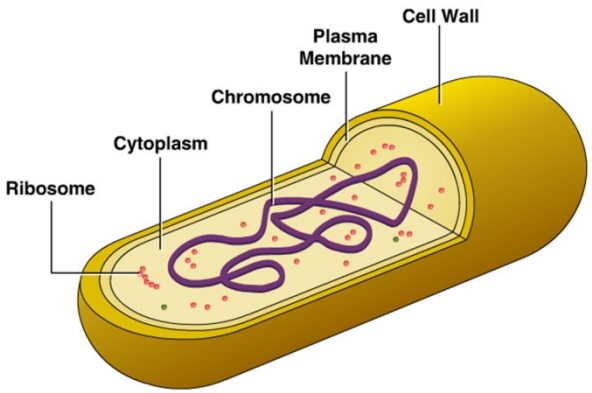
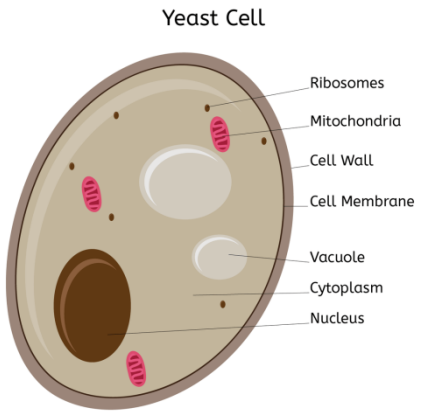
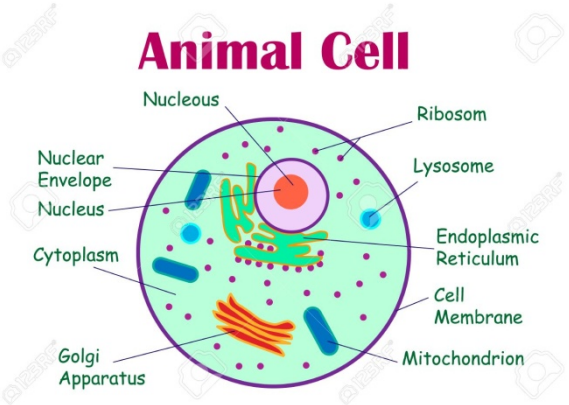
MİKROBİYAL HÜCRE YAPISI VE FONKSİYONU

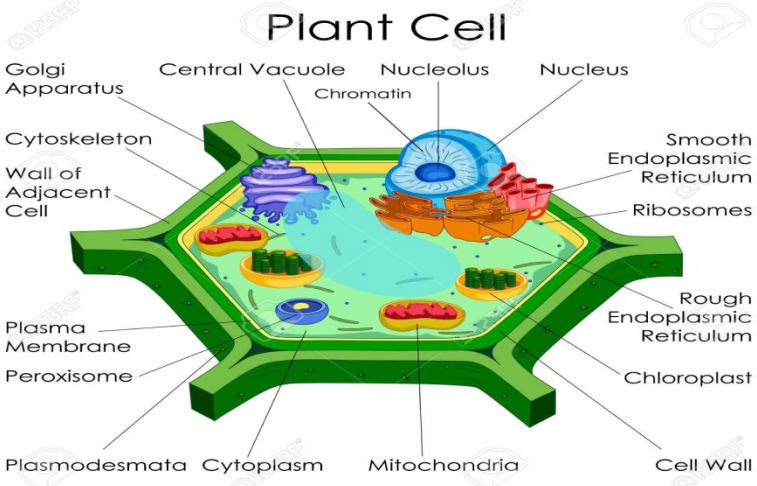
Dr. Ali Osman ADIGÜZEL

Tüm hücreler sıvı bir matriks ile doludur ve temel olarak lipit ve proteinden oluşmuş sitoplazmik zar ile çevrilidir.

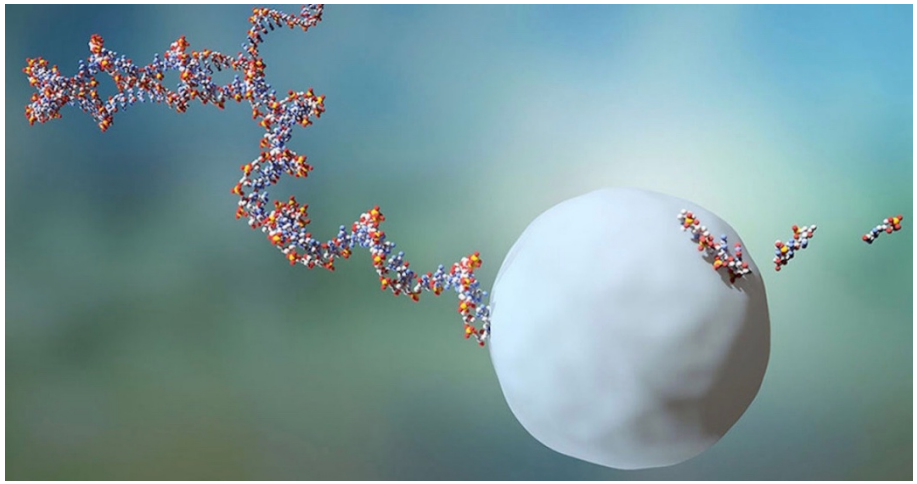




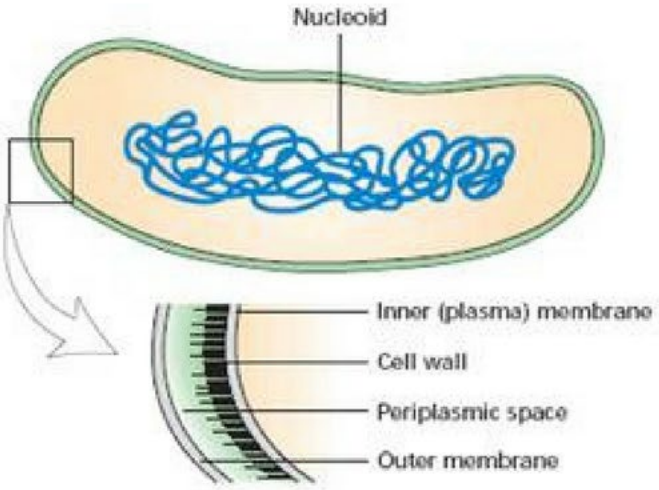


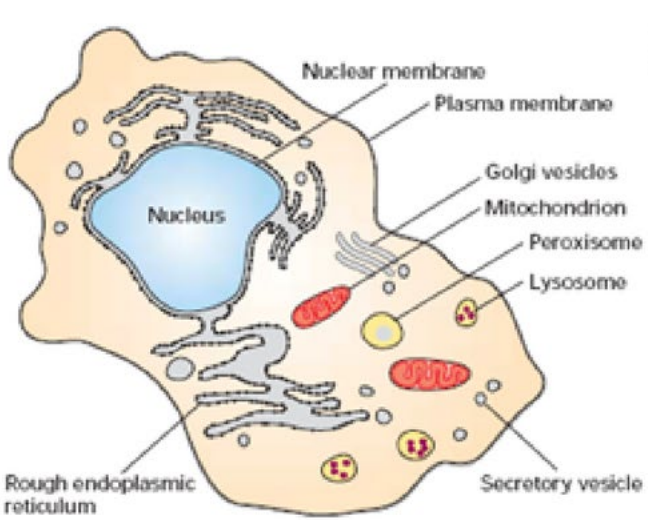


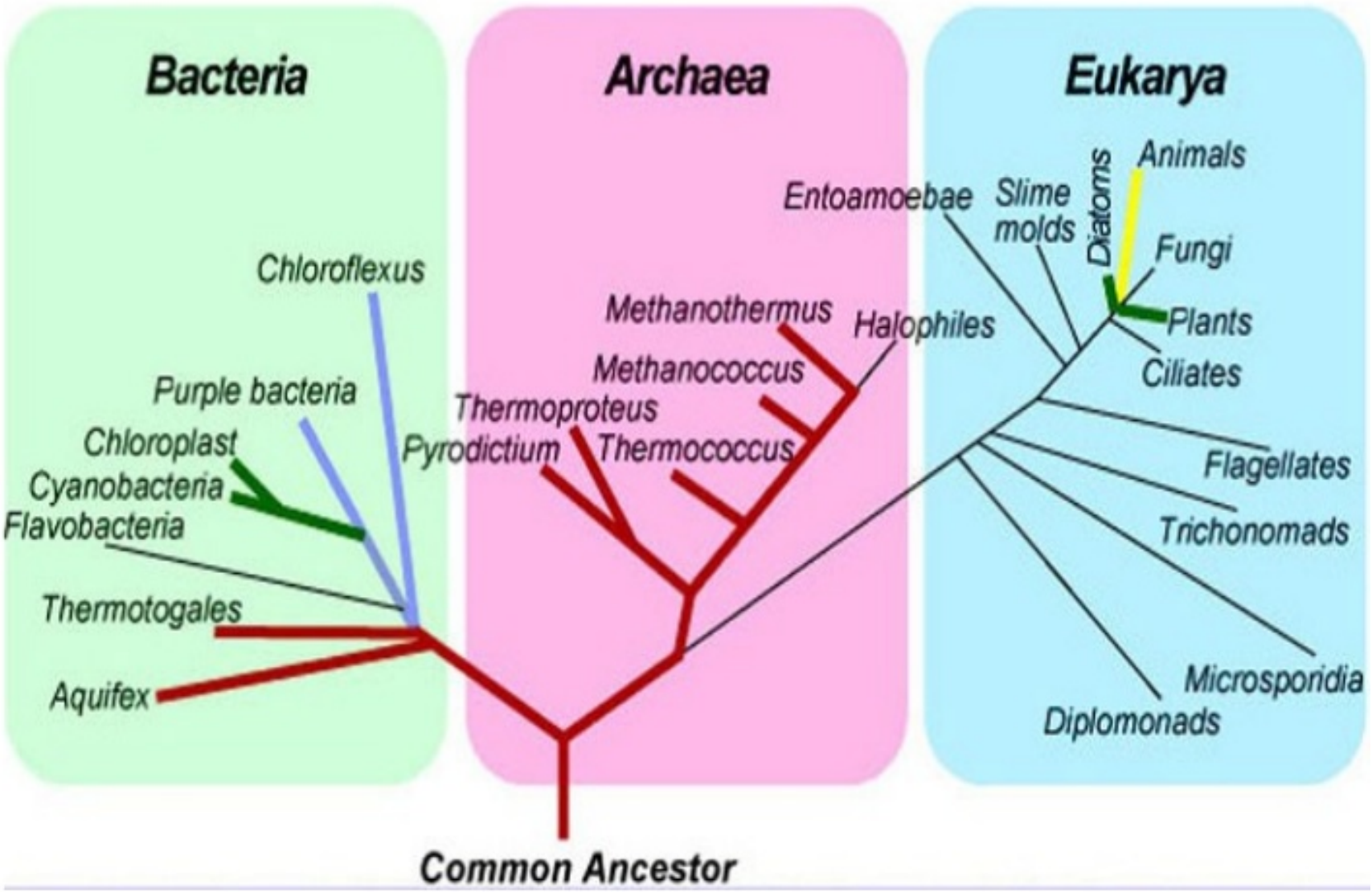
Tüm hücreler ribozomlar ve kalıtsal materyal olarak DNA bulundururlar



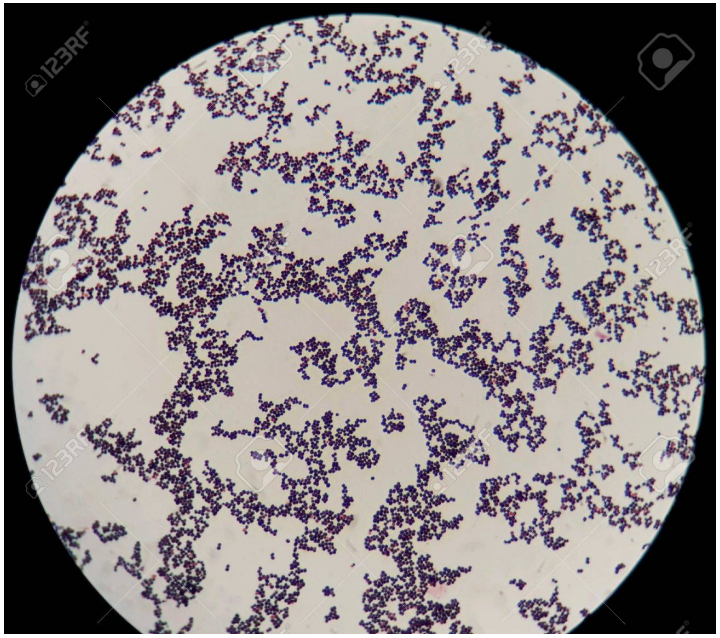
Organizmalar yapısal olarak 2 ana gruba ayrılır

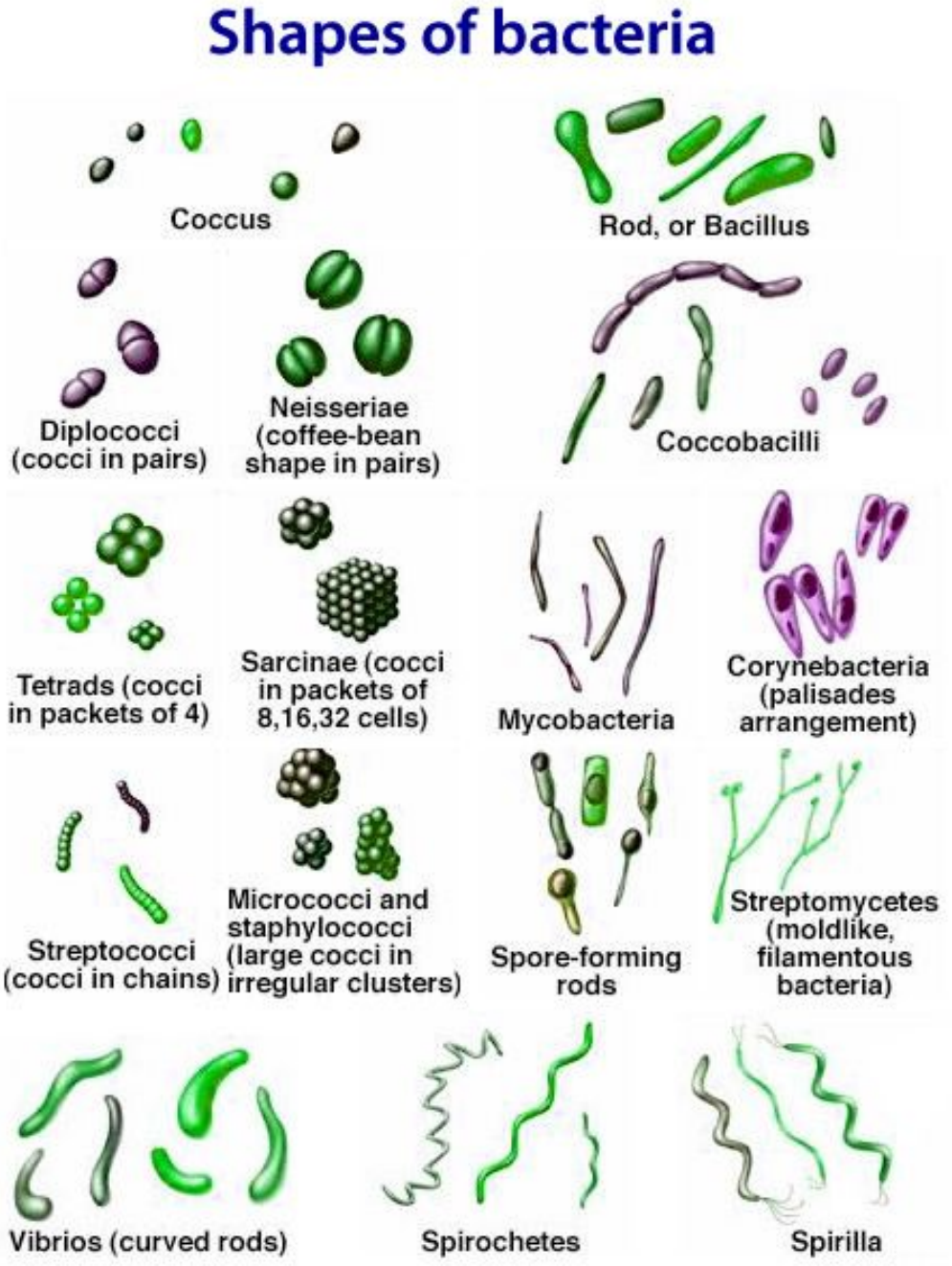





Bacteria
Archaea
Eukarya
Chloroflexus
Purple bacteria
Chloroplast
Cyanobacteria
Flavobacteria
Thermotogales
Aquifex
Methanothermus
Halophiles
Methanococcus
Thermoproteus
Pyrodictium
Thermococcus
Entoamoebae
Slime molds
Diatoms
Animals
Fungi
Plants
Ciliates
Flagellates
Trichonomads
Microsporidia
Diplomonads
Common Ancestor

Bakteriler




Shapes of bacteria
Coccus
Rod, or Bacillus
Diplococci (cocci in pairs)
Neisseriae (coffee-bean shape in pairs)
Coccobacilli
Tetrads (cocci in packets of 4)
Sarcinae (cocci in packets of 8,16,32 cells)
Mycobacteria
Corynebacteria (palisades arrangement)
Streptococci (cocci in chains)
Micrococci and staphylococci (large cocci in irregular clusters)
Spore-forming rods
Streptomycetes (moldlike, filamentous bacteria)
Vibrios (curved rods)
Spirochetes
Spirilla

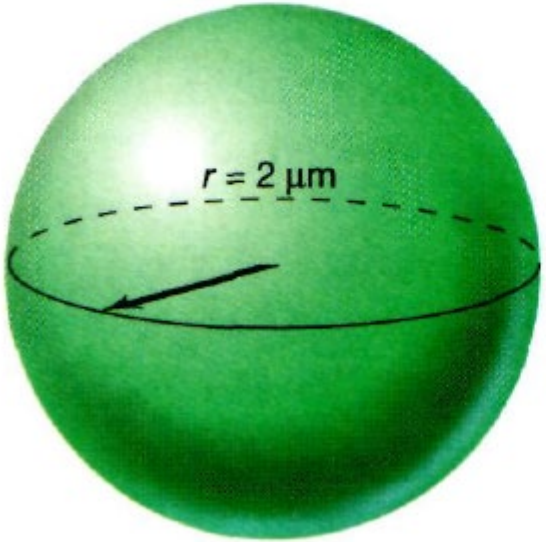
Hücre Morfolojisi ve Küçük Olmanın Önemi

$r = 1\ \mu m$

Yüzey alanı $(4\pi r^2) = 12.6\ \mu m^2$

Hacim $(\frac{4}{3}\pi r^3) = 4.2\ \mu m^3$

$$\frac{\text{Yüzey}}{\text{Hacim}} = 3$$



$r = 2\ \mu m$

Yüzey alanı $= 50.3\ \mu m^2$

Hacim$= 33.5\ \mu m^3$

$$\frac{\text{Yüzey}}{\text{Hacim}} = 1.5$$

BAKTERİLER

hücre duvarı (çeper),

hücre zarı,

nüklear bölge (nükleoid),

sitoplazmik materyal

Ribozom

flagellum,

pilus,

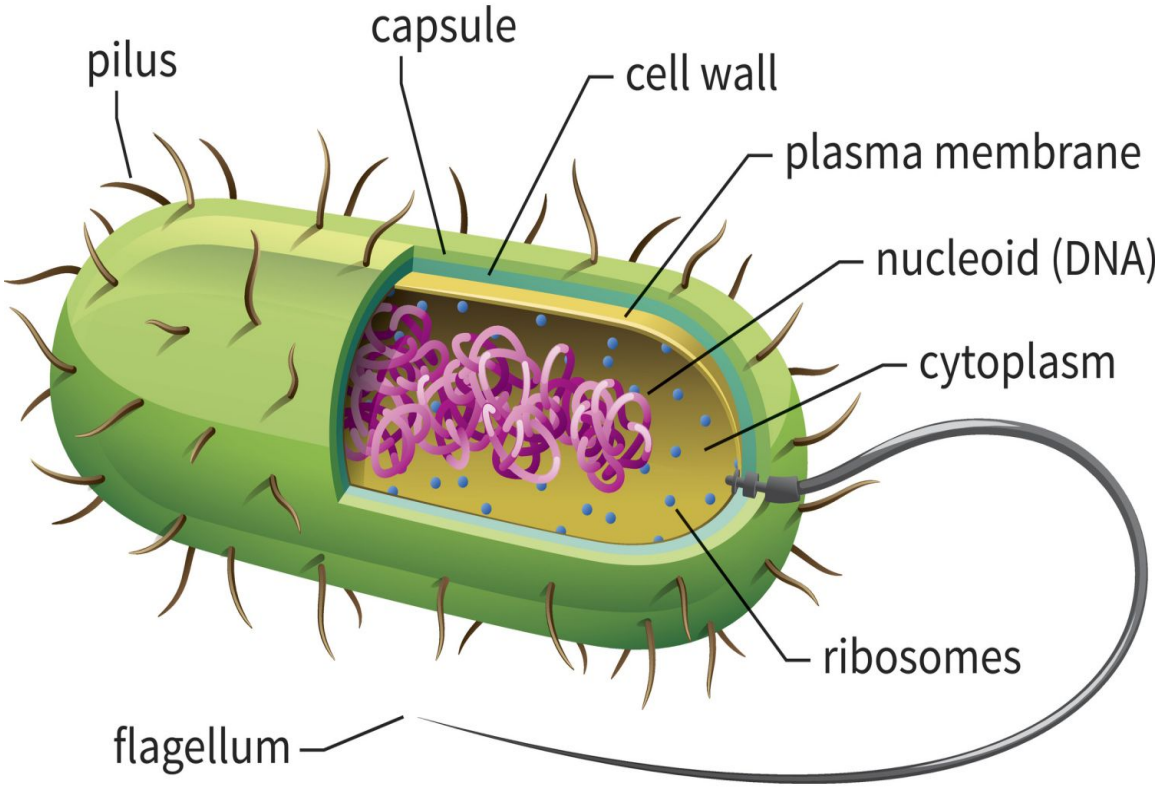
kapsül,

inklüzyon cisimleri,

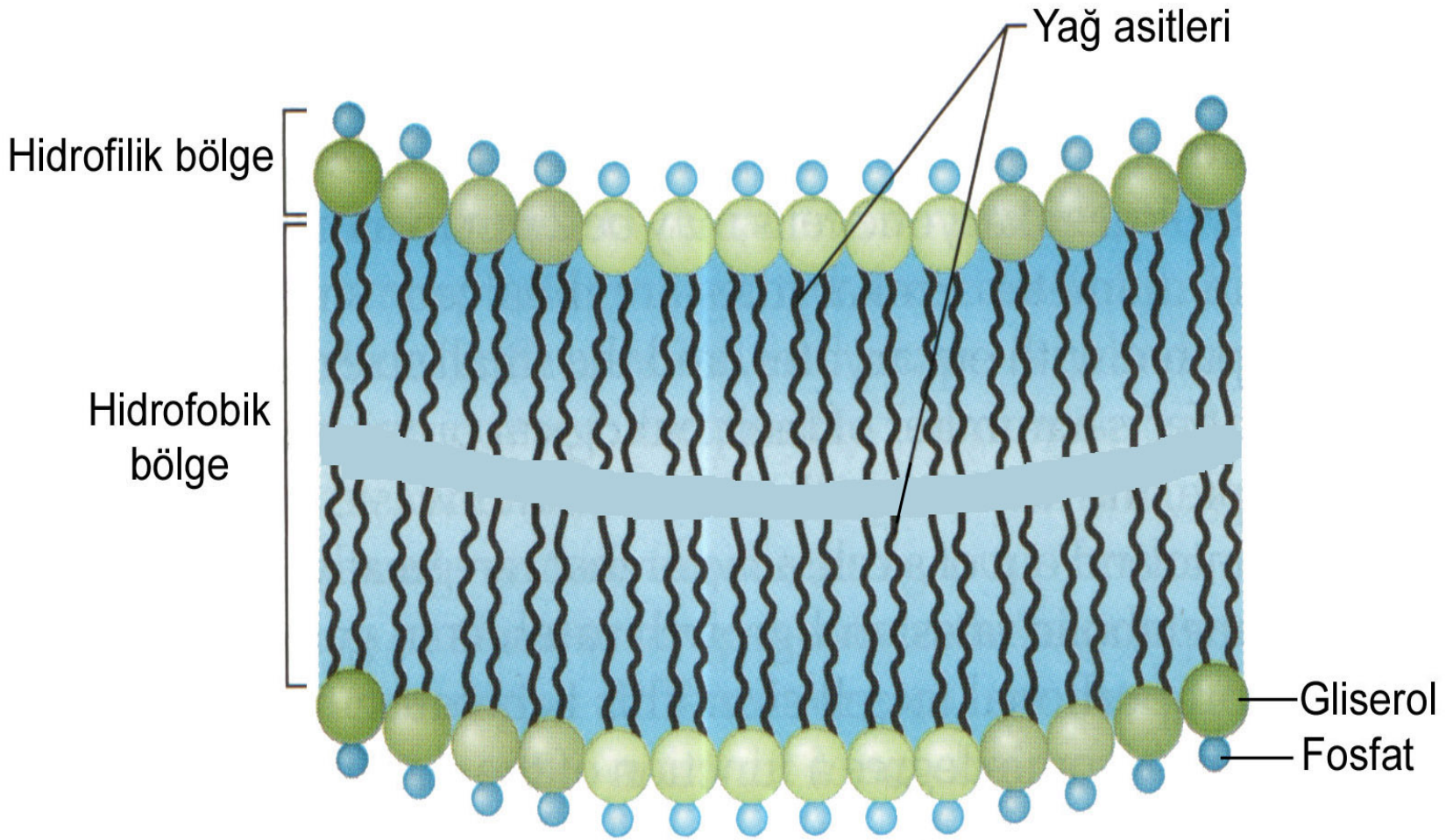
gaz vezikülleri,

kist ve

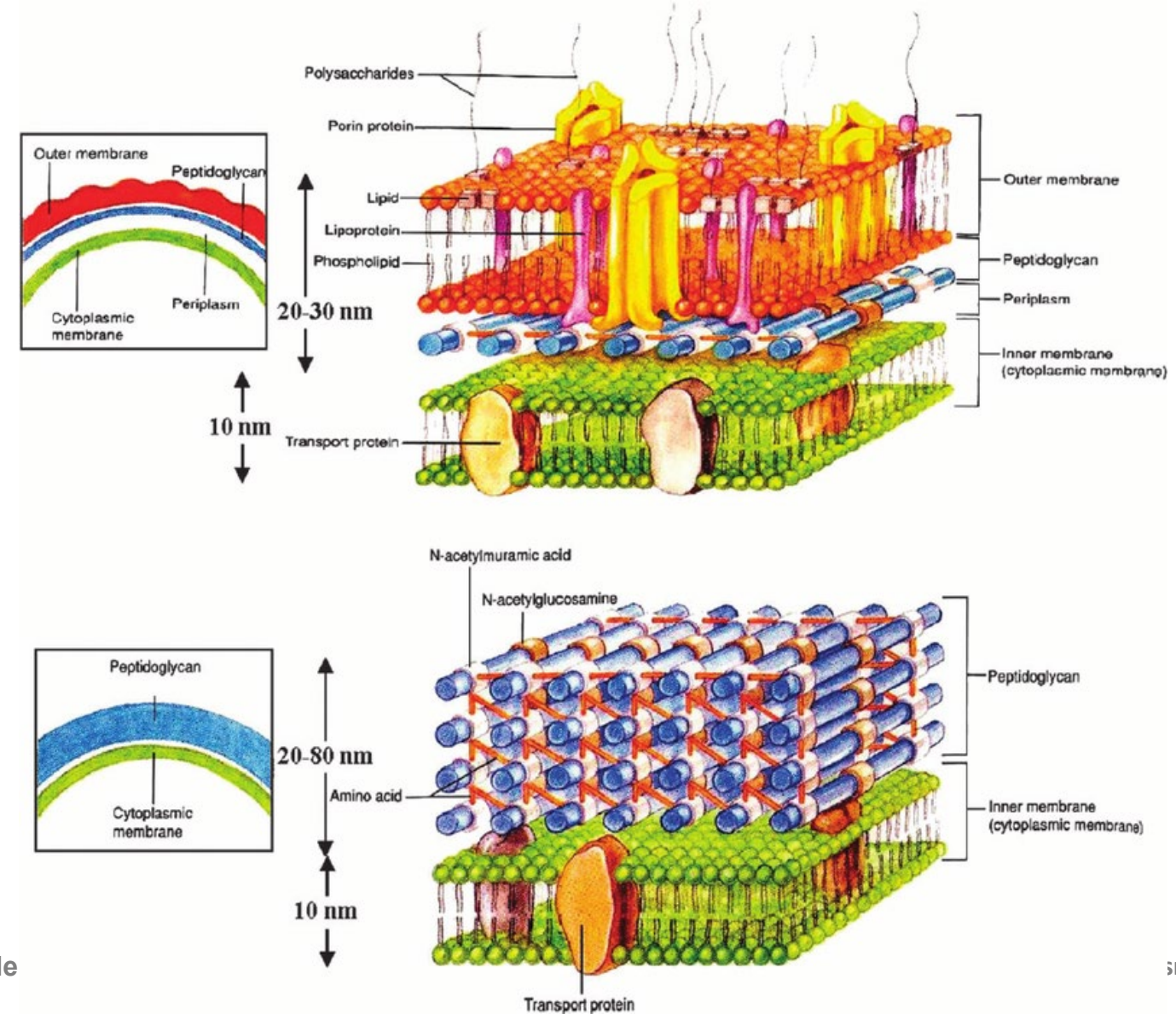
spor



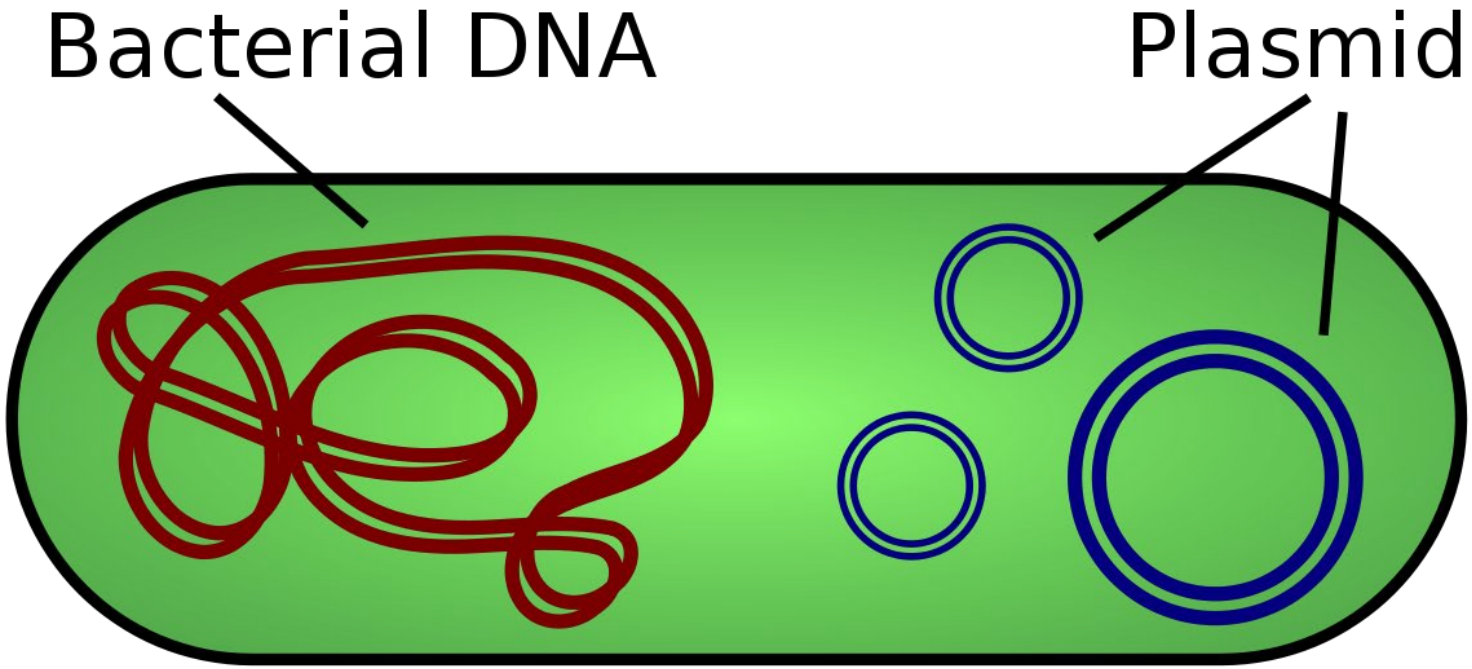
Bakterilerdeki zar yapısı fosfolipit çift-tabakasından oluşur



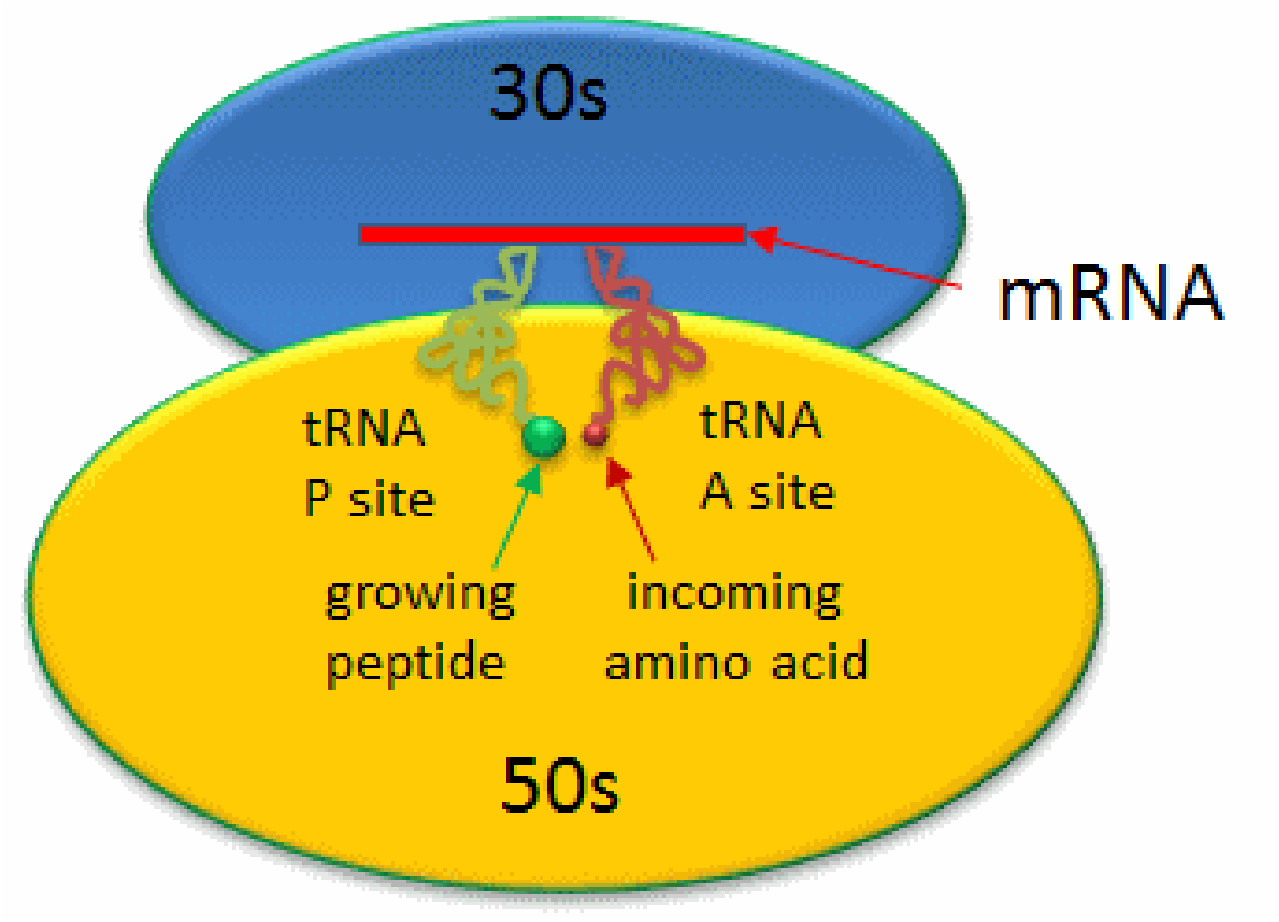
Bakterilerdeki hücre duvarının temel bileşeni peptidoglukandır



Bakterilerde DNA

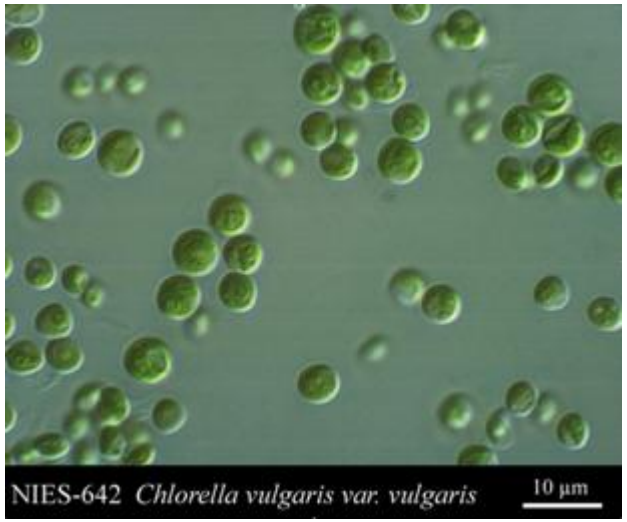


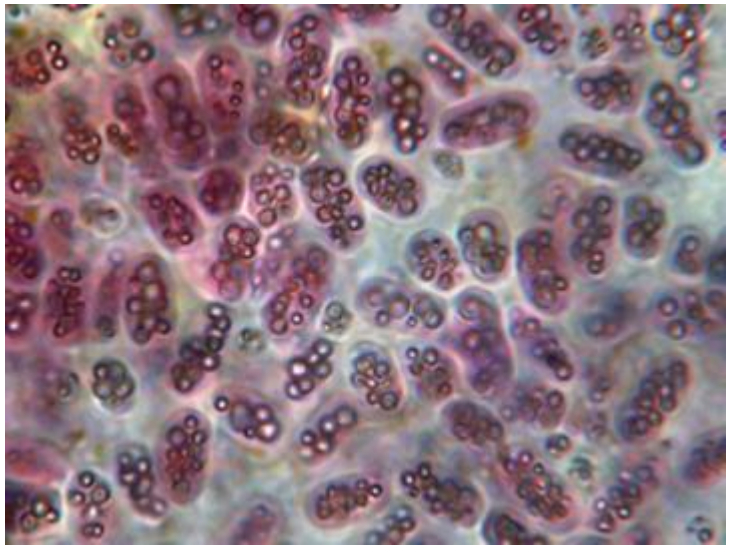
Bakterilerde ribozom (70S)



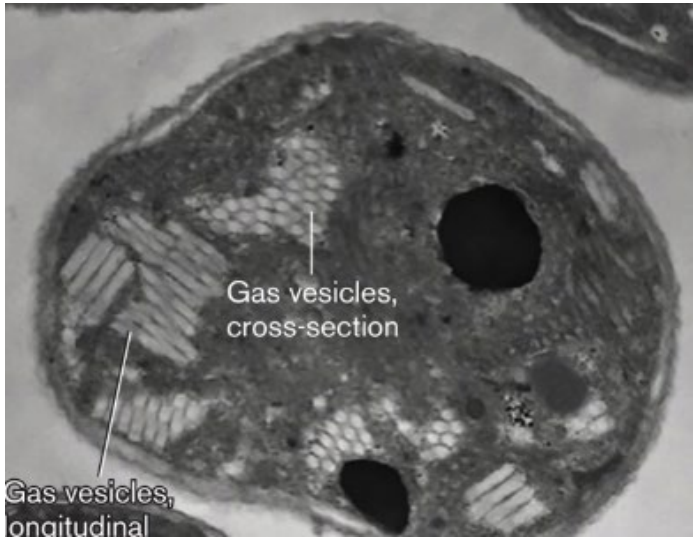
Cyanobacteria

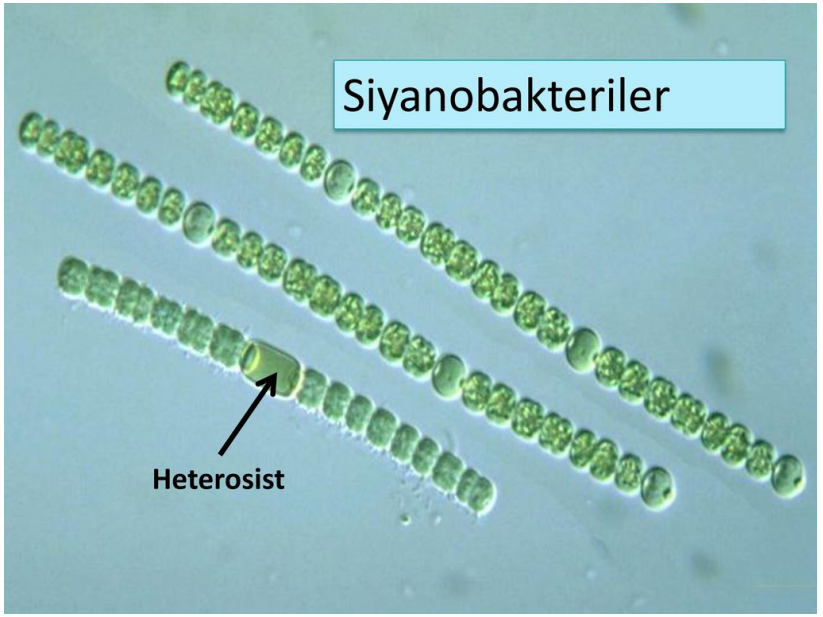
- *Oksijenik fototrofturlar*
- *Hücre duvar yapısı Gr – e benzer fakat filogenetik olarak Gr + lere daha yakındır*
- *Tek tip klorofil bulundurur. Klorofil A*
- *Fakat türden türe değişişebilen aksesuar pigmentler bulundurabilir*
  - *Fikosiyanin – mavi – mavi-yeşil renk oluşumu*
  - *Fikoeritrin – kırmızı – kırmızı-kahverengi*





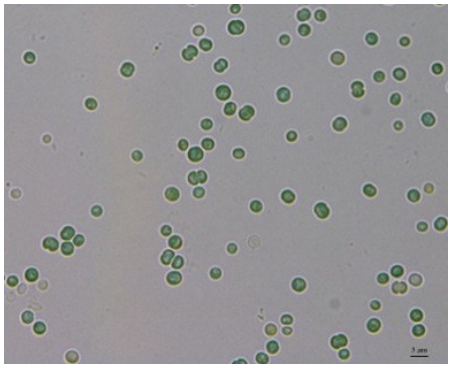
Siyanobakterilerde gaz vezikülleri suyun yüzeyinde kalmayı sağlar.
Bazı siyanobakterilerde ise heterosist olarak adlandırılan yapılar vardır.

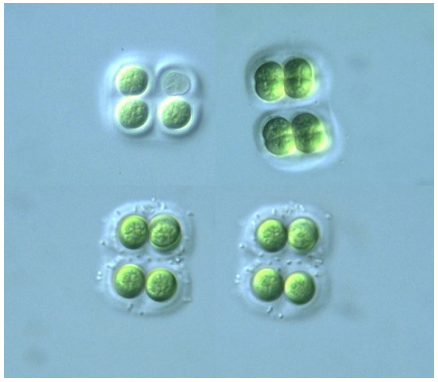


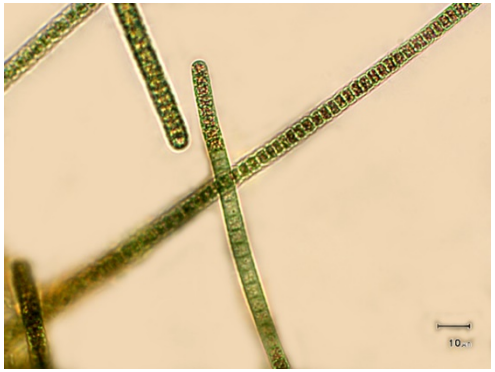


Siyanobakteriler yapısal özelliklerine göre 5 grupta incelenir

- *İkiye bölünen tek hücreli*
- *Çoğa bölünen tek hücreli*
- *Heterosist içeren flamentli*
- *Heterosistik olmayan flamentli*
- *Dallanan flamentöz*

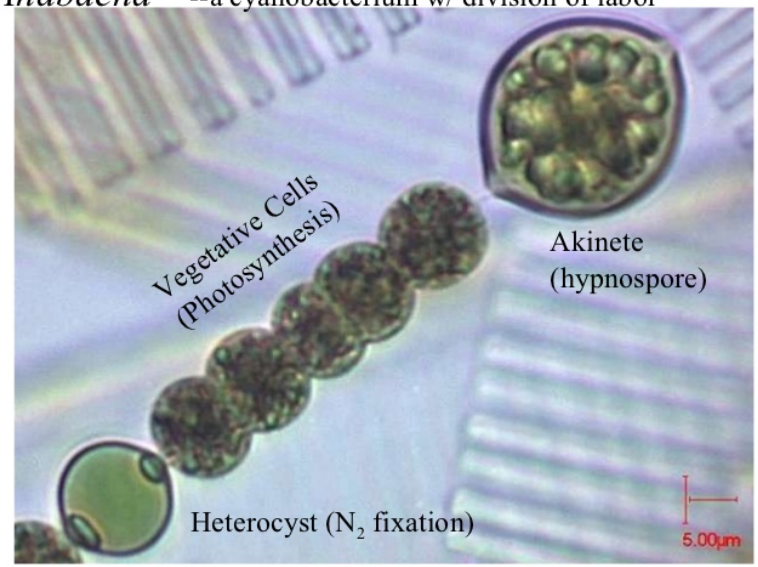




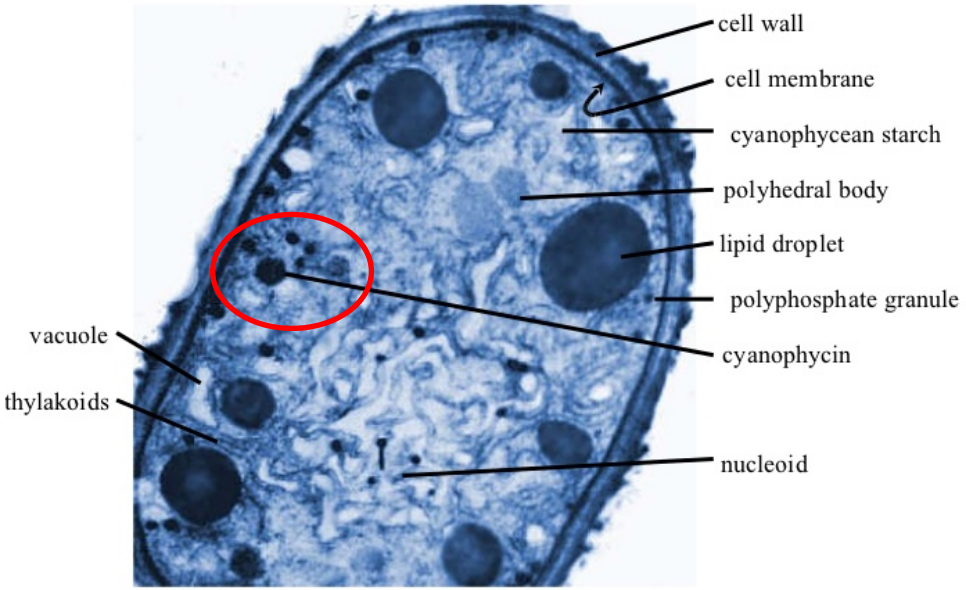


- *Çoğu siyanobakterilerde siyanofisin olarak adlandırılan azot depoları bulunur.*
- *Bazı türler ise akinet oluşturabilir*

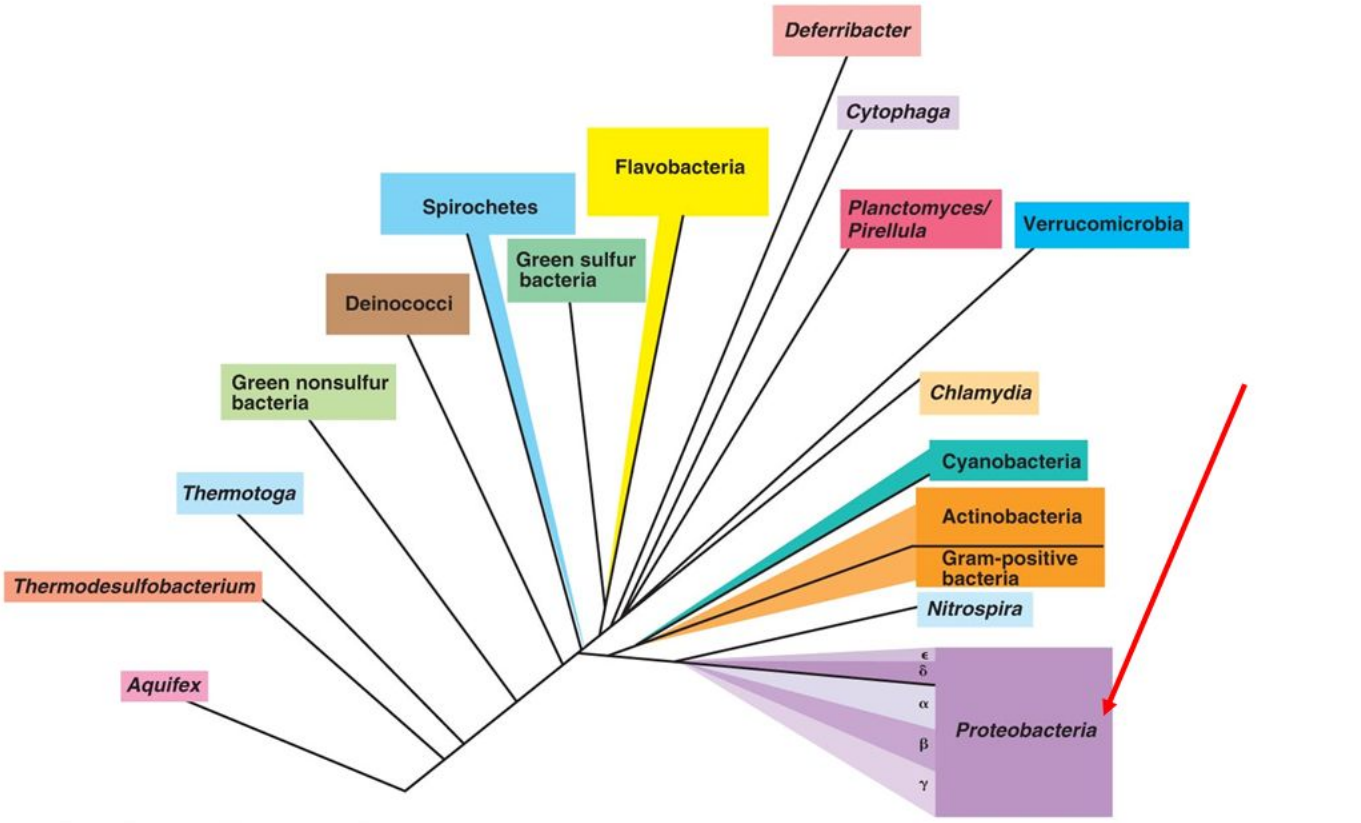
Anabaena --a cyanobacterium w/ division of labor



Cyanobacterial Akinete (hypnospore)



Bakteriyel filogeni



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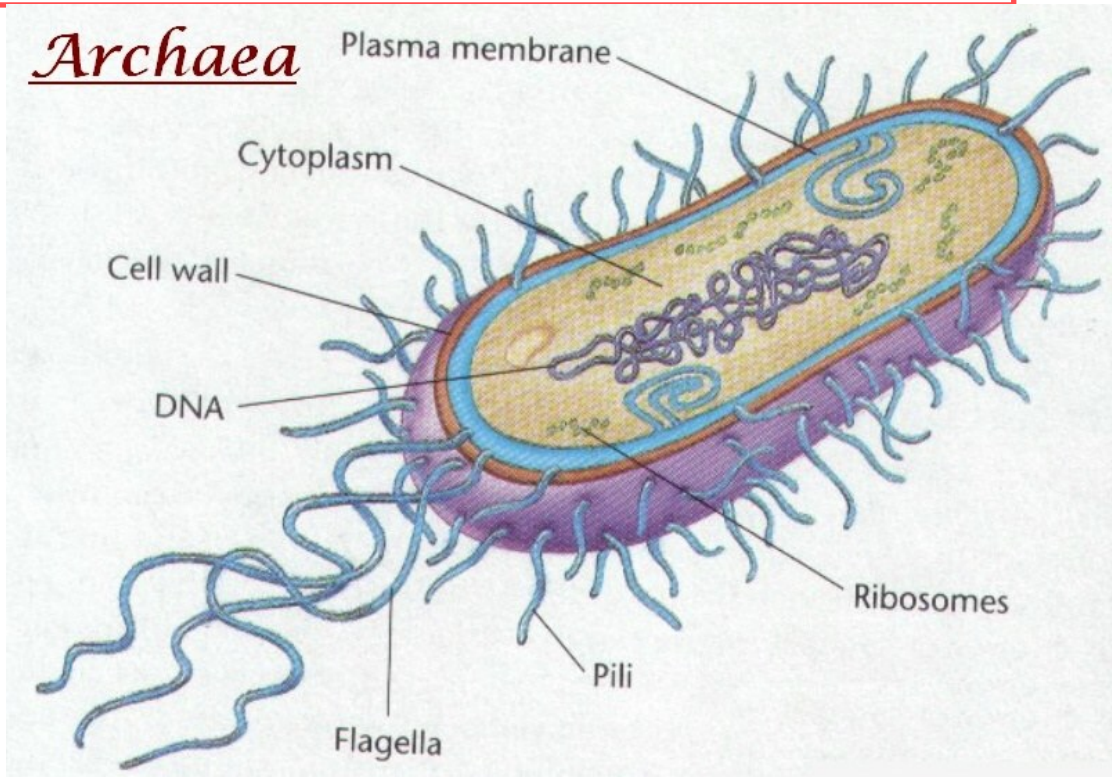
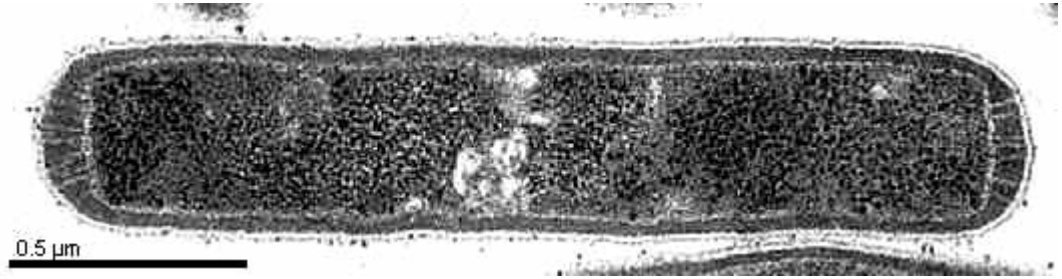
Arkeler


Archaea
Plasma membrane
Cytoplasm
Cell wall
DNA
Ribosomes
Pili
Flagella

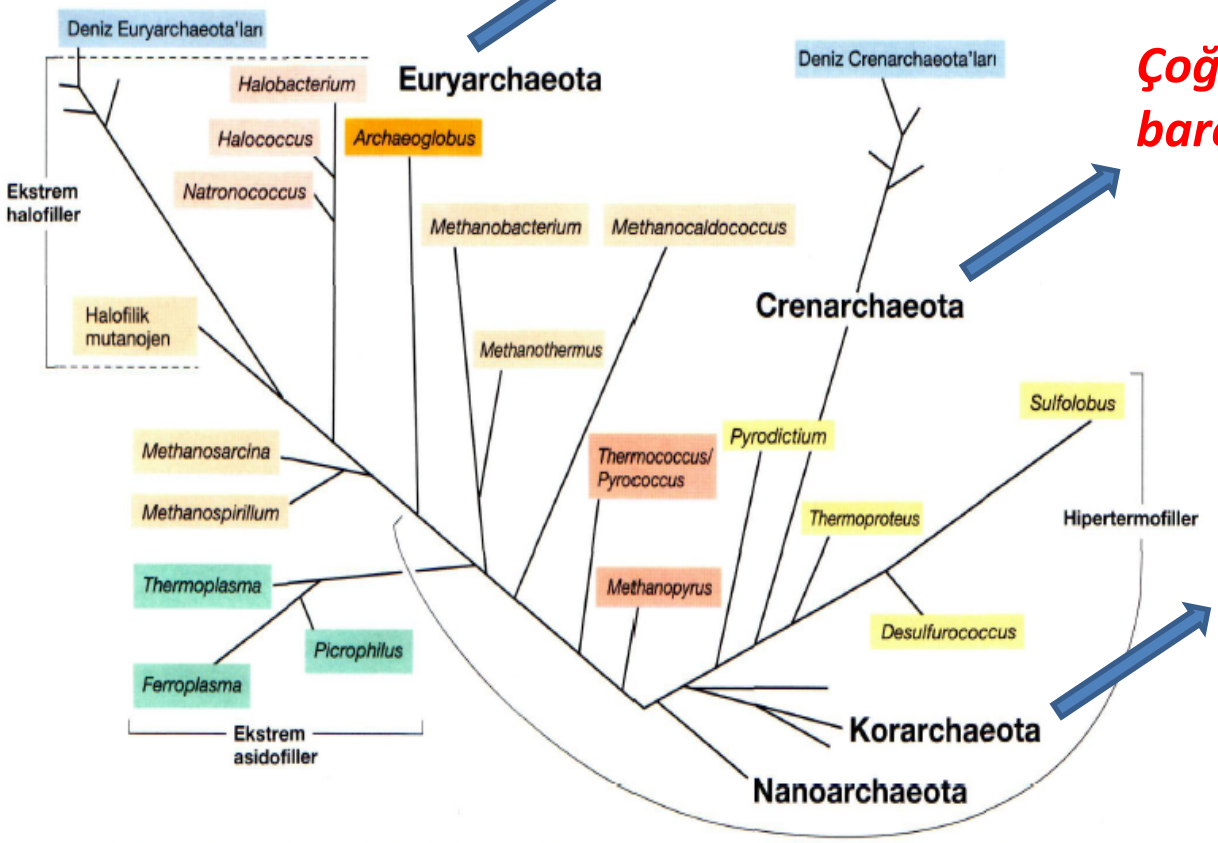

0.5 µm

ARKELER

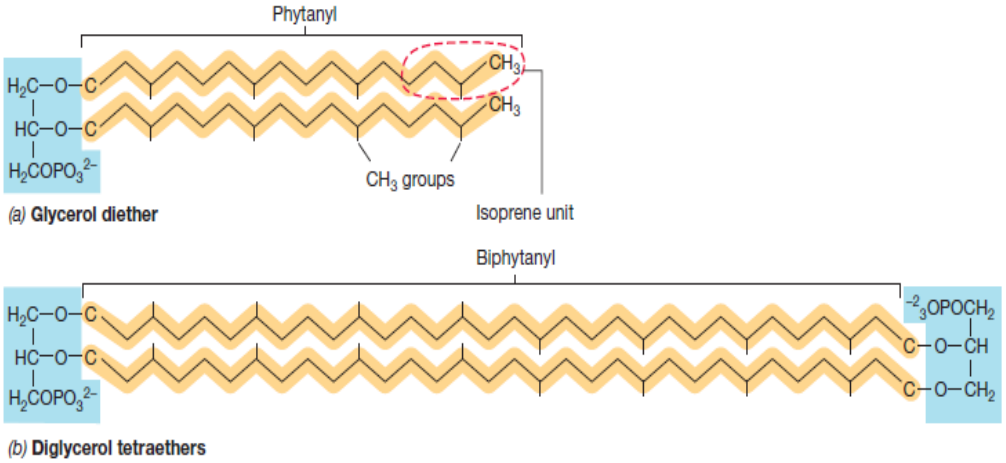
Başlıca metanojenleri ve aşırı halofil türleri içerir

Çoğunlukla aşırı termofil ve barofilleri içerir

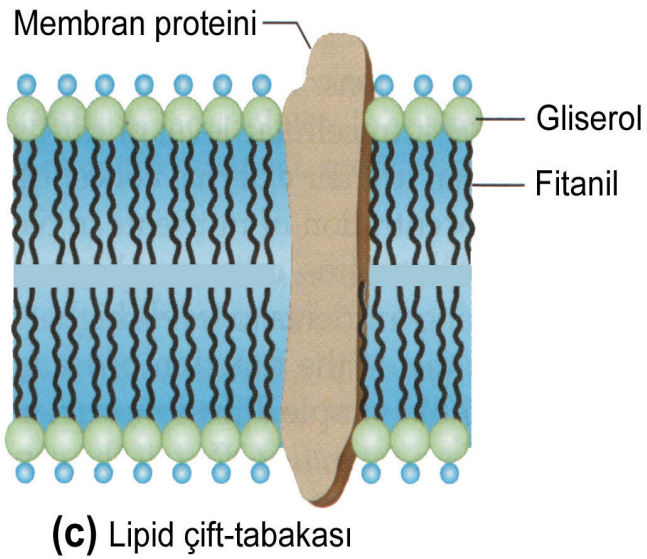
Hiper termofillerdir ve henüz saf kültürleri elde edilememiştir.

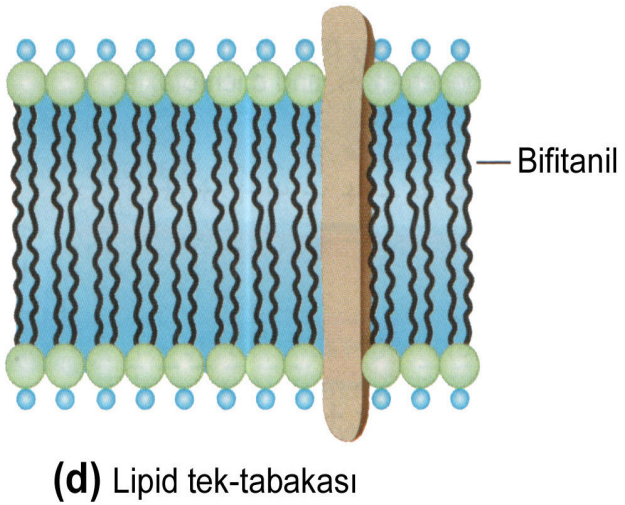


Arkelerin hücre zarları

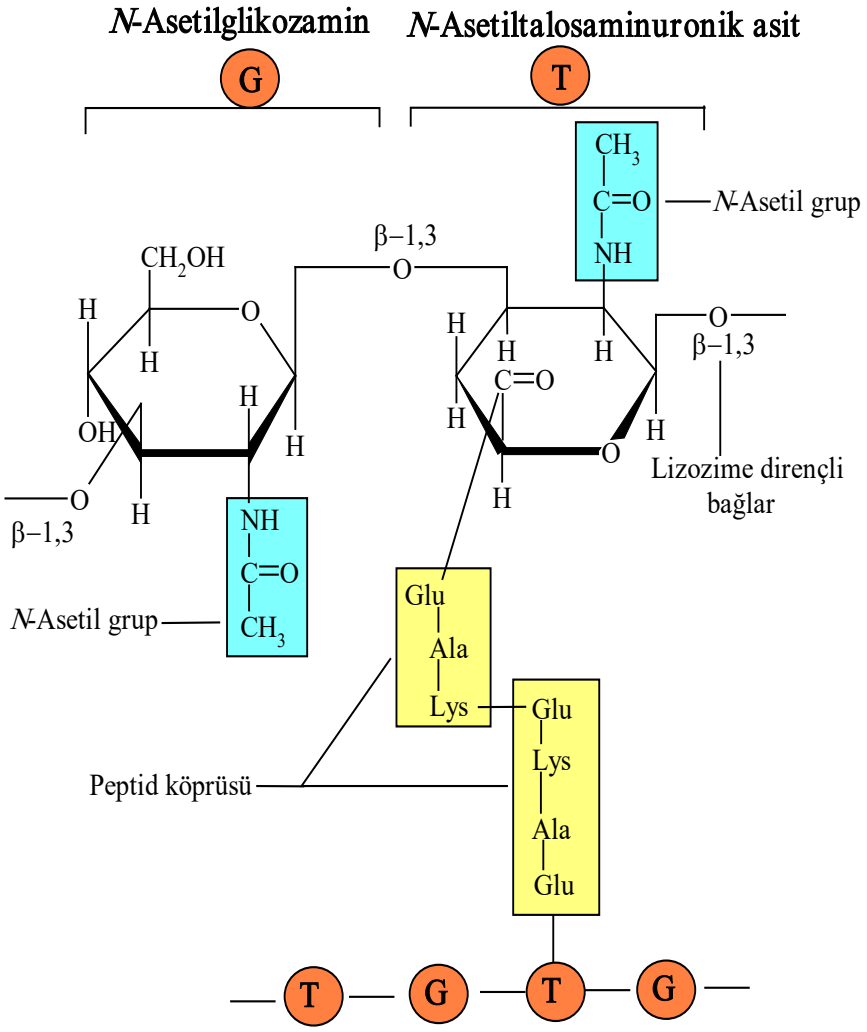


Arkeal lipitlerde yağ asitleri bulunmaz. Fitanil bulundururlar ve gliserole eter bağı ile bağlıdırlar.

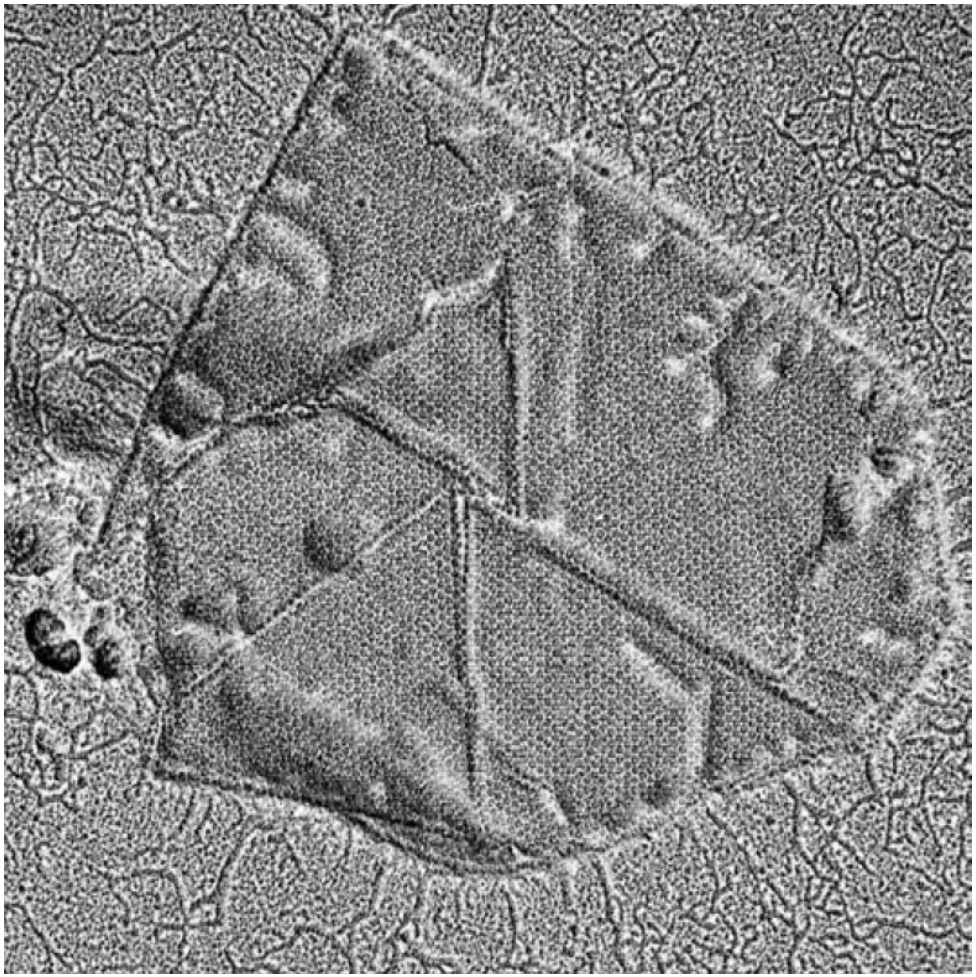




Arkelerin hücre duvarları (Pseudopeptidoglukan)

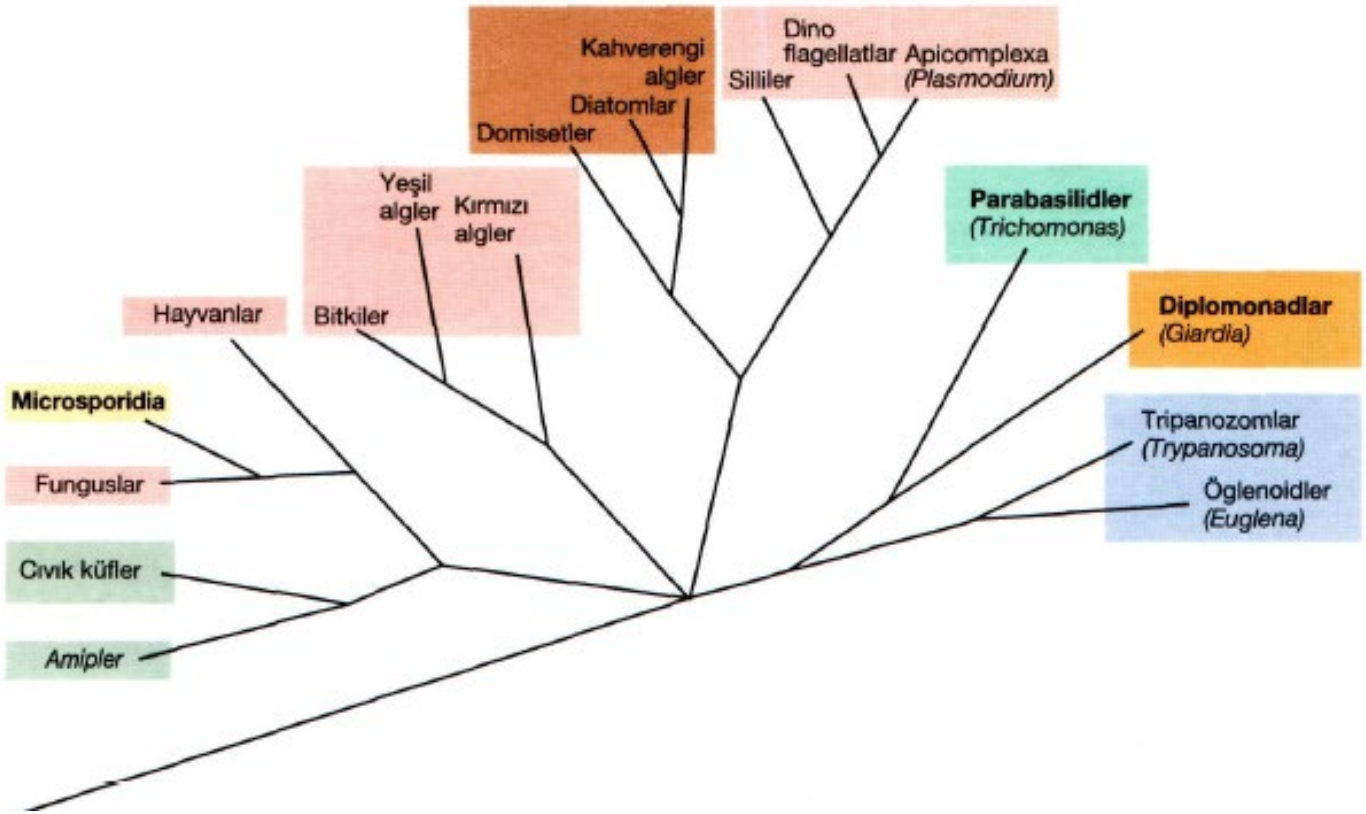


Arkelerin hücre duvarları (S tabakası)



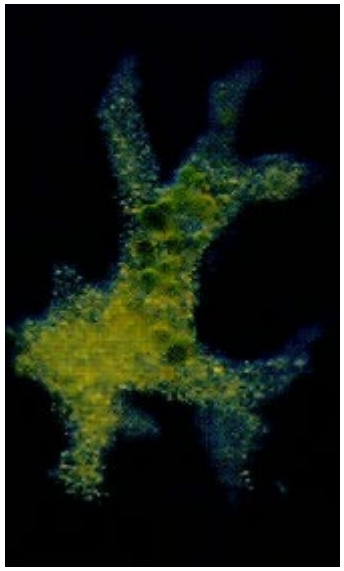
ÖKARYOTİK MİKROBİYAL ÇEŞİTLİLİK

- ***protozoa, cıvık küfler ve fungusları içerir.***

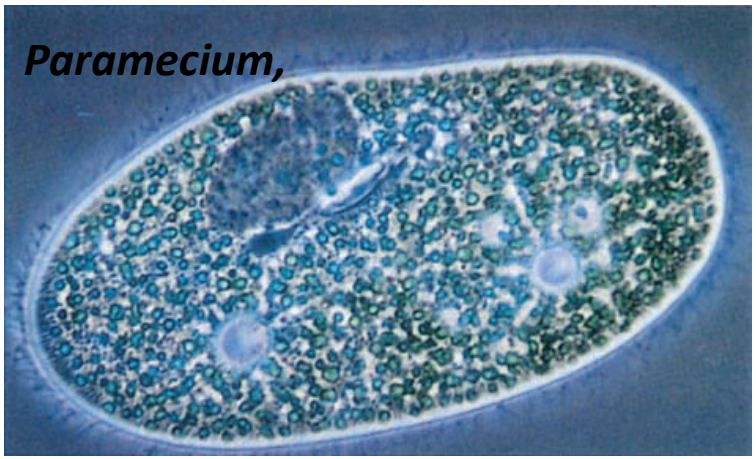


Protozoa

- *hücre duvarı olmayan ökaryotik tek hücreli mikroorganizmalardır*
- *genellikle renksiz ve hareketlidir*
- *klorofile sahip olmamaları ile alglerden,*
- *hareketli olmaları ve birçok durumda bir hücre duvarı taşımamaları ile diğer fungus ve mayalardan*
- *ve fruktifikasyon organları (fruiting bodies) oluşturmama özellikleri ile cıvık küflerden ayrılırlar*



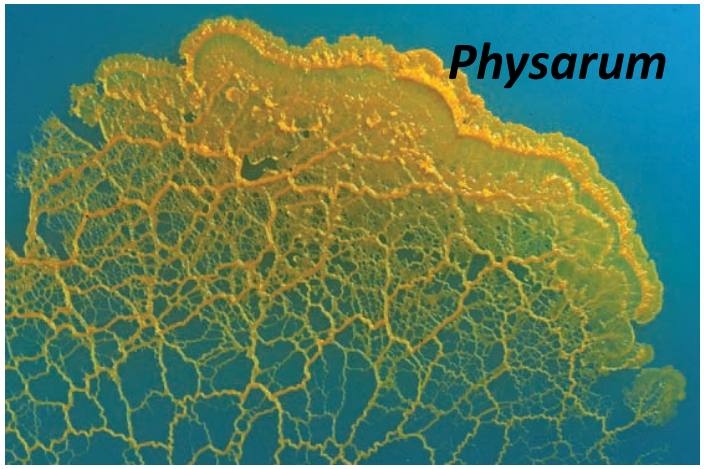
Euglena,

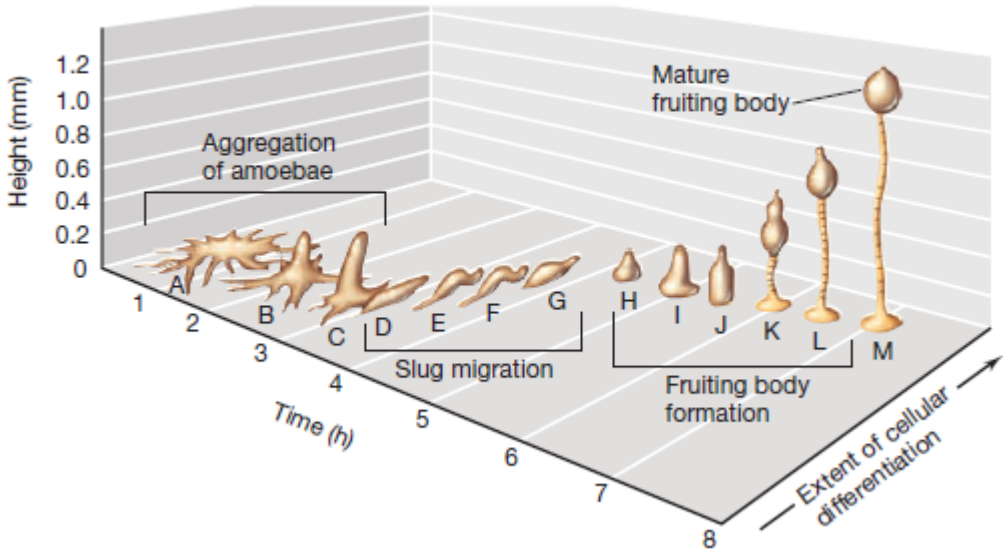


Paramecium,

CIVIK KÜFLER

- *hem fungus ve hem de protozoanlara benzeyen mikrobiyal ökaryotlardır.*
- *Funguslar gibi (bkz. Kısım 14.12), cıvık küfler bir yaşam döngüsüne sahip olup spor üretebilirler.*
- *Ancak, protozoa gibi (bkz. Kısım 14.10), cıvık küfler hareketli olup katı bir yüzey üzerinde hızlıca hareket edebilirler*





FUNGUSLAR

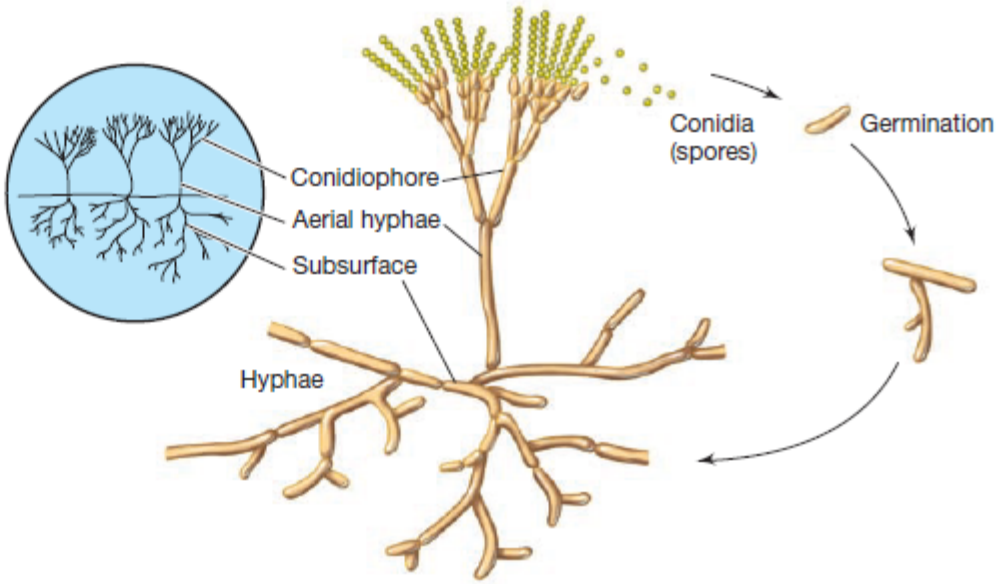
- *hücre duvarlarına sahiptir ve spor üretirler.*
- *Fungusların çoğunun hücre duvarları bir glukoz türevi olan N-asetilglukozaminden yapılmış kitin içerir*
- *Fungusların 3 büyük grubu göze çarpar:*
  - *Küfler,*
  - *Mayalar ve*
  - *Mantarlar.*

TABLE 12.1 Selected Features of Fungi and Bacteria Compared

	Fungi	Bacteria
Cell Type	Eukaryotic	Prokaryotic
Cell Membrane	Sterols present	Sterols absent, except in *Mycoplasma*
Cell Wall	Glucans; mannans; chitin (no peptidoglycan)	Peptidoglycan
Spores	Sexual and asexual reproductive spores	Endospores (not for reproduction); some asexual reproductive spores
Metabolism	Limited to heterotrophic; aerobic, facultatively anaerobic	Heterotrophic, autotrophic; aerobic, facultatively anaerobic, anaerobic

KÜFLER

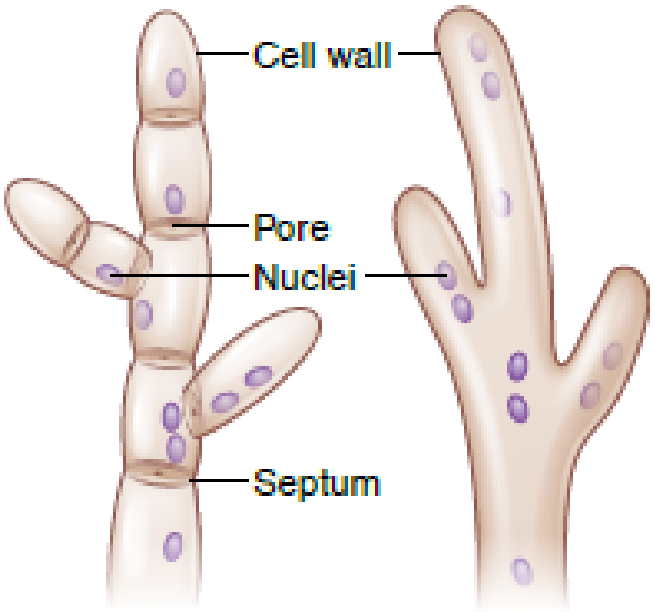
(a)



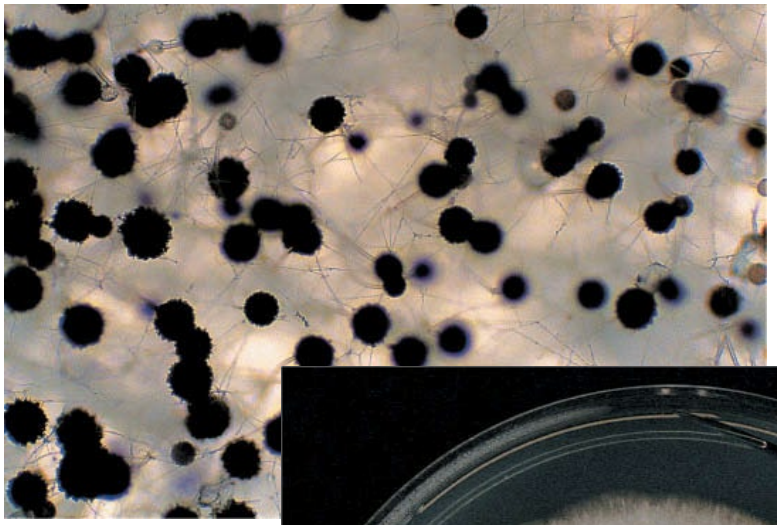
(b)

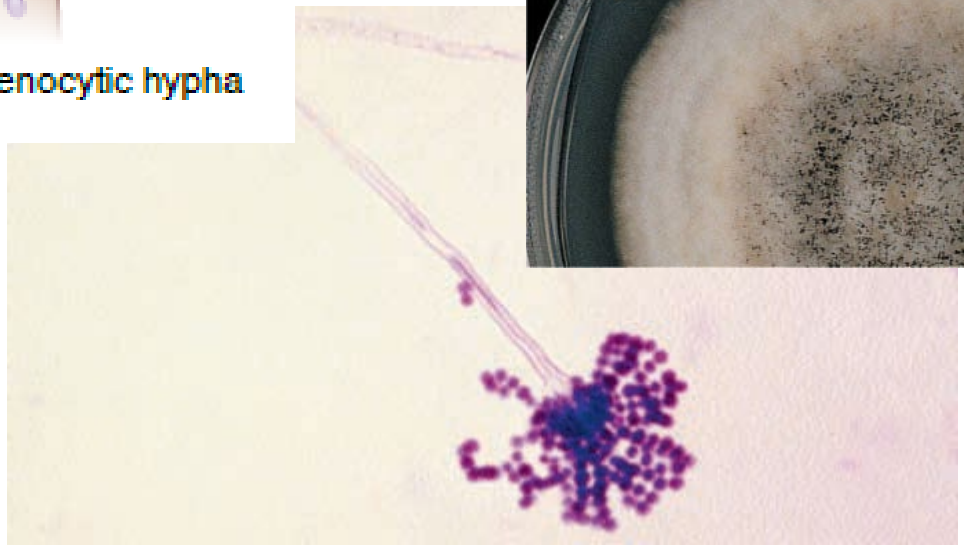
Figure 17.19 **Fungal structure and growth.** *(a)* Photomicrograph of a typical mold fungus. Spherical structures at the ends of aerial hyphae are asexual spores (conidia). *(b)* Diagram of a mold life cycle. The conidia can be dispersed by either wind or animals and are about 2 µm wide.

Hif tipleri

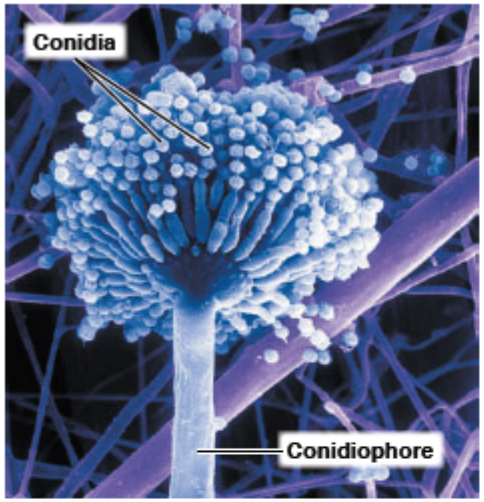


(a) Septate hypha (b) Coenocytic hypha

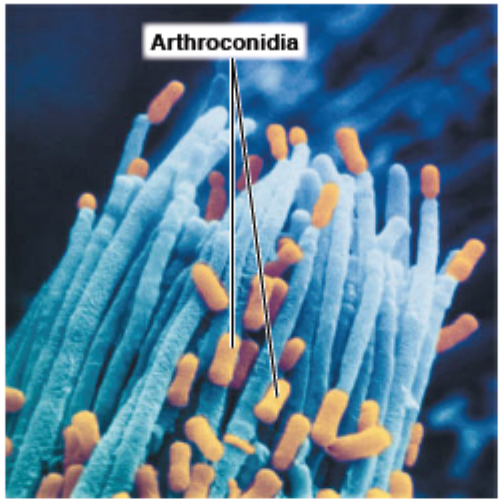




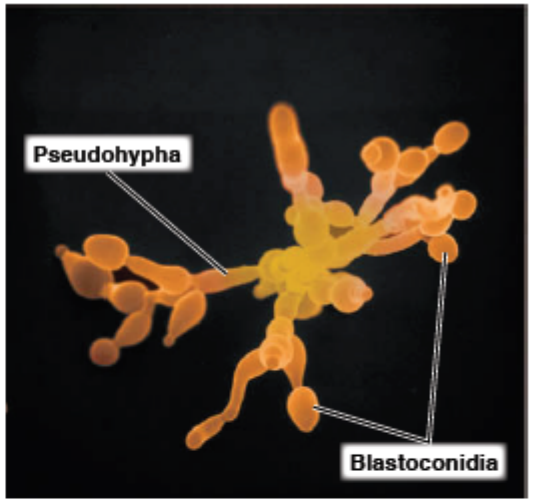
KÜFLER



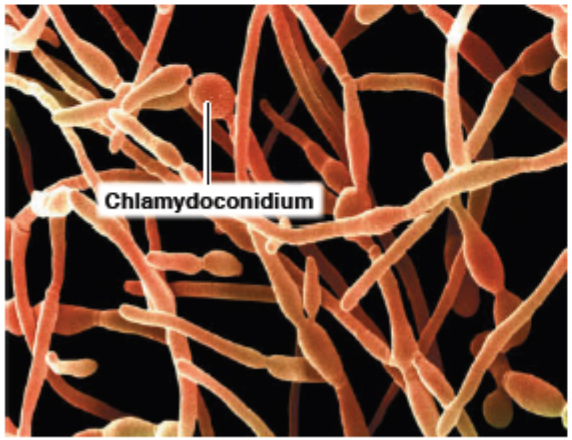
(a) Conidia are arranged in chains at the end of an *Aspergillus niger* conidiophore. SEM 12 μm



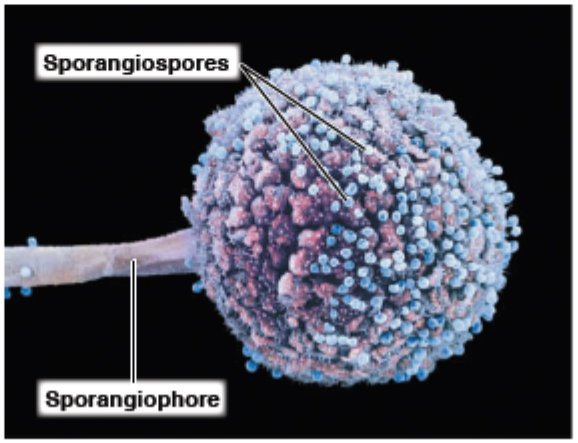
(b) Fragmentation of hyphae results in the formation of arthroconidia in *Ceratocystis ulmi*. SEM 2.5 μm



(c) Blastoconidia are formed from the buds of a parent cell of *Candida albicans*. SEM 13 μm

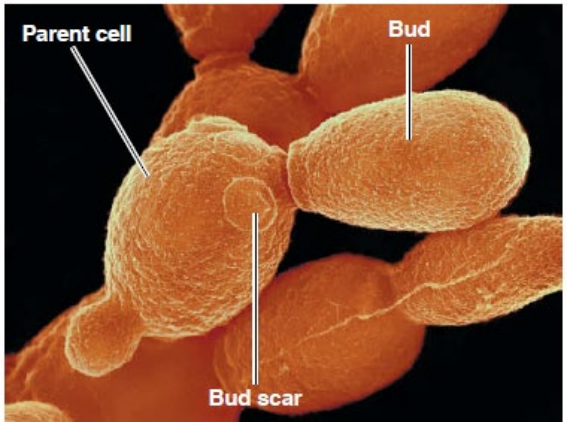


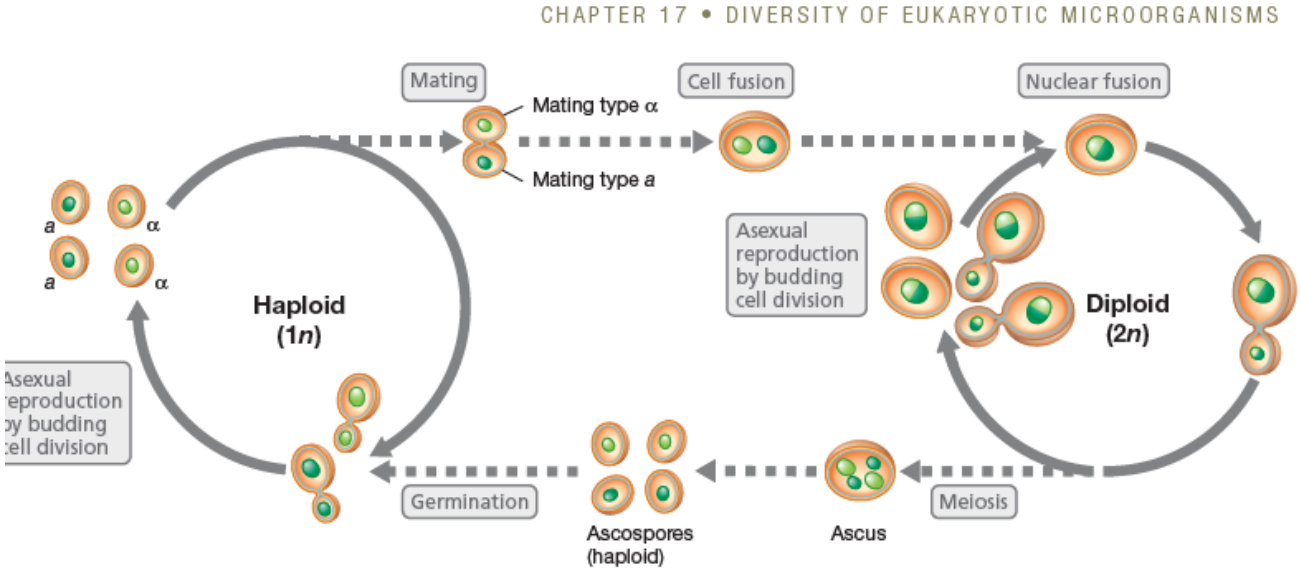
(d) Chlamydoconidia are thick-walled cells within hyphae of this *Candida albicans*. SEM 5 μm



(e) Sporangiospores are formed within a sporangium of *Rhizopus stolonifer*. SEM 5 μm

MAYALAR

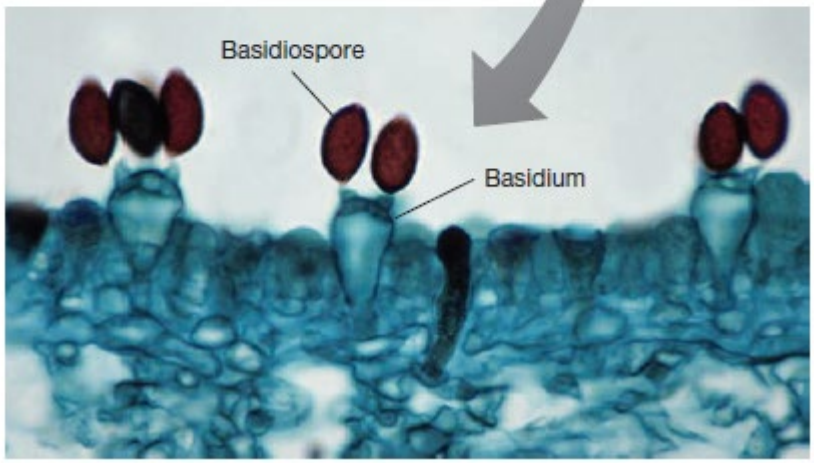

Parent cell
Bud
Bud scar


CHAPTER 17 • DIVERSITY OF EUKARYOTIC MICROORGANISMS
Mating
Mating type α
Mating type a
Cell fusion
Nuclear fusion
Asexual reproduction by budding cell division
Diploid (2n)
Haploid (1n)
Asexual reproduction by budding cell division
Germination
Ascospores (haploid)
Ascus
Meiosis

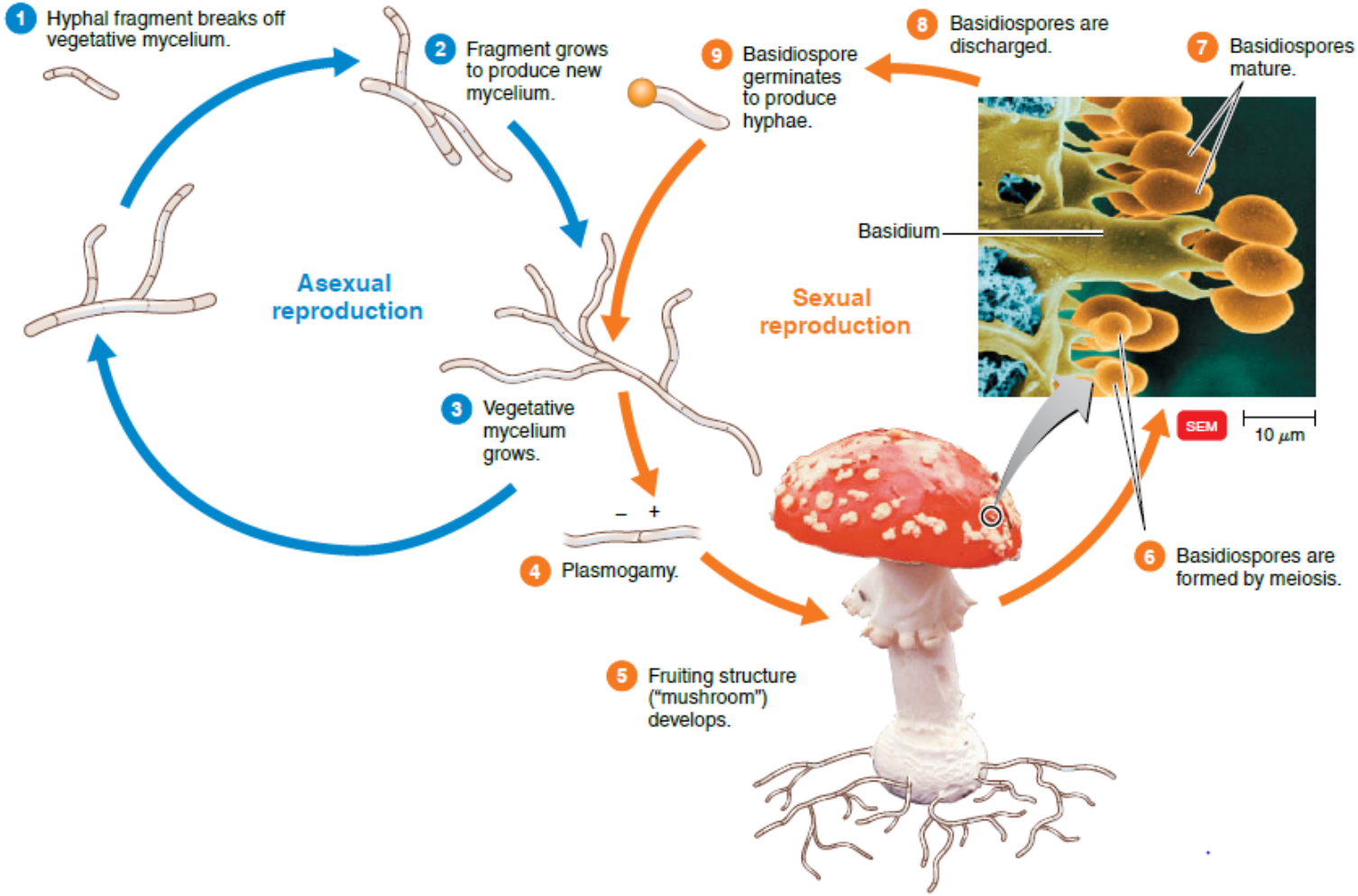
MANTARLAR

(a)

(b)



MANTARLAR


1 Hyphal fragment breaks off vegetative mycelium.
2 Fragment grows to produce new mycelium.
3 Vegetative mycelium grows.
4 Plasmogamy.
5 Fruiting structure ("mushroom") develops.
6 Basidiospores are formed by meiosis.
7 Basidiospores mature.
8 Basidiospores are discharged.
9 Basidiospore germinates to produce hyphae.
Asexual reproduction
Sexual reproduction
Basidium
SEM
10 μm
– +