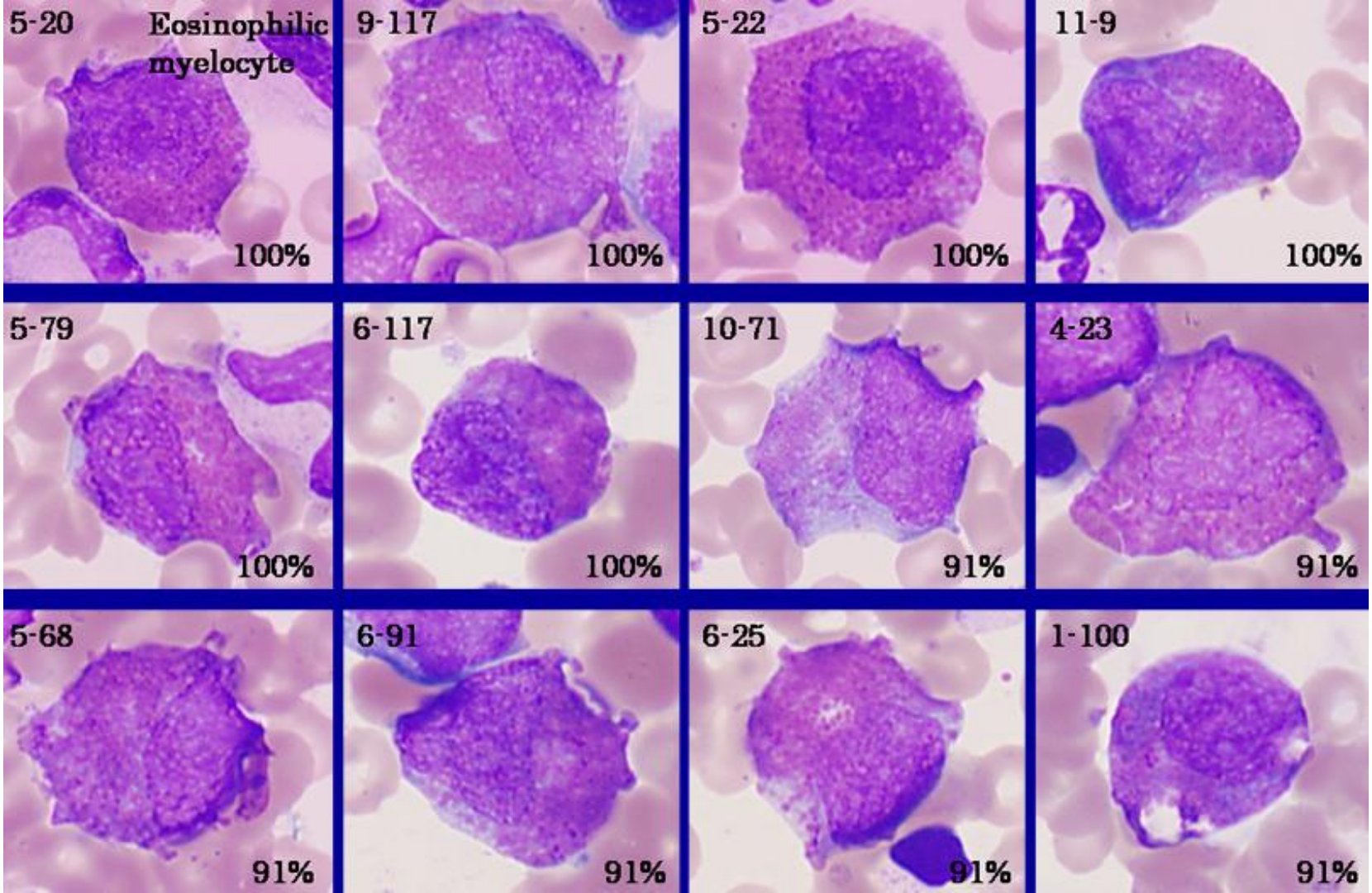




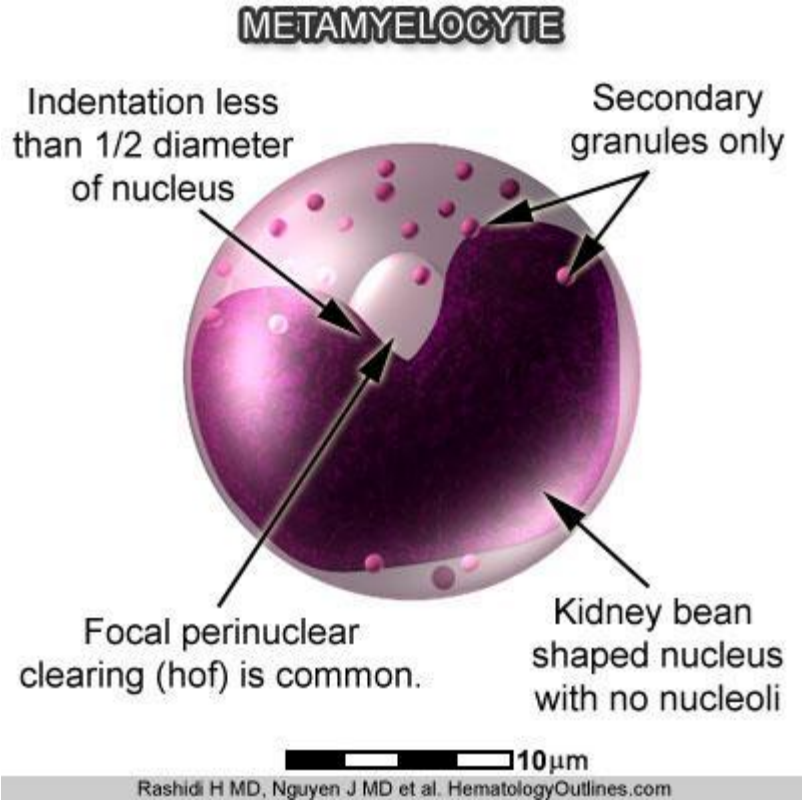


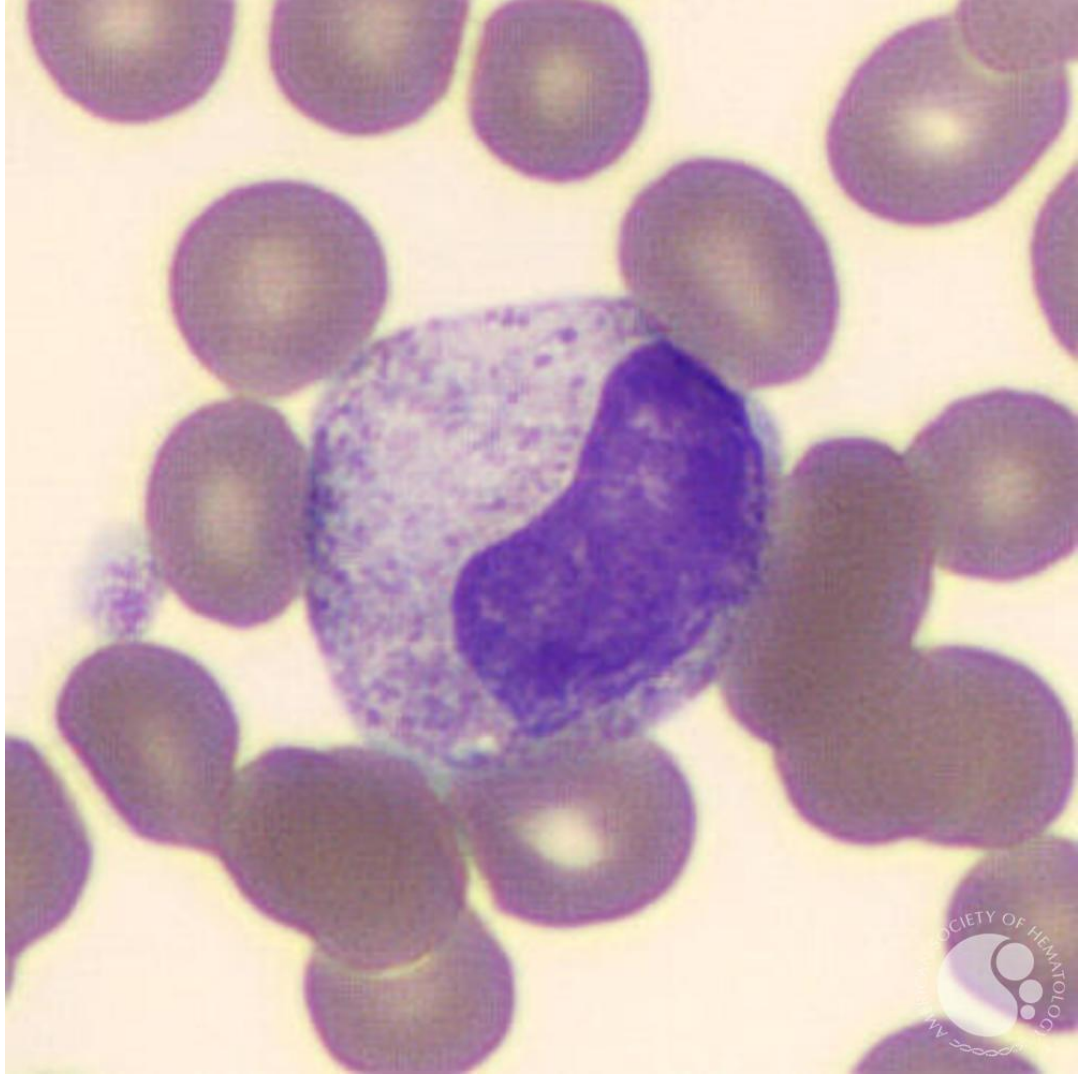

1-11
Myelocyte
100%
1-25
100%
1-26
100%
1-65
100%
2-53
100%
2-81
100%
2-98
100%
3-121
100%
4-3
100%
4-9
100%
4-107
100%
5-15
100%

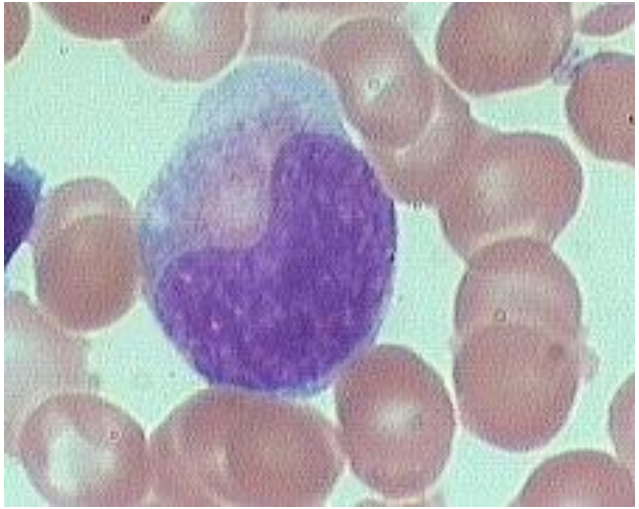

5-78
Myelocyte
100%
6-31
100%
7-15
100%
7-32
100%
7-55
100%
7-66
100%
7-78
100%
7-91
100%
8-69
100%
9-6
100%
12-20
100%
1-7
91%

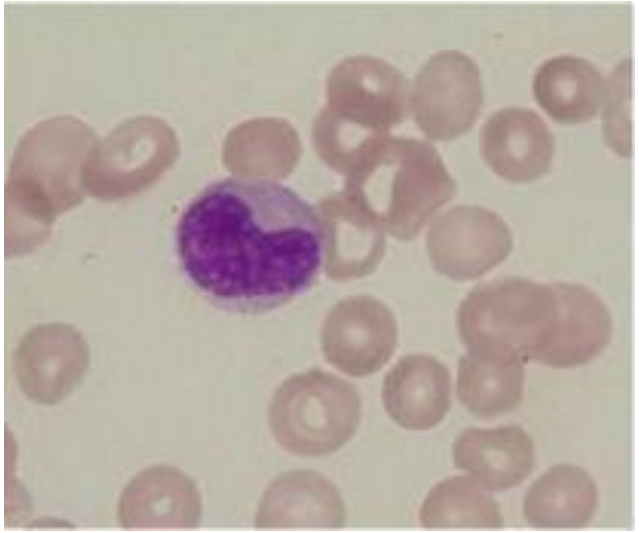

5-20
Eosinophilic myelocyte
100%
9-117
100%
5-22
100%
11-9
100%
5-79
100%
6-117
100%
10-71
91%
4-23
91%
5-68
91%
6-91
91%
6-25
91%
1-100
91%

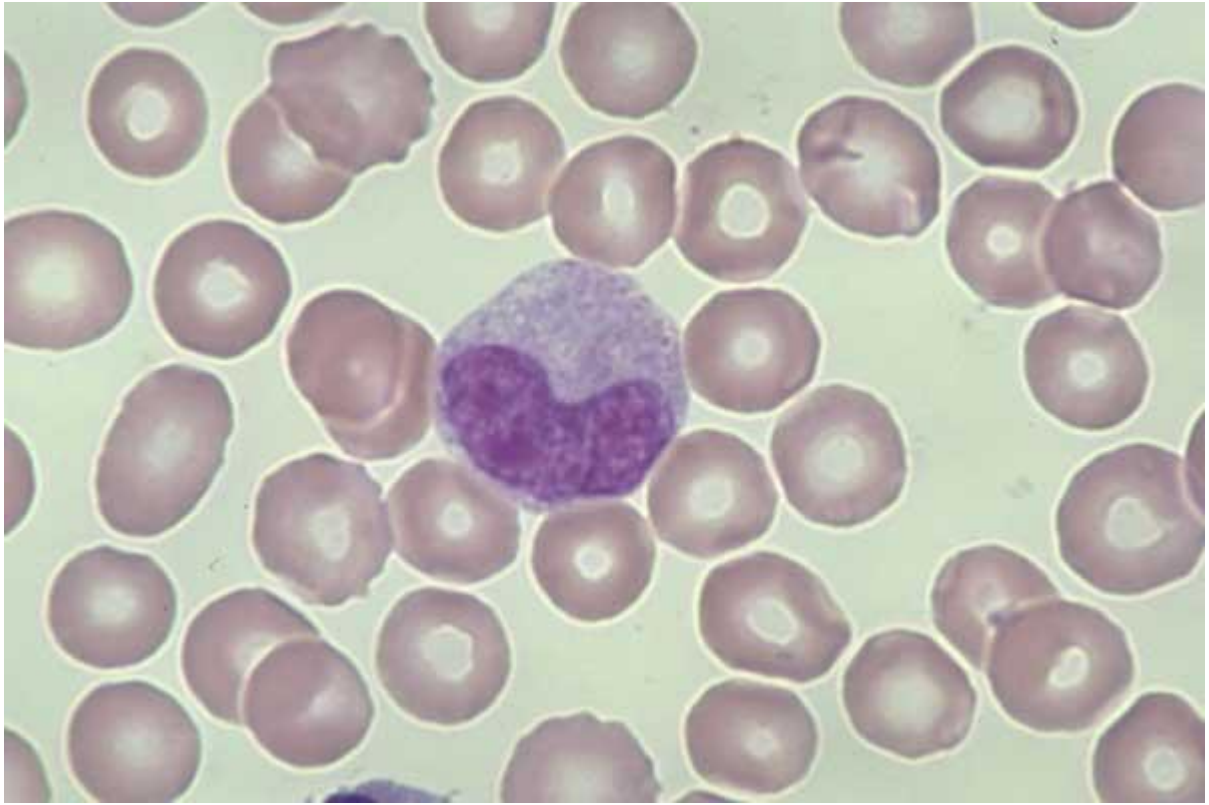
МЕТАМИЕЛОЦИТ

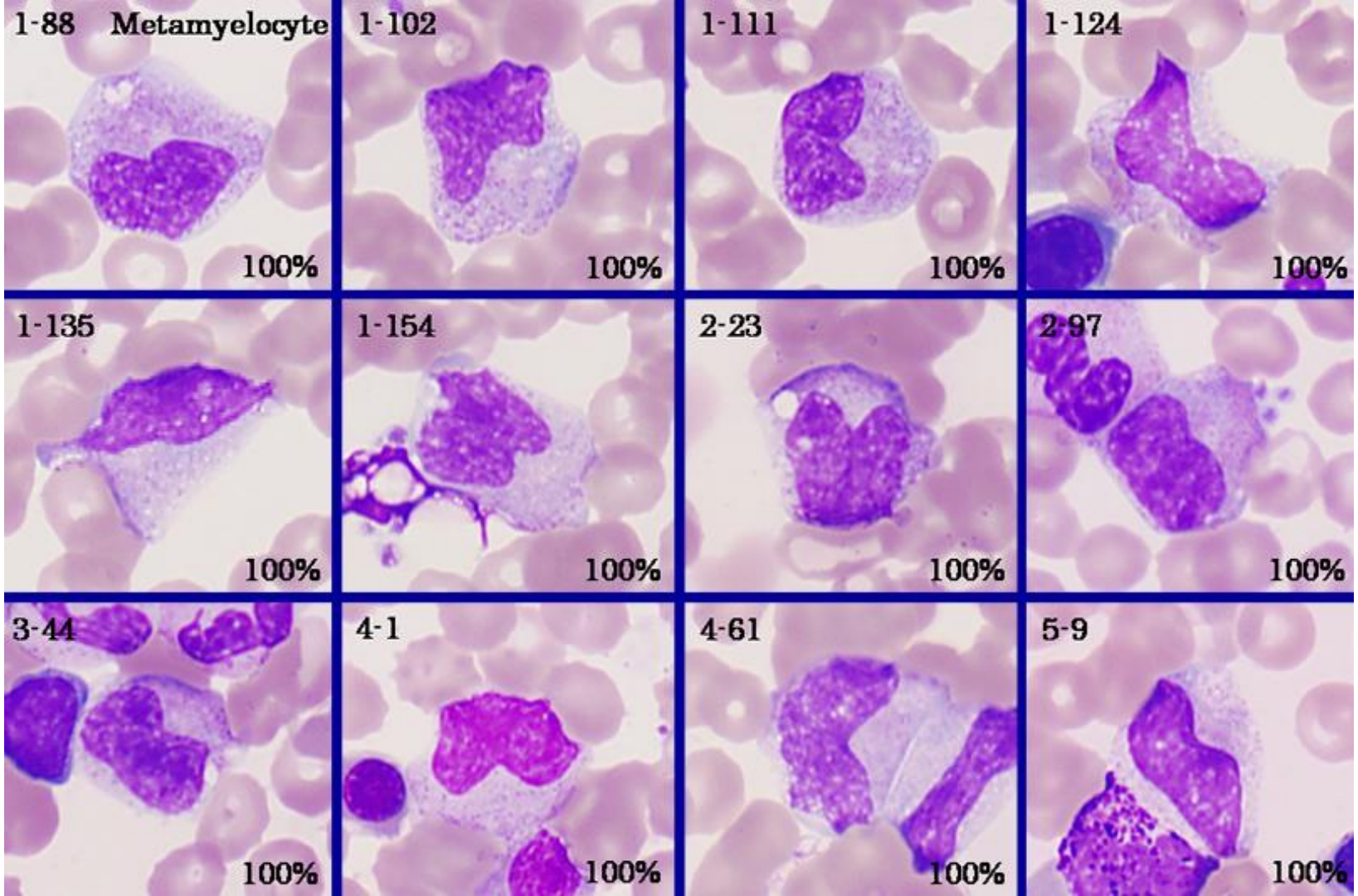


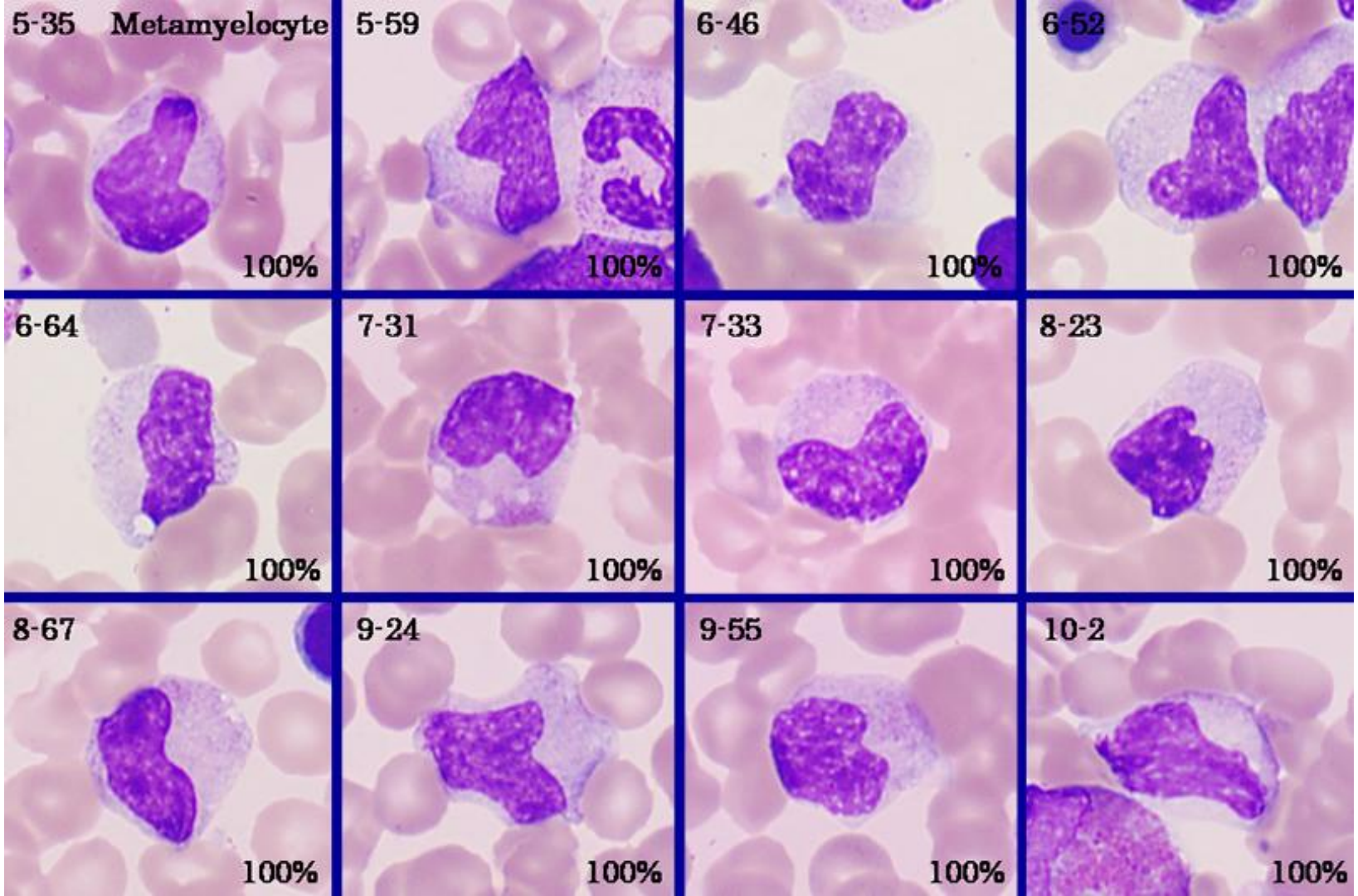

SOCIETY OF HEMATOLOGY

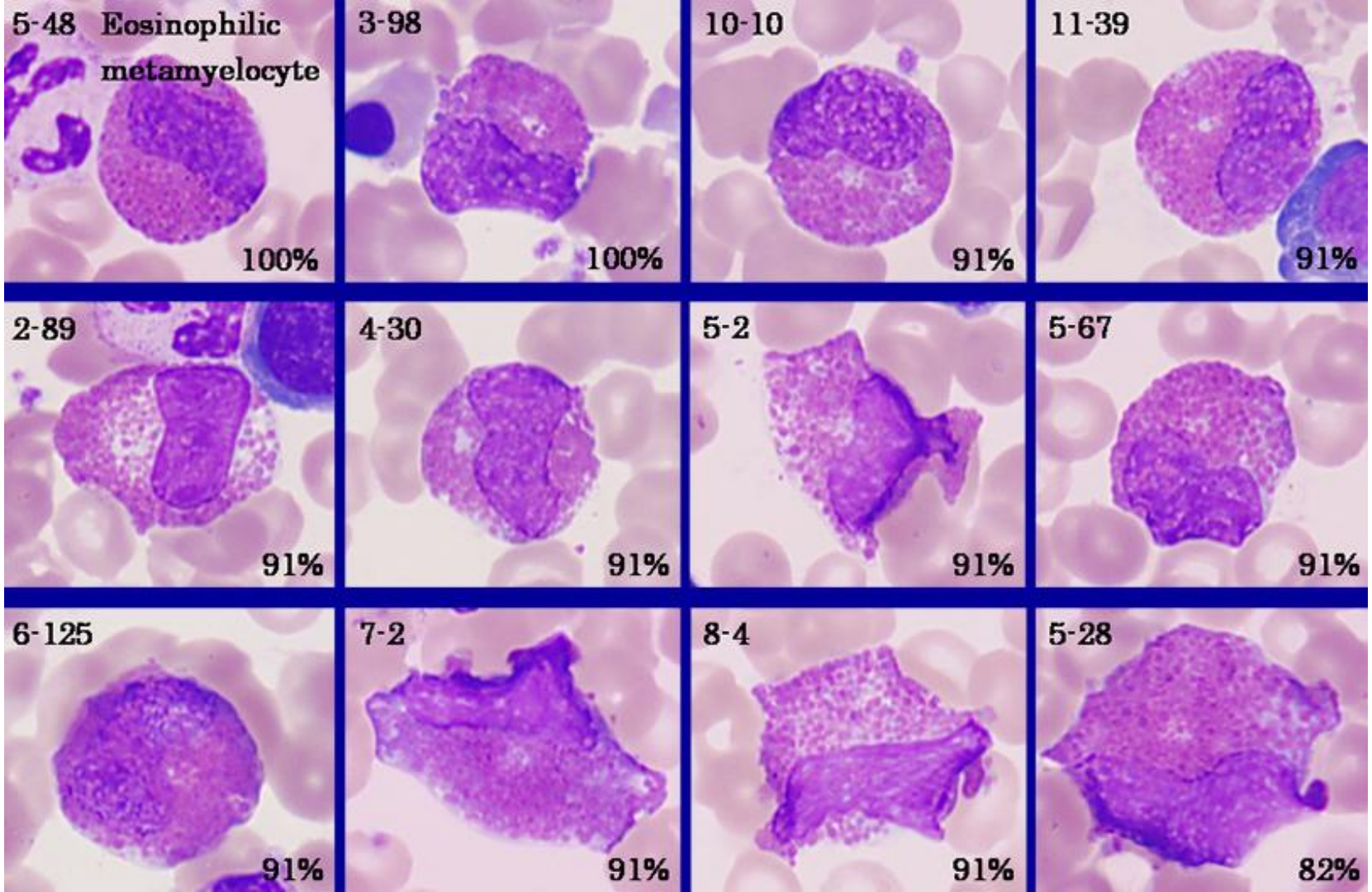


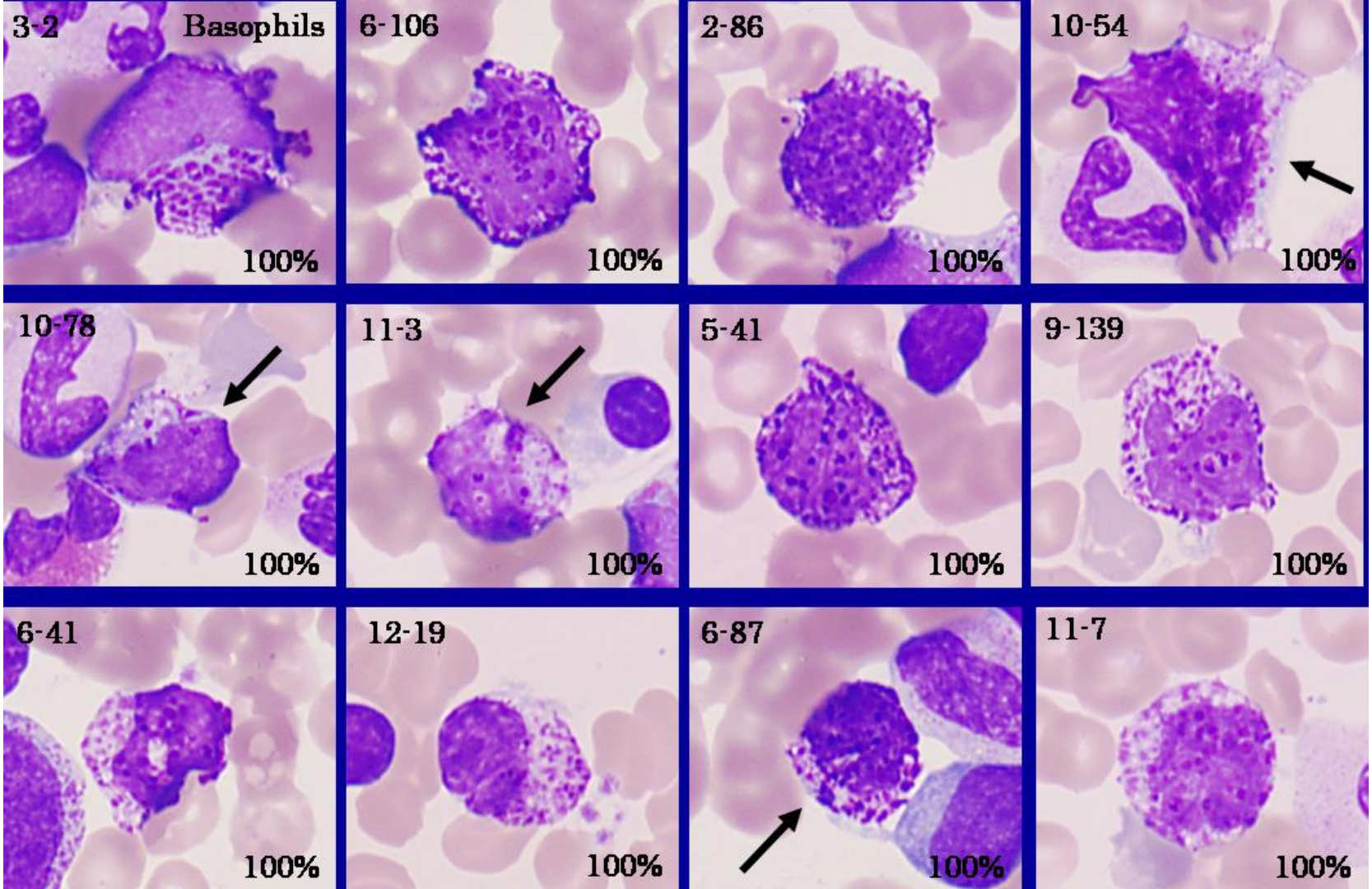


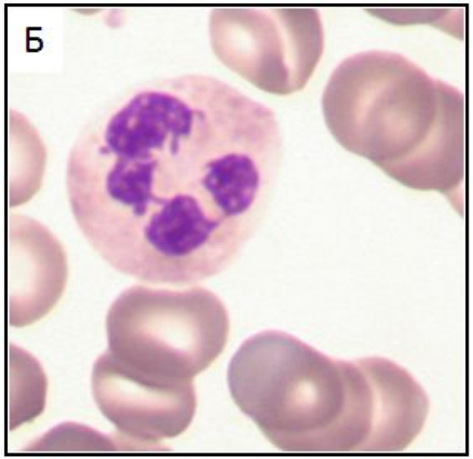



1-88 Metamyelocyte
100%
1-102
100%
1-111
100%
1-124
100%
1-135
100%
1-154
100%
2-23
100%
2-97
100%
3-44
100%
4-1
100%
4-61
100%
5-9
100%


5-35 Metamyelocyte
100%
5-59
100%
6-46
100%
6-52
100%
6-64
100%
7-31
100%
7-33
100%
8-23
100%
8-67
100%
9-24
100%
9-55
100%
10-2
100%

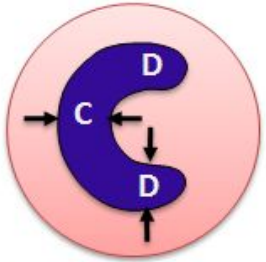

5-48 Eosinophilic metamyelocyte
100%
3-98
100%
10-10
91%
11-39
91%
2-89
91%
4-30
91%
5-2
91%
5-67
91%
6-125
91%
7-2
91%
8-4
91%
5-28
82%


3-2
Basophils
100%
6-106
100%
2-86
100%
10-54
100%
10-78
100%
11-3
100%
5-41
100%
9-139
100%
6-41
100%
12-19
100%
6-87
100%
11-7
100%



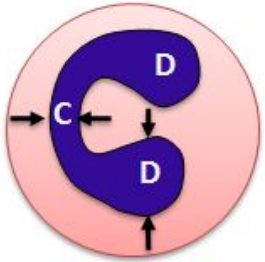
В

Палочкоядерный гранулоцит

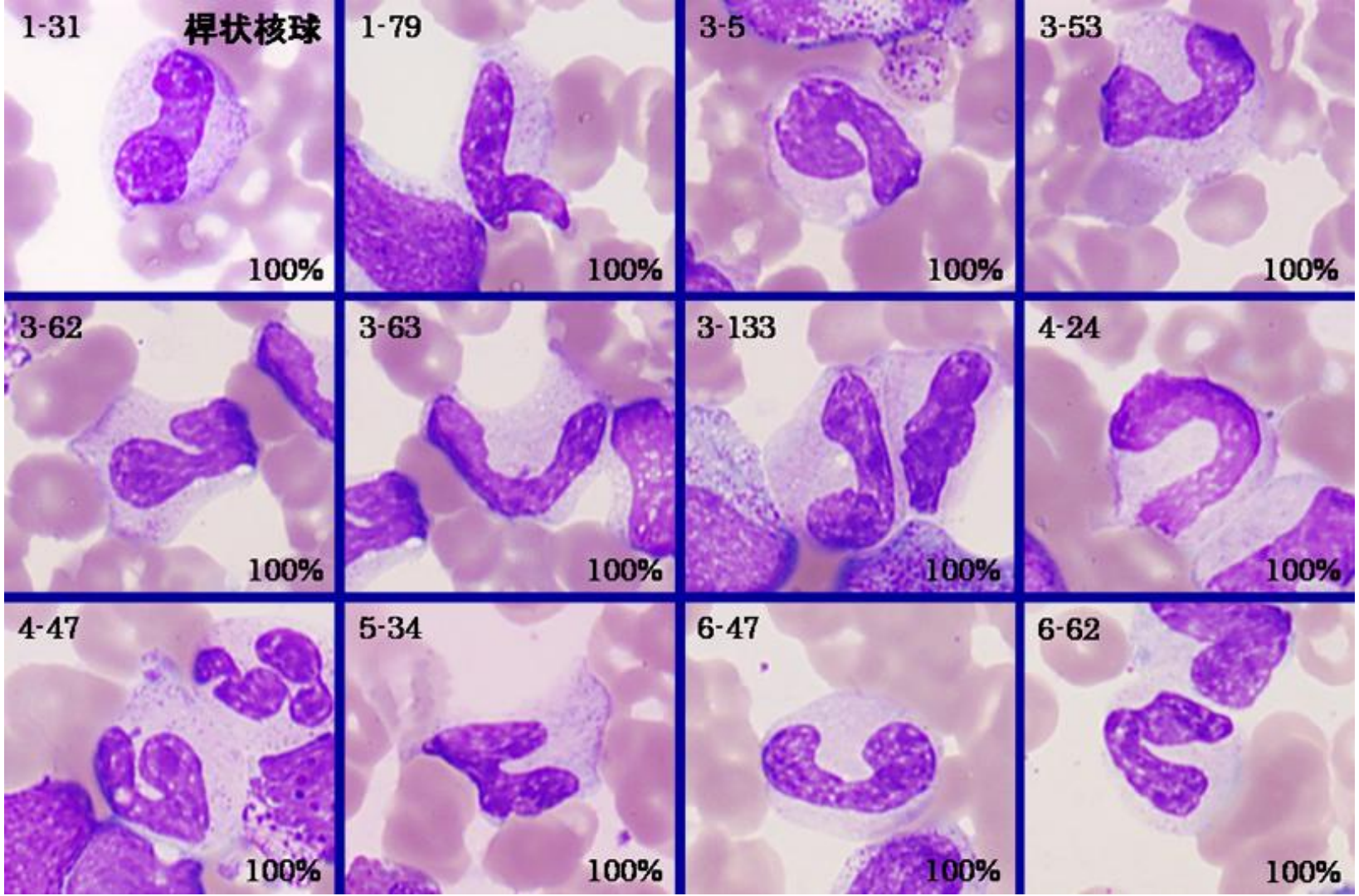


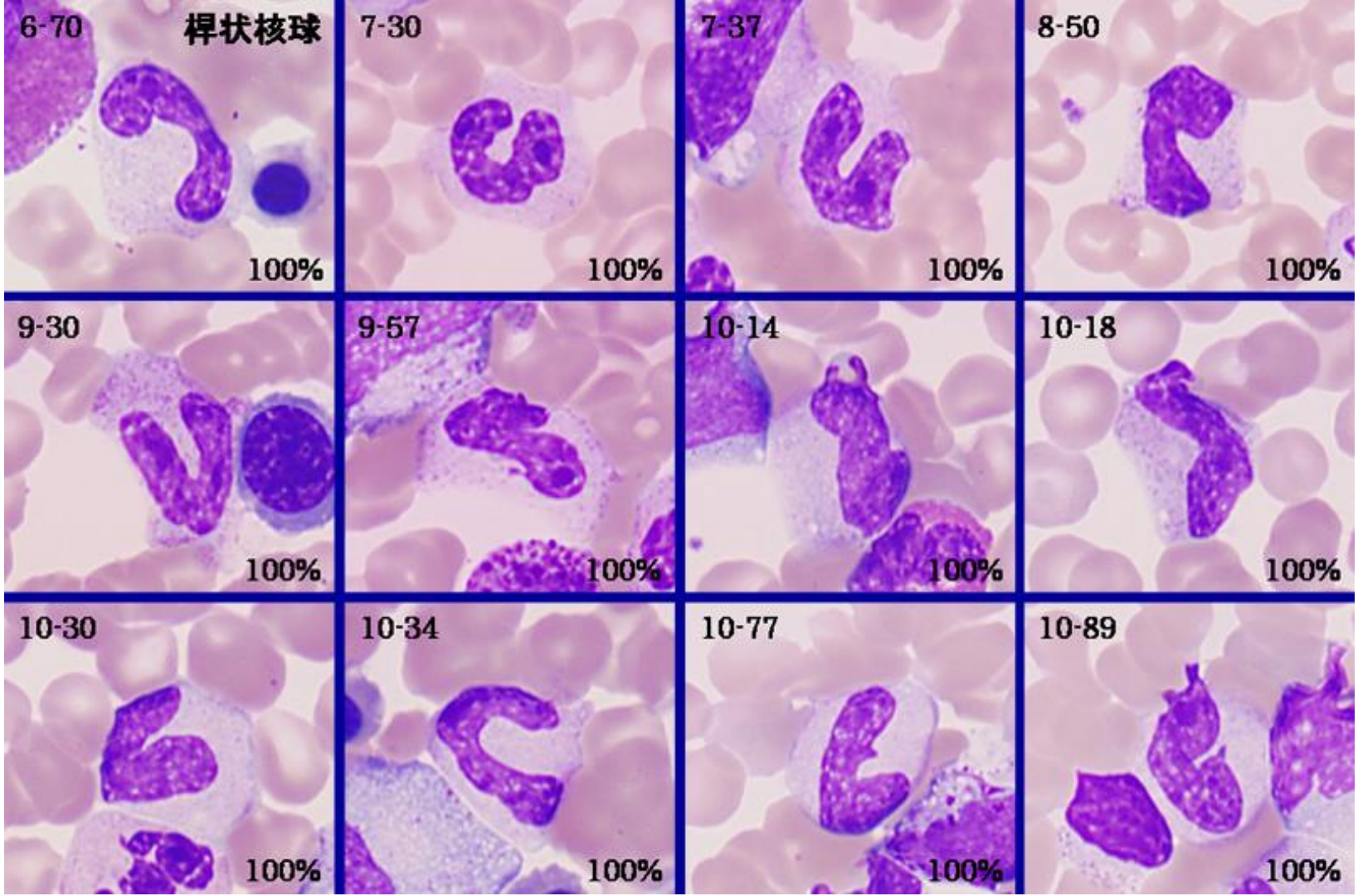
Для палочкоядерного гранулоцита характерно:
$C \geq \frac{1}{3} D$

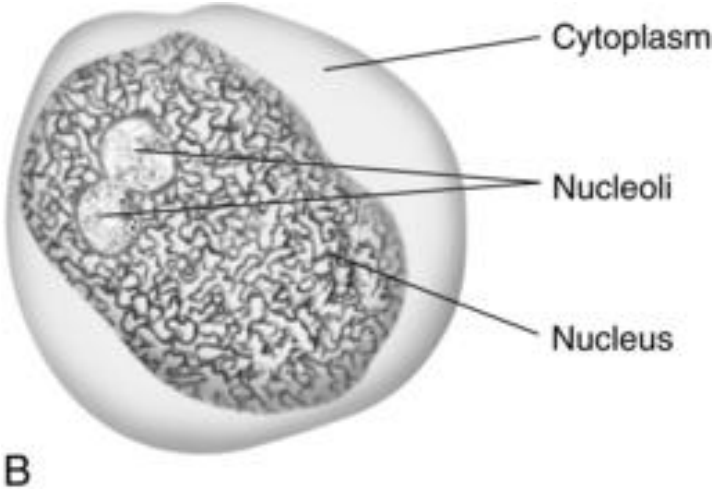
Сегментоядерный гранулоцит



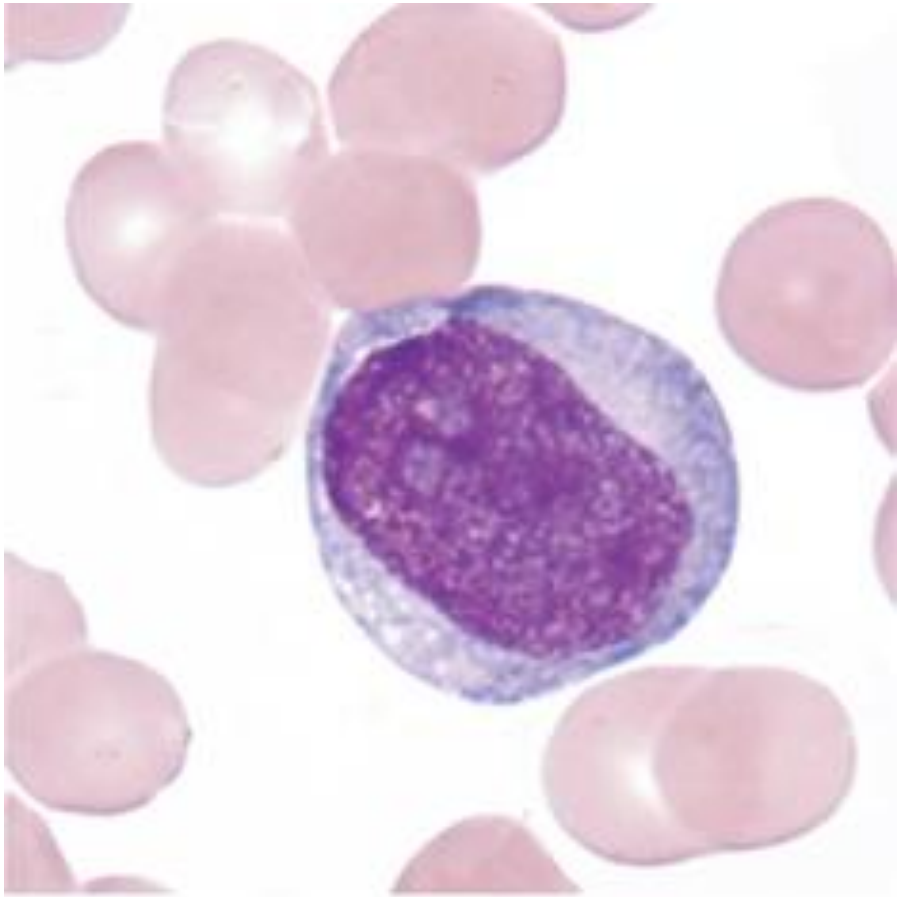
Для сегментоядерного гранулоцита характерно:
$C < \frac{1}{3} D$


1-31
桿状核球
100%
1-79
100%
3-5
100%
3-53
100%
3-62
100%
3-63
100%
3-133
100%
4-24
100%
4-47
100%
5-34
100%
6-47
100%
6-62
100%

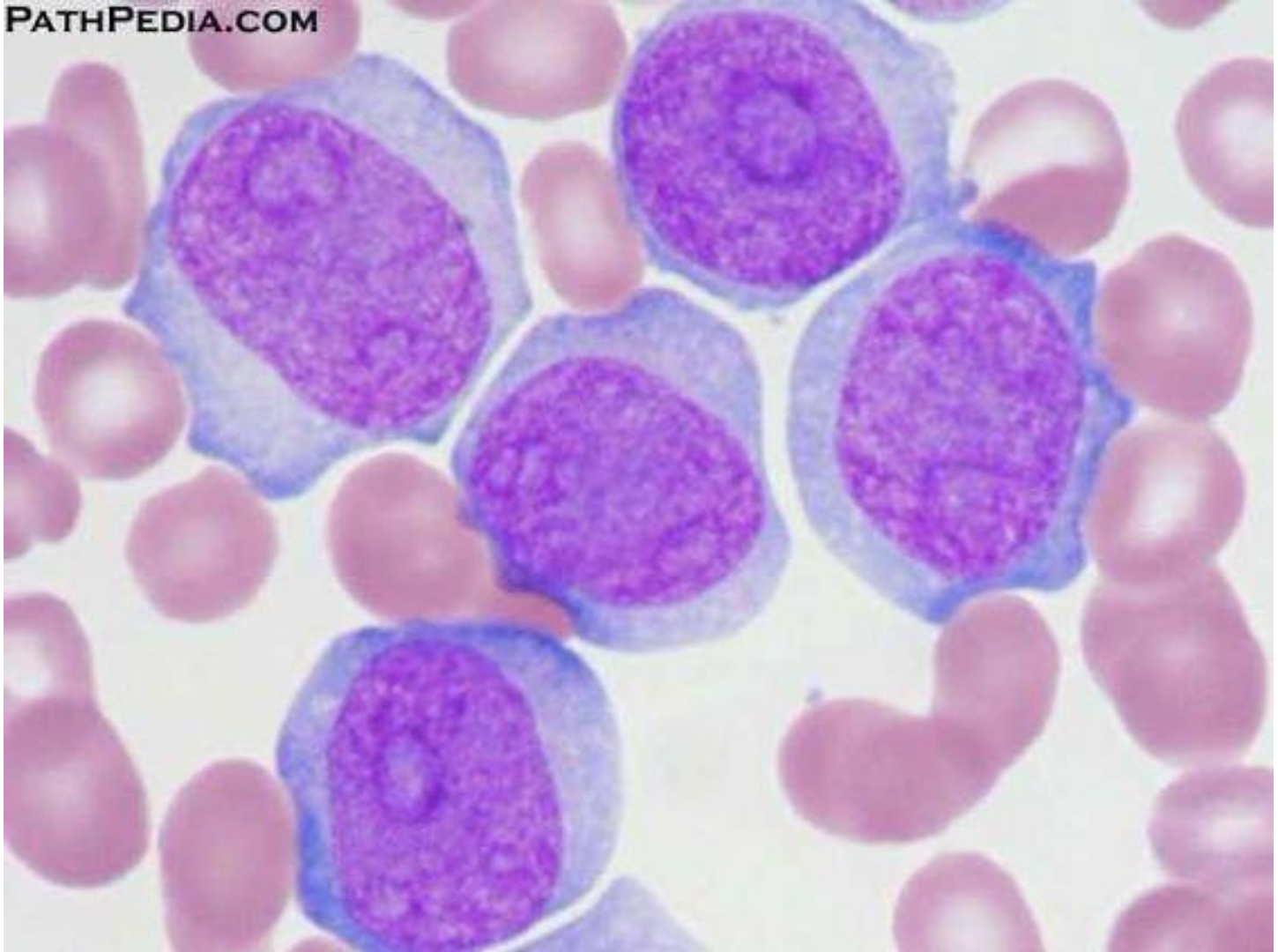

6-70
桿状核球
100%
7-30
100%
7-37
100%
8-50
100%
9-30
100%
9-57
100%
10-14
100%
10-18
100%
10-30
100%
10-34
100%
10-77
100%
10-89
100%

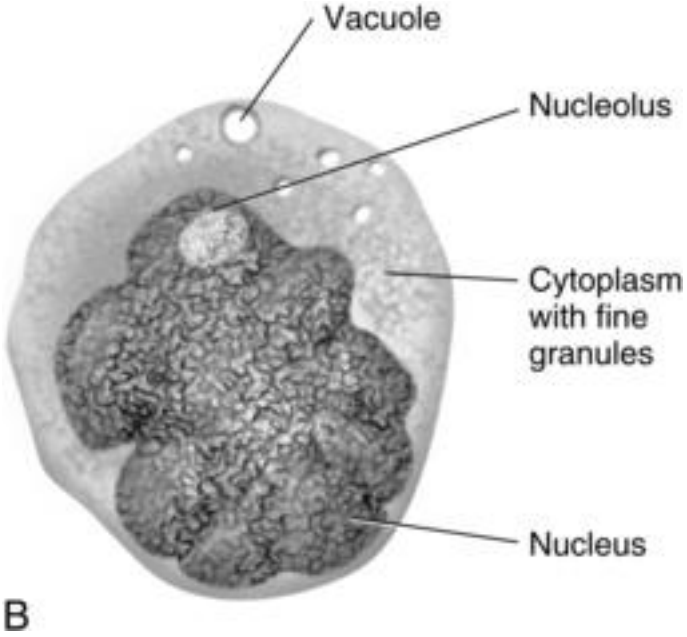


МОНОБЛАСТ

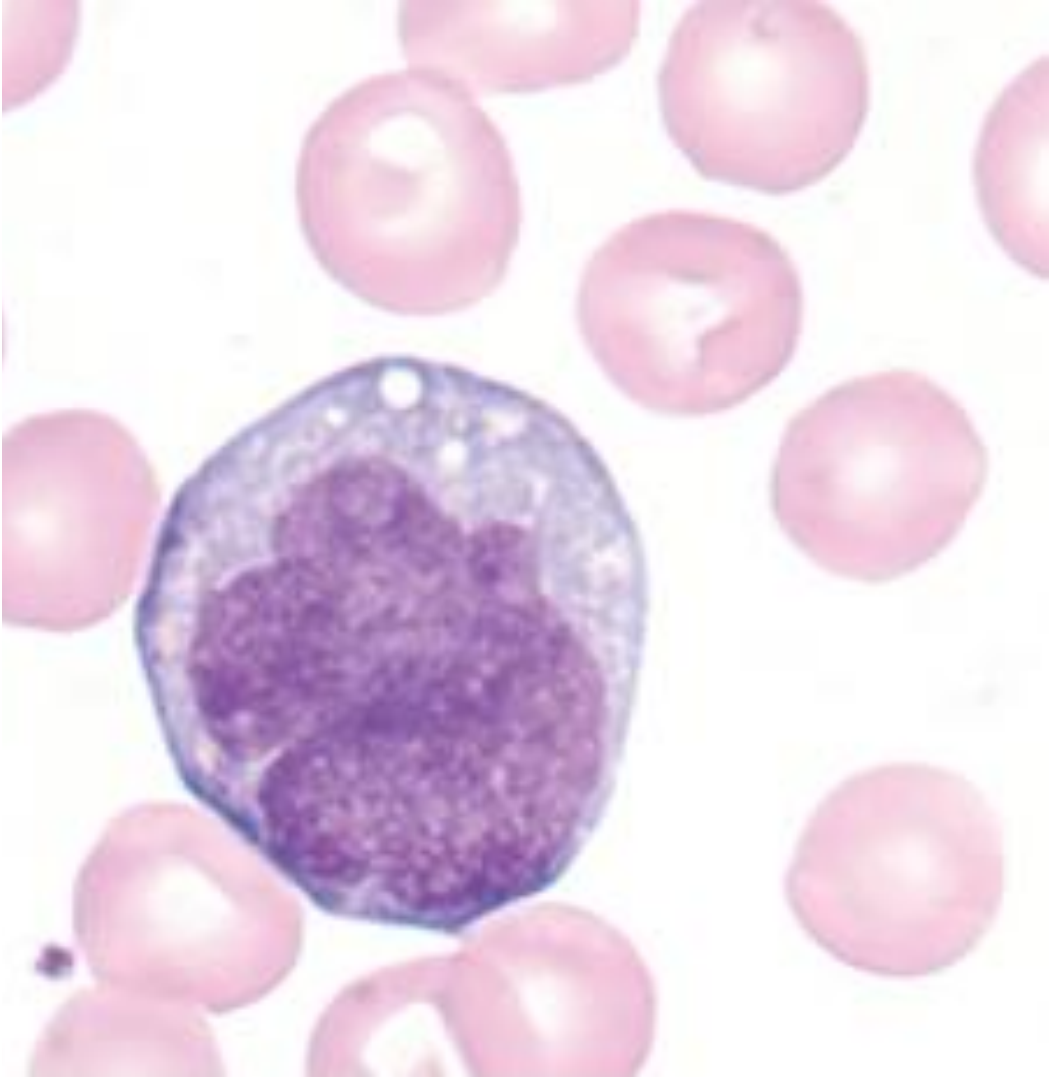


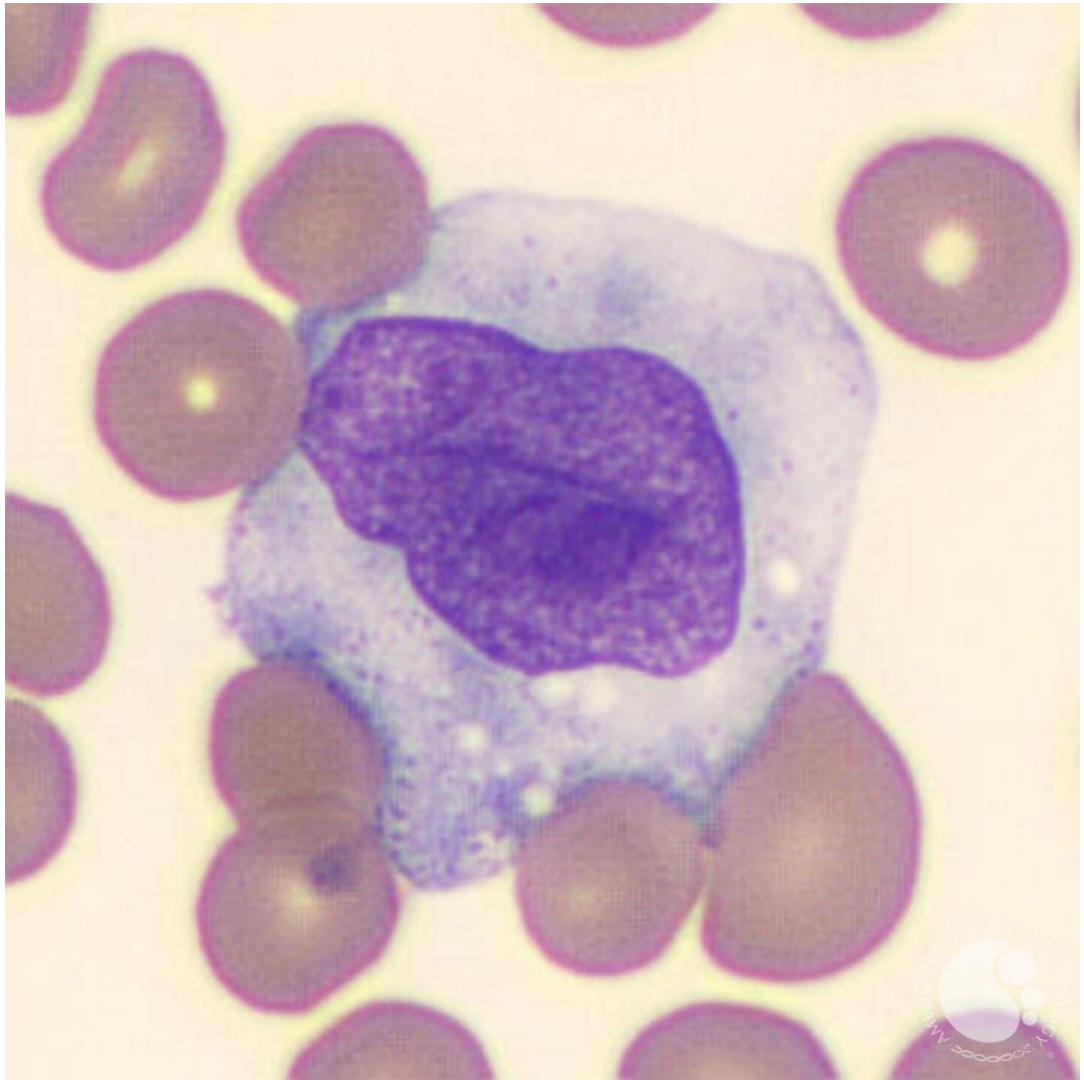
A

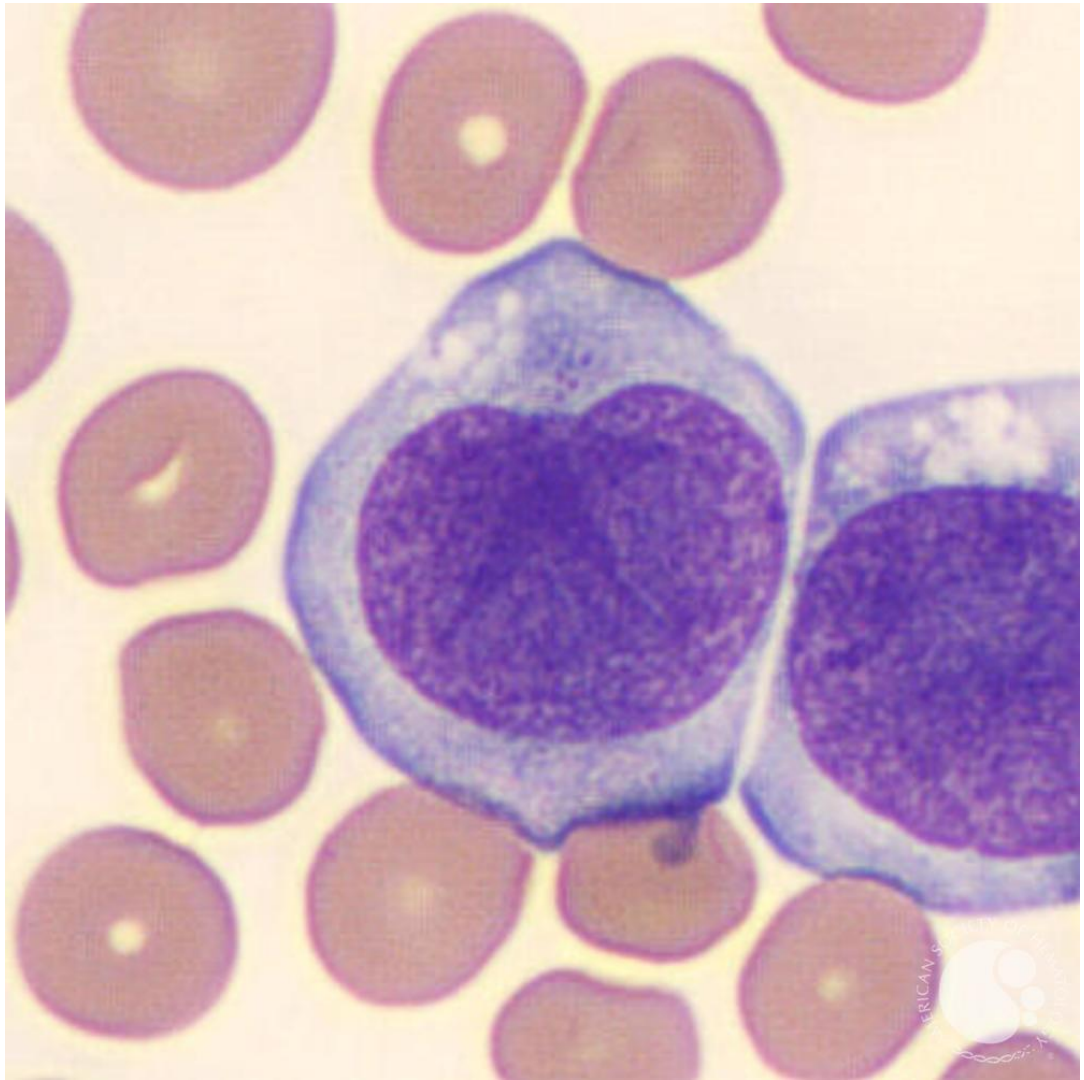

PATHPEDIA.COM

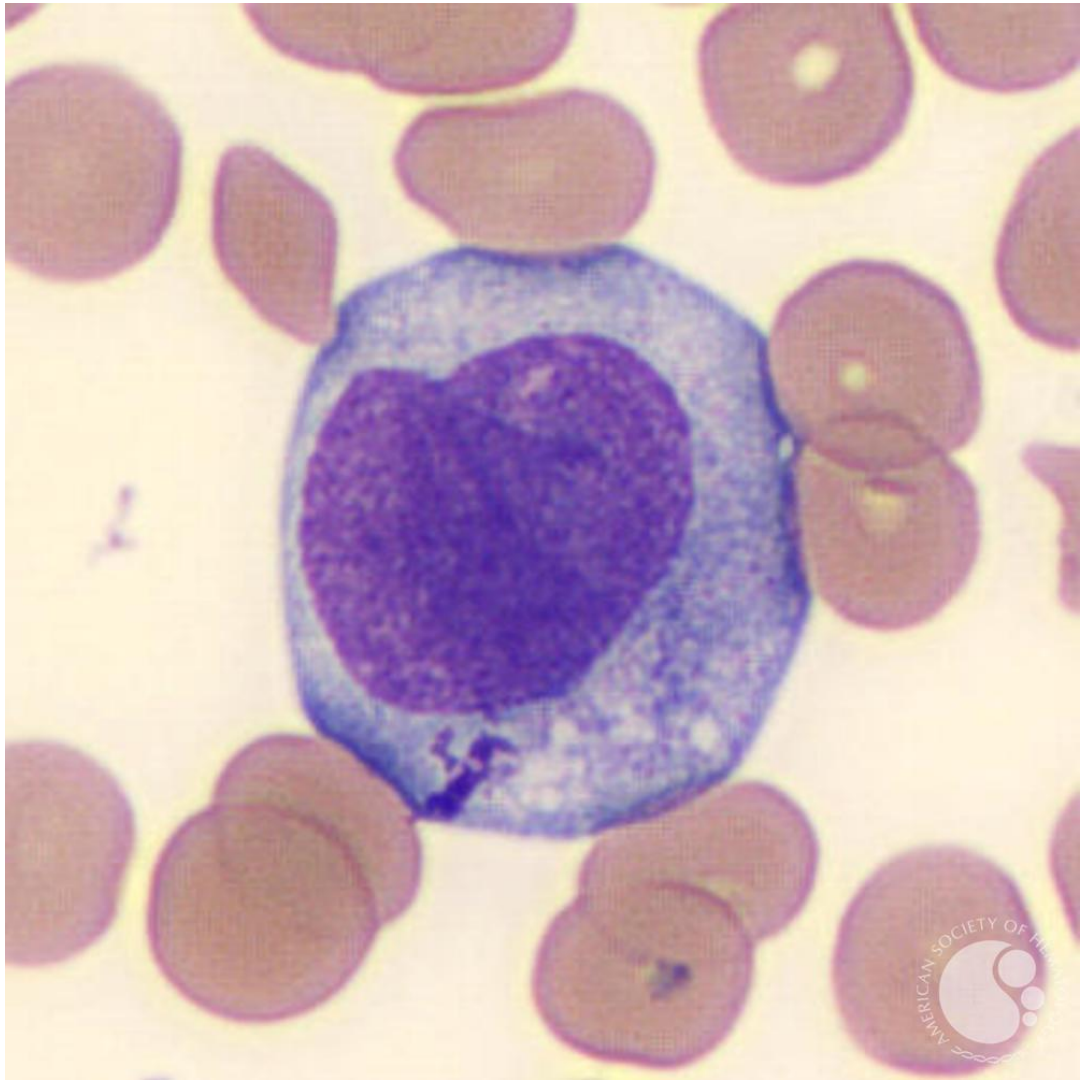


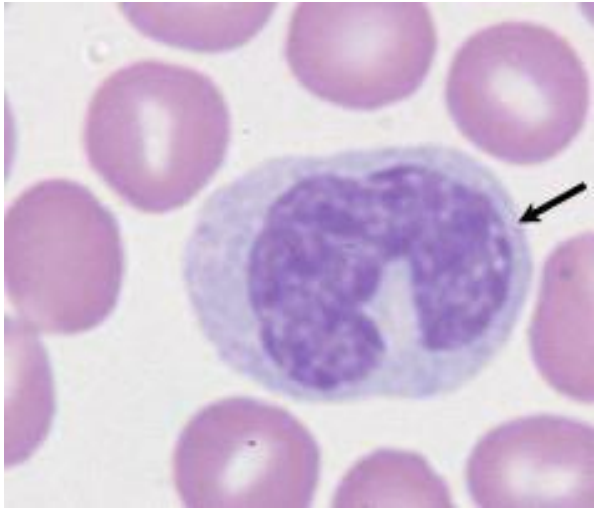
ПРОМОНОЦИТ

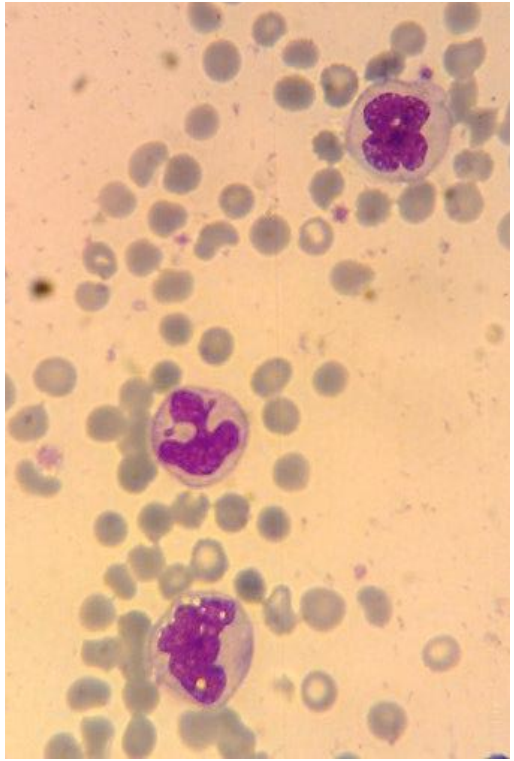




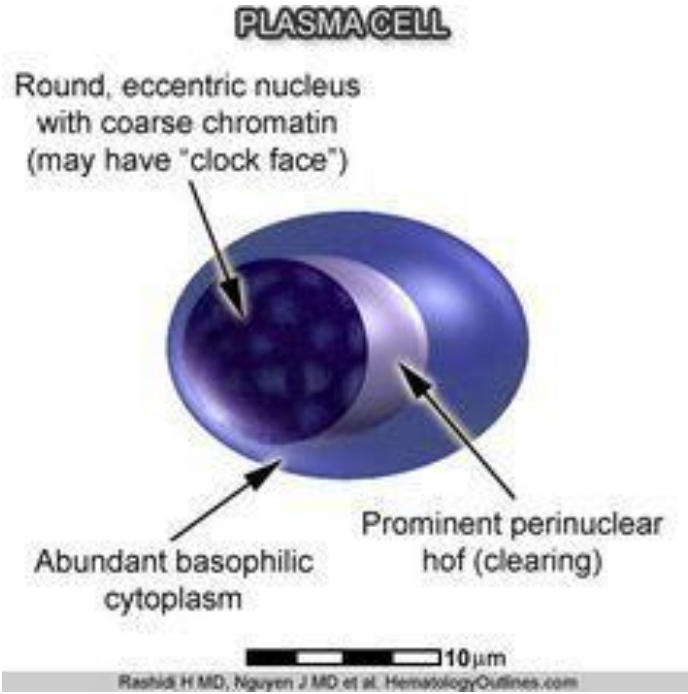



AMERICAN SOCIETY OF



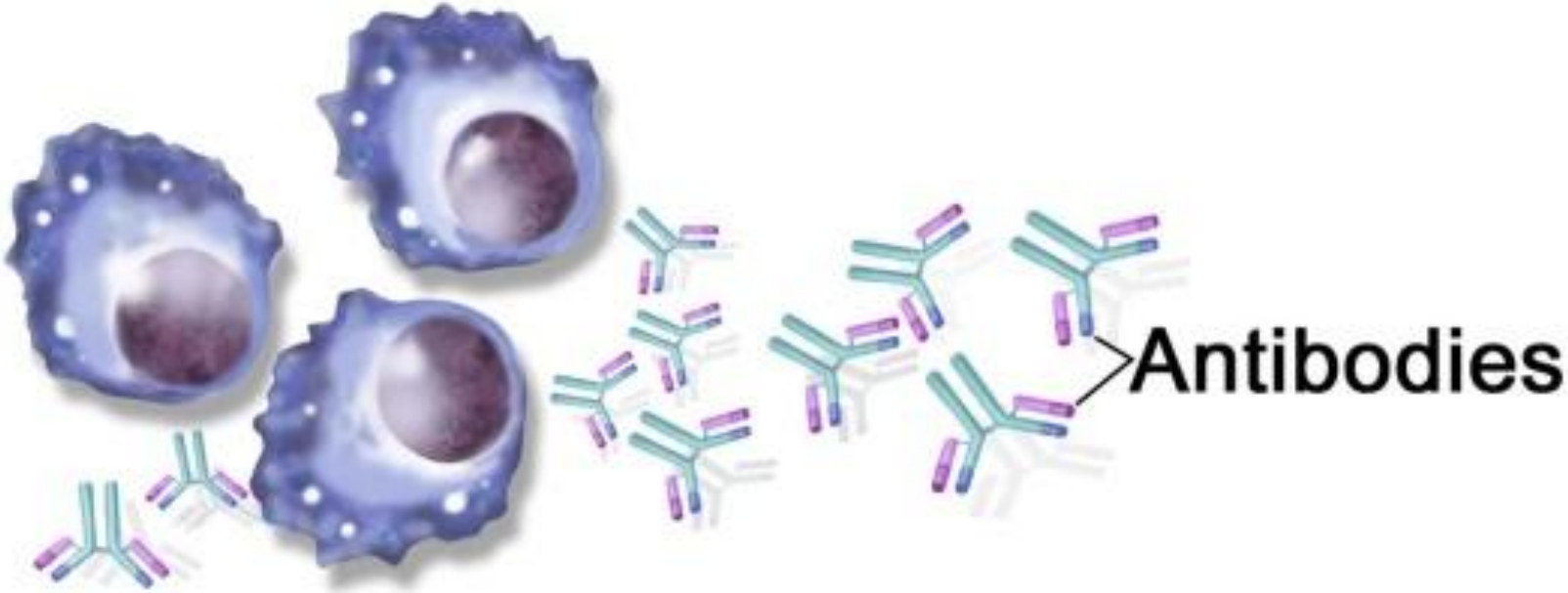


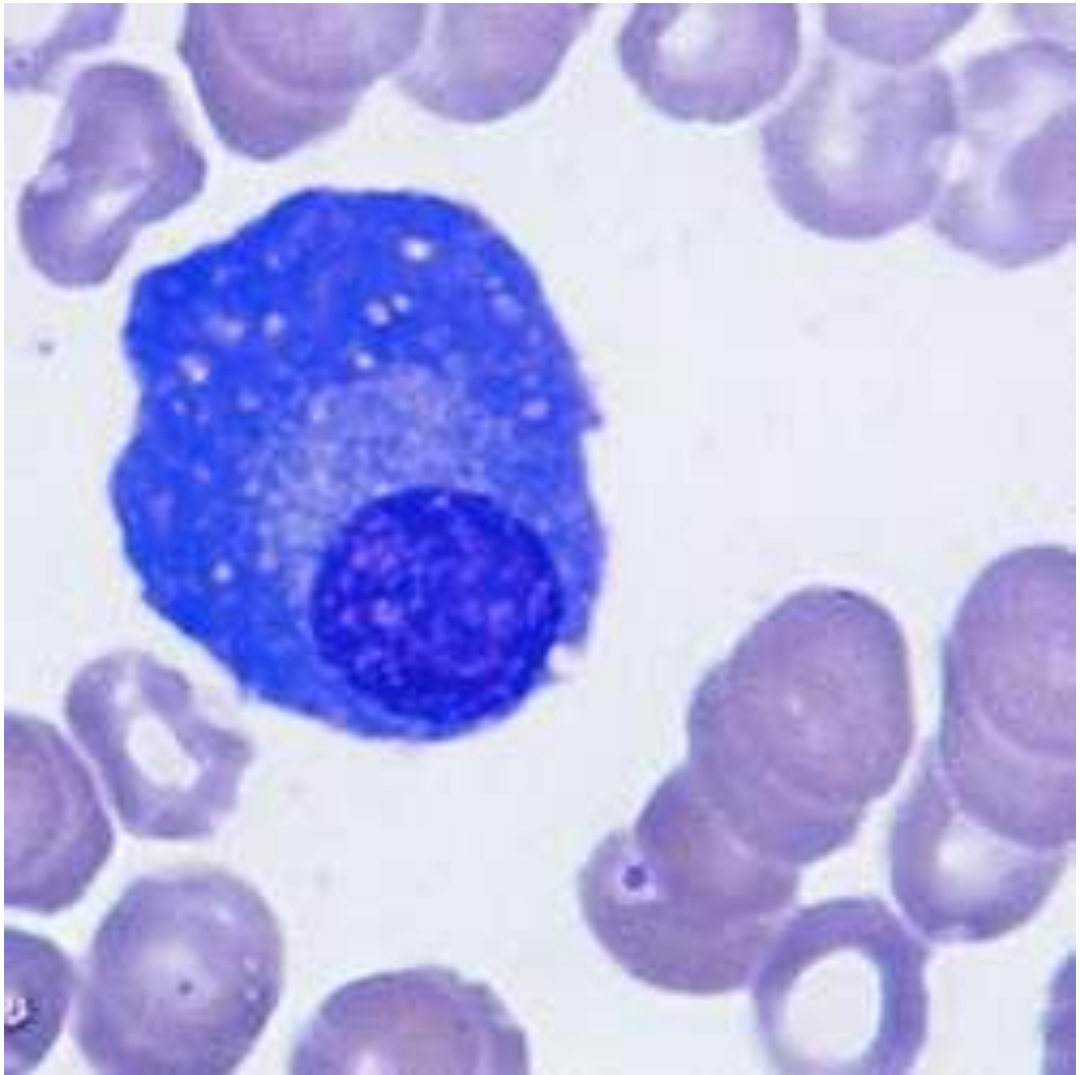
Моноциты

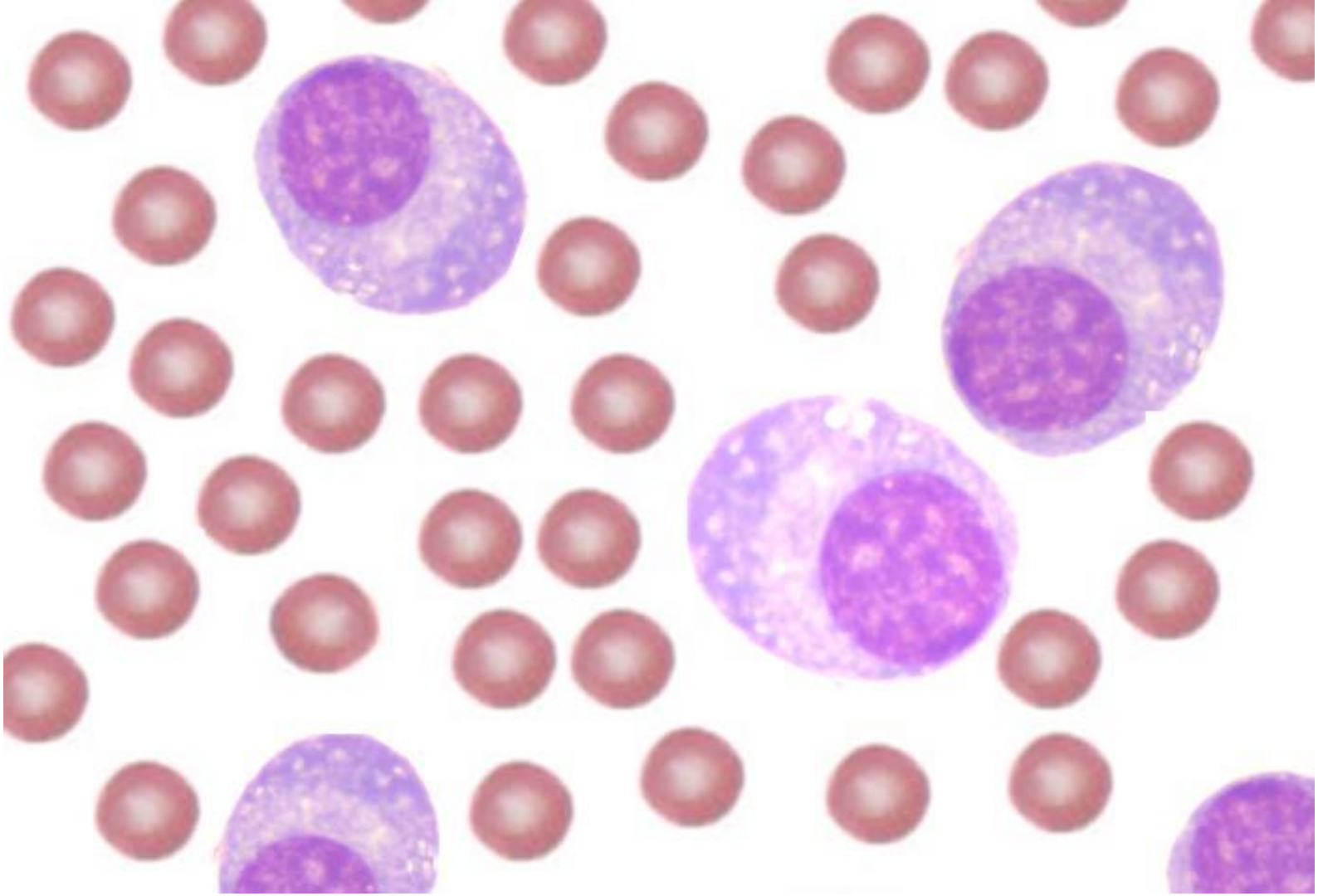


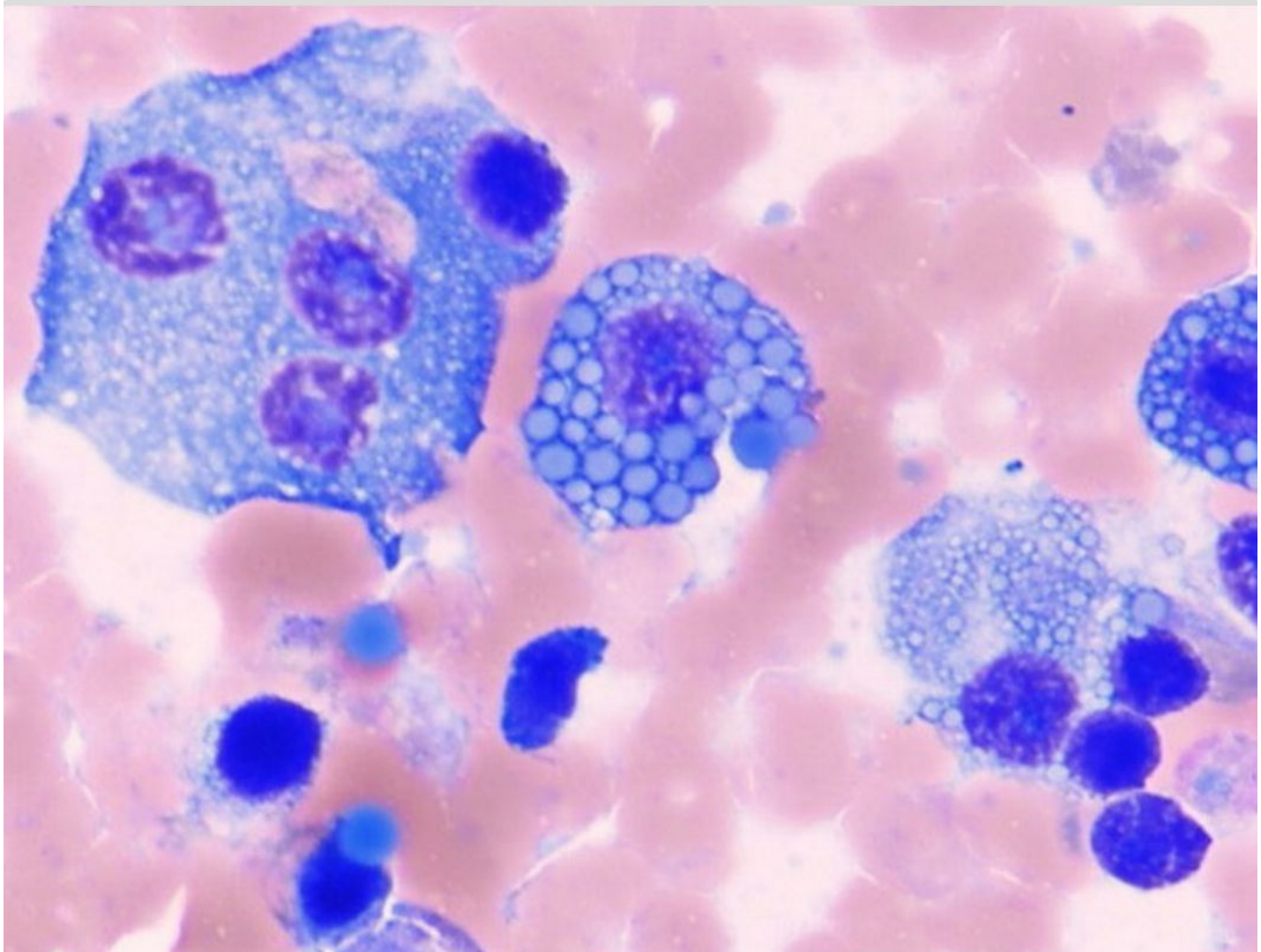
ПЛАЗМАТИЧЕСКАЯ КЛЕТКА

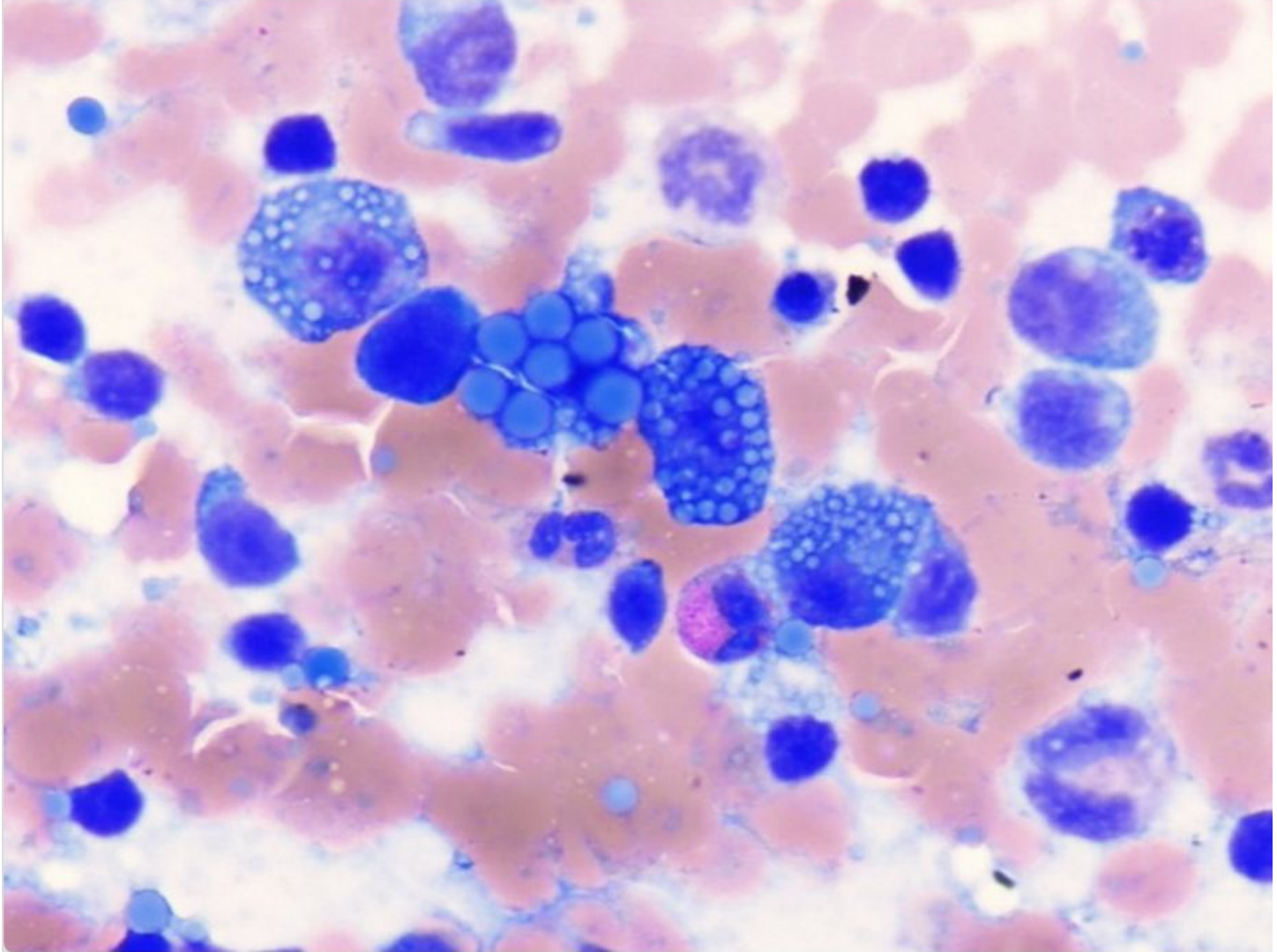
Normal plasma cells

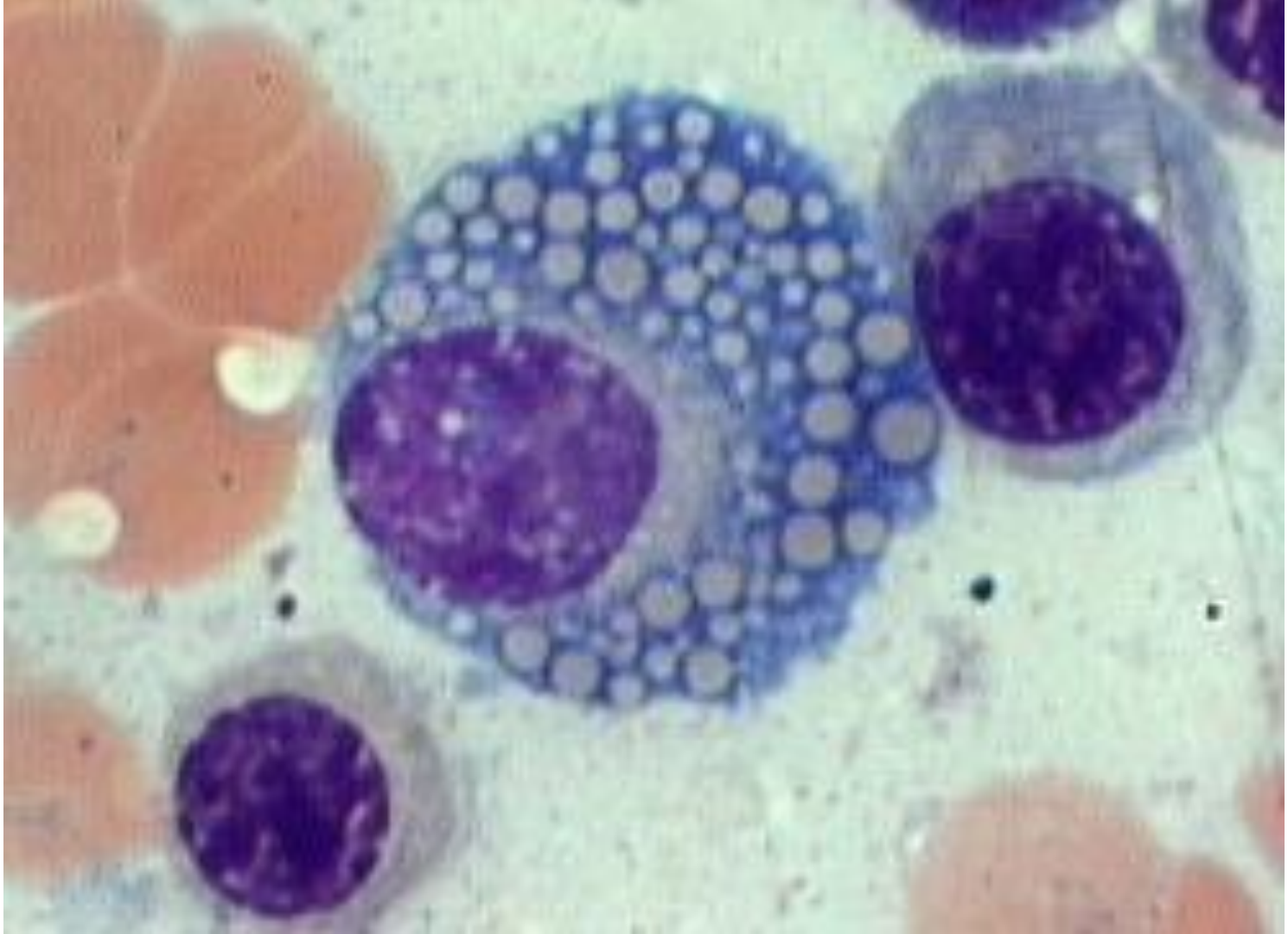


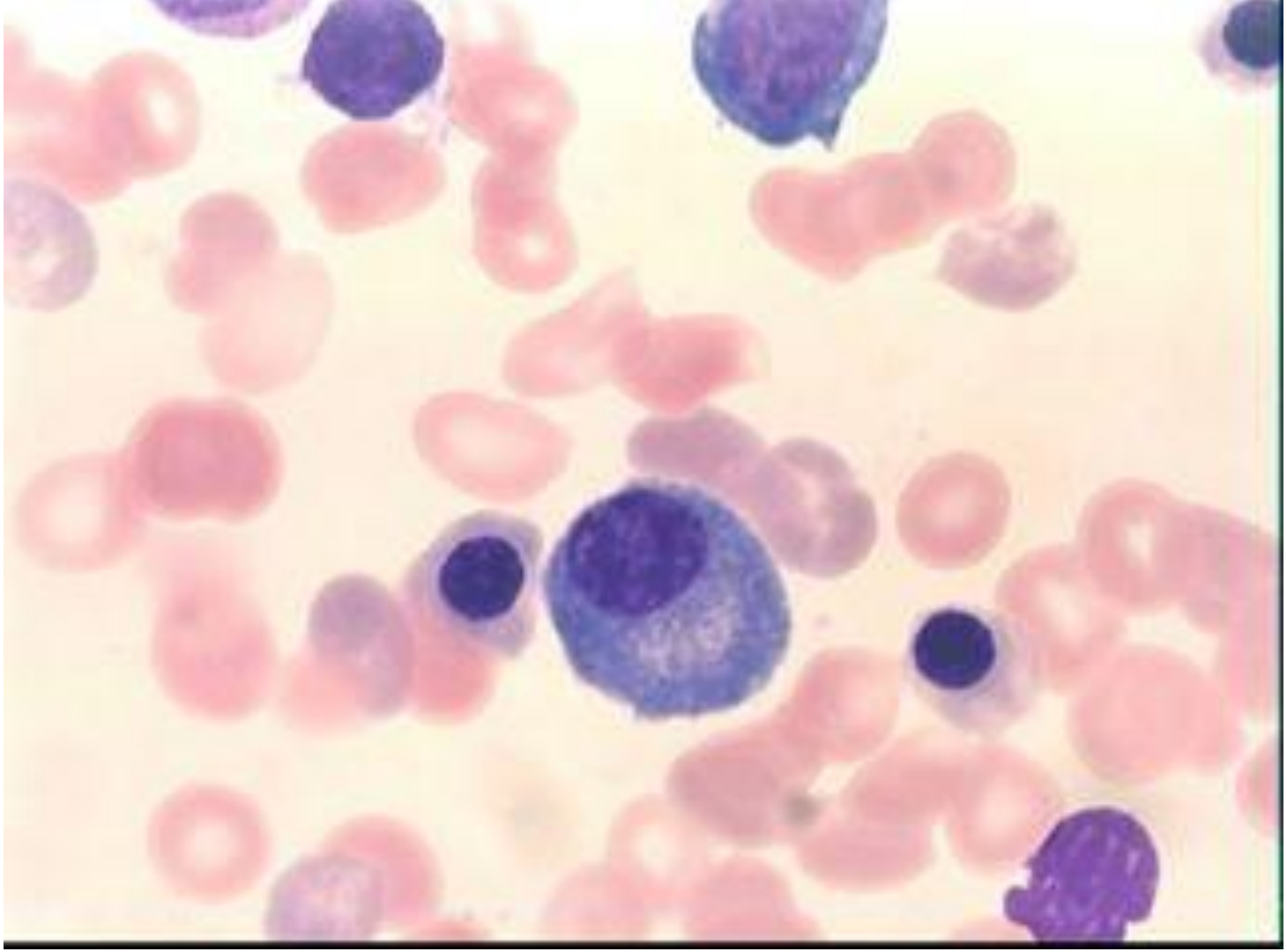


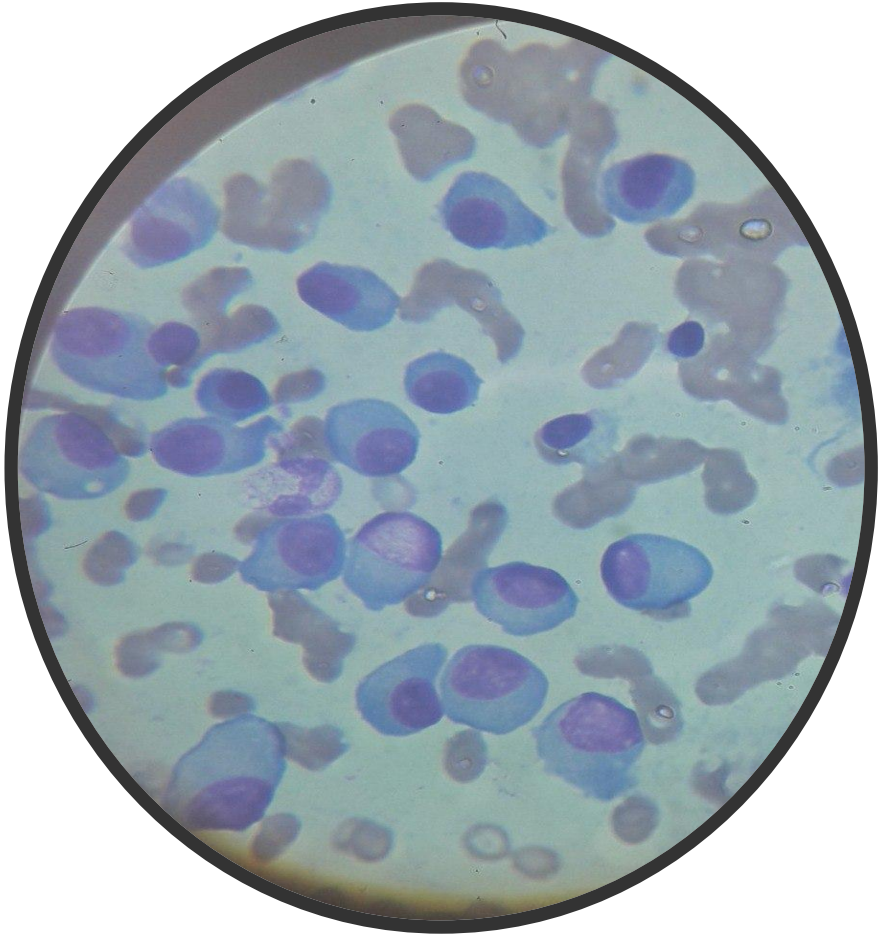


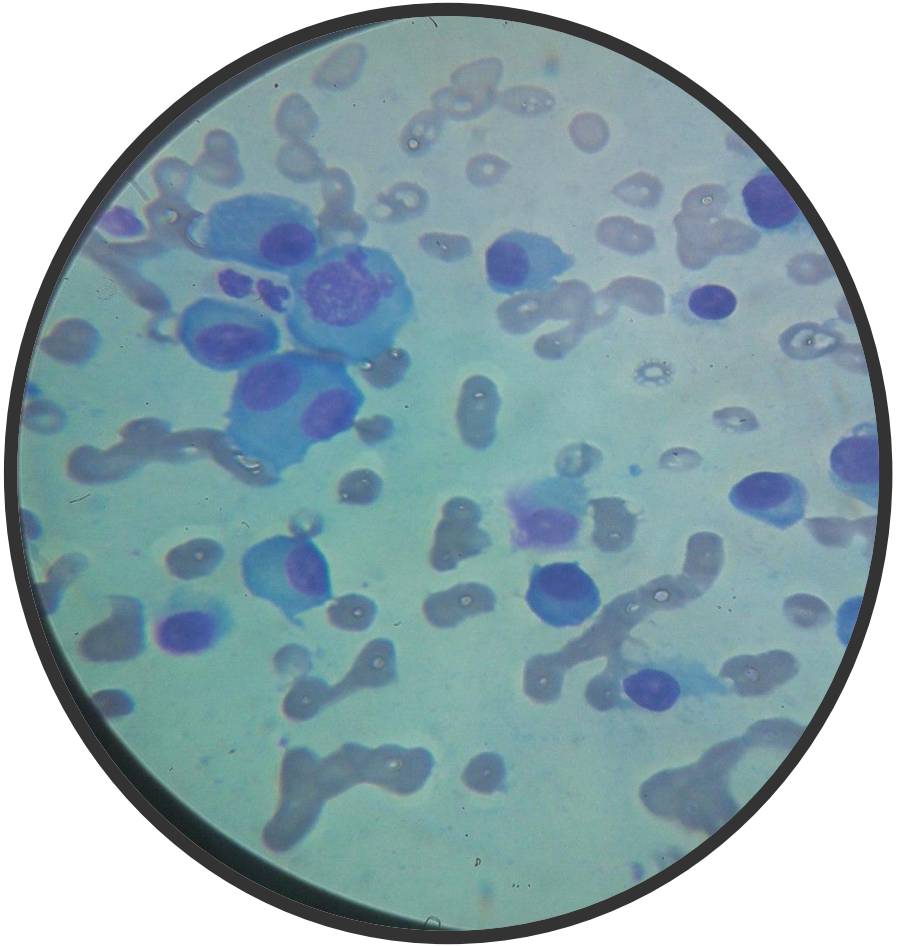
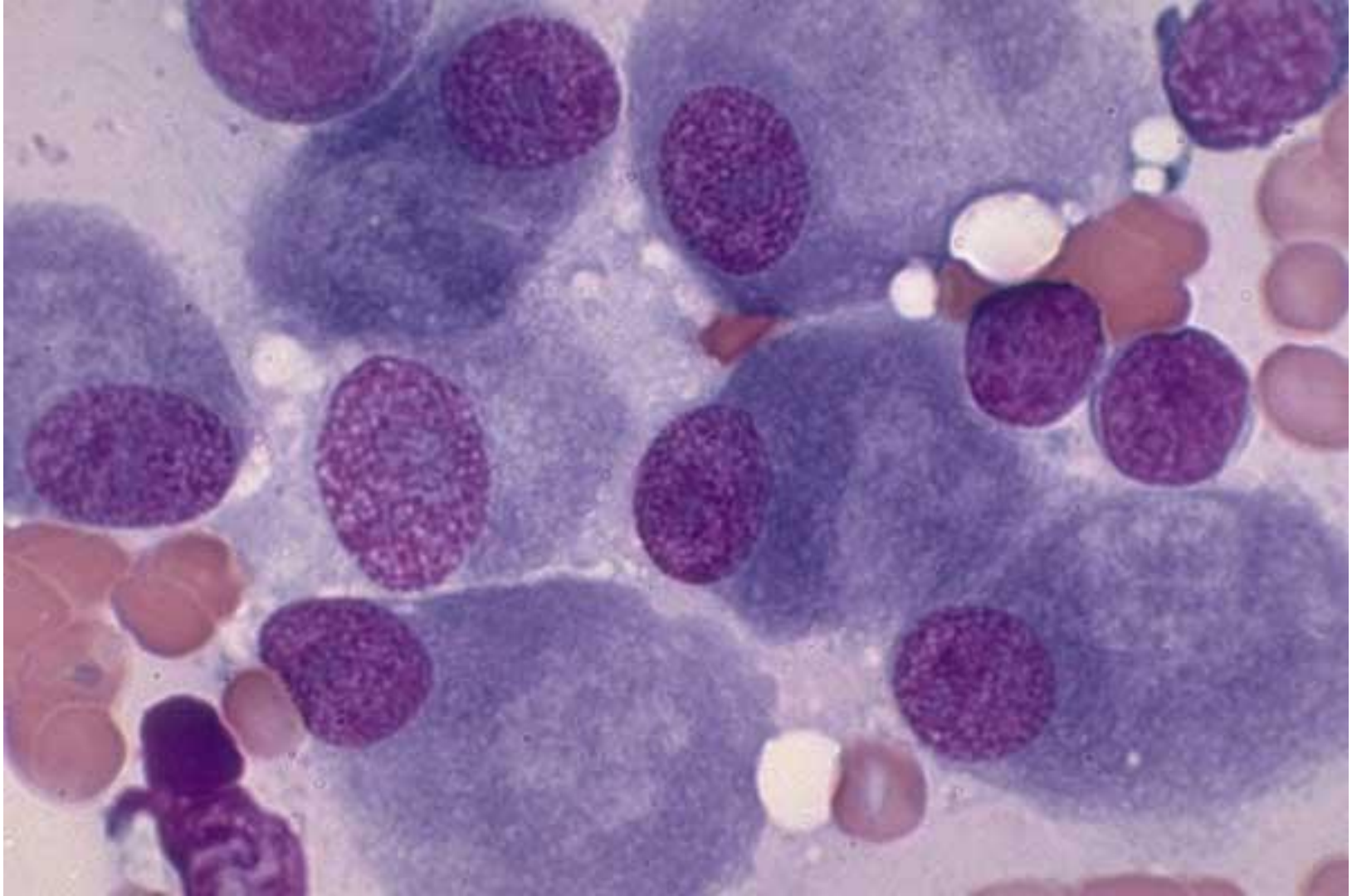
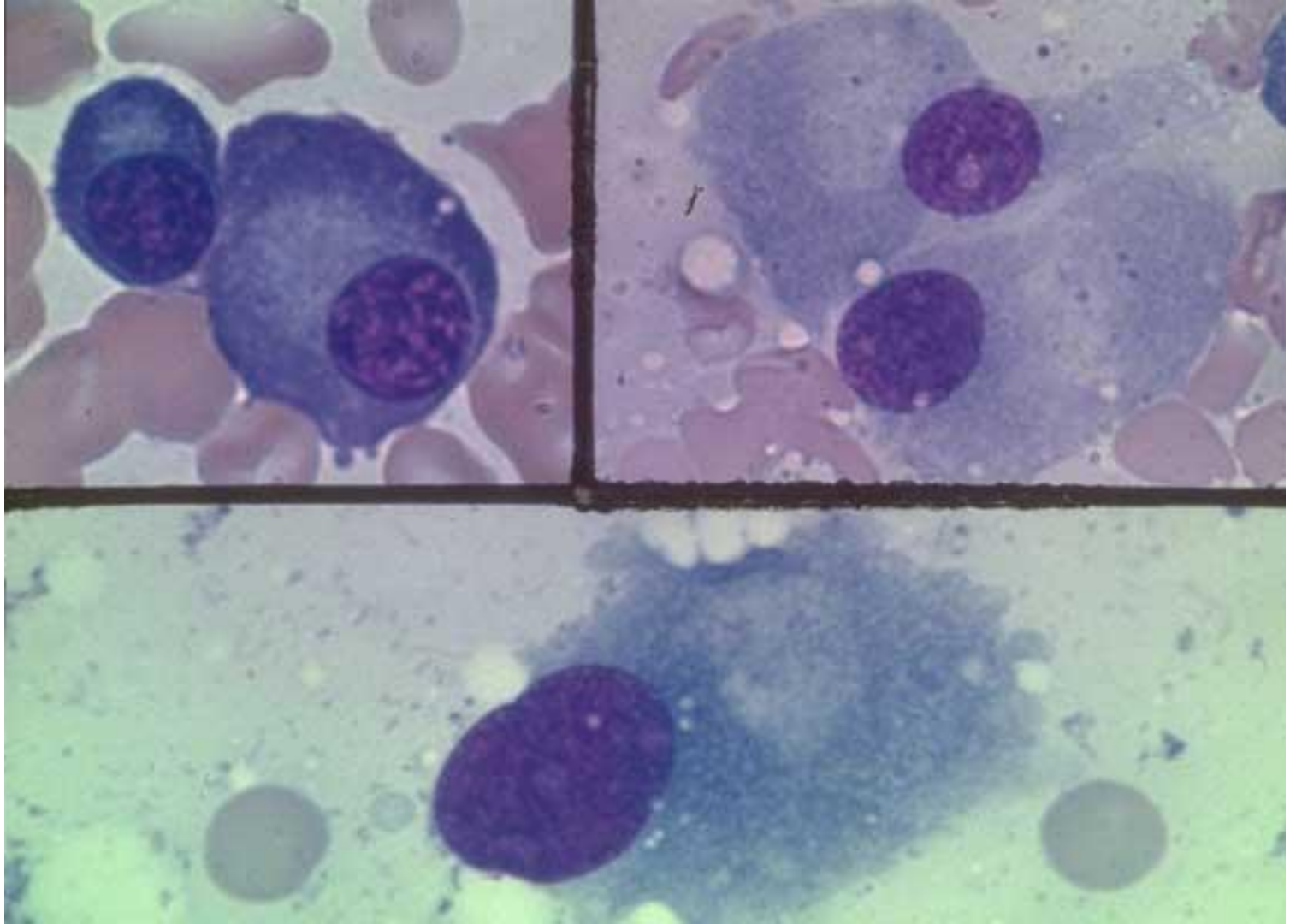












HO!