

ANNEX I

Principals Grups Microbians

- Procariotes:
 - Bacteris
 - Eubacteris
 - Arqueobacteris
- Eucariotes:
 - Algues
 - Fongs
 - Bolets
 - Llevats
 - Floridures
 - Protozous
 - Ciliats
 - Flagelats
 - Amebes
- Acel·lulars:
 - Virus
 - Viroids i Prions

PROTOZOUS: 2 - 200 µm
 ALGUES: 1 µm - metres
 FONGS: 2 µm - 20 cm
 BACTERIS: 0,1 - 1000 µm
 VIRUS: 0,01 - 0,2 µm
 VIROIDS I PRIONS

VIROIDS
 ssRNA (350 nucleotids)
PRIONS
 PROTEINA (250 aminoàcids)

Dimensions entre bacteris



Figura 13.2. Tamany relatiu de les virus, de les bacteris i de les cel·les humanes.

Formes i agrupacions bacterianes

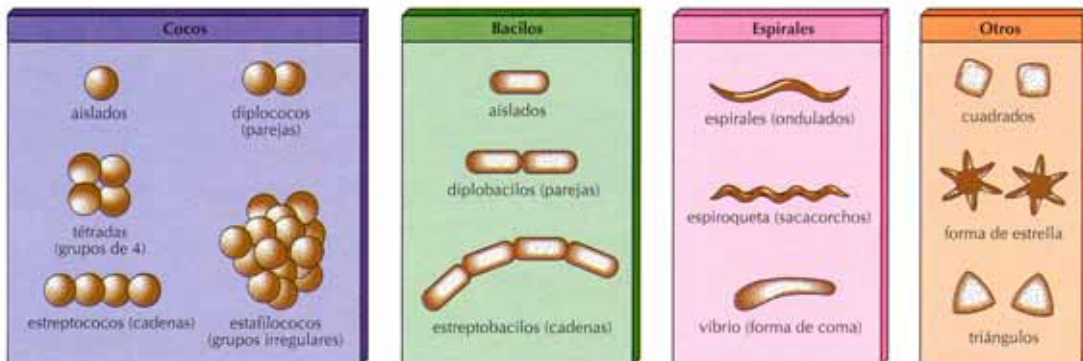
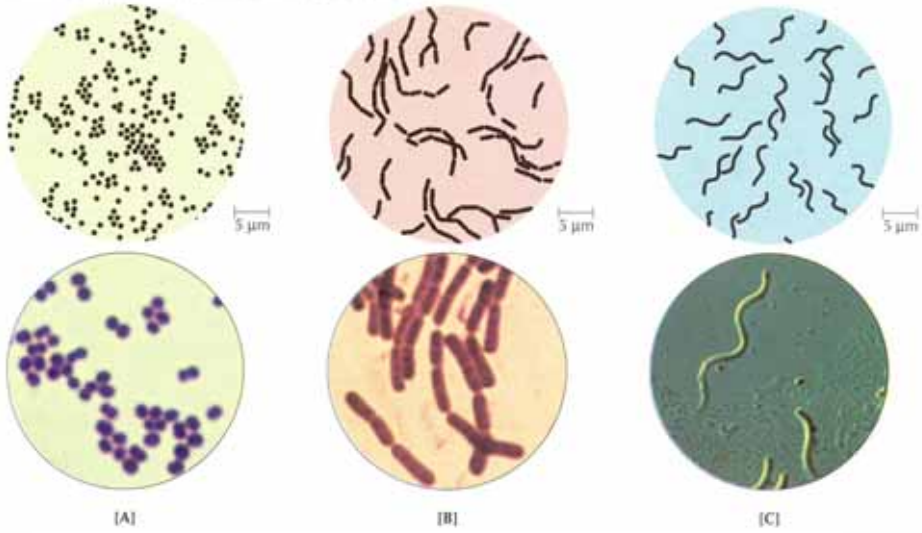


Figura 4.9. Formes i agrupacions de les cel·les bacterianes.

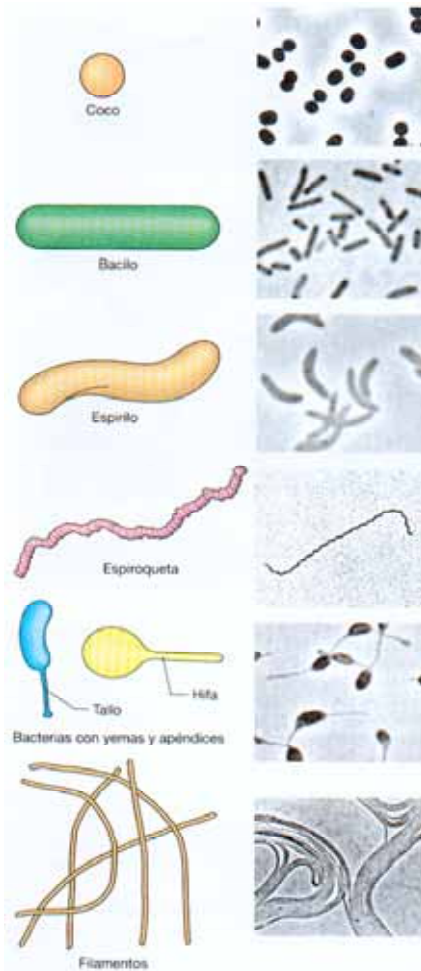
FIGURE 2.11

Bacteria. Bacterial cells are generally one of the following shapes:

[A] spherical (cocci); [B] rodlike (rods or bacilli); [C] helical (spirilla). There are, however, many modifications of these three shapes, and bacteria of all shapes vary in sizes.



Morfologia

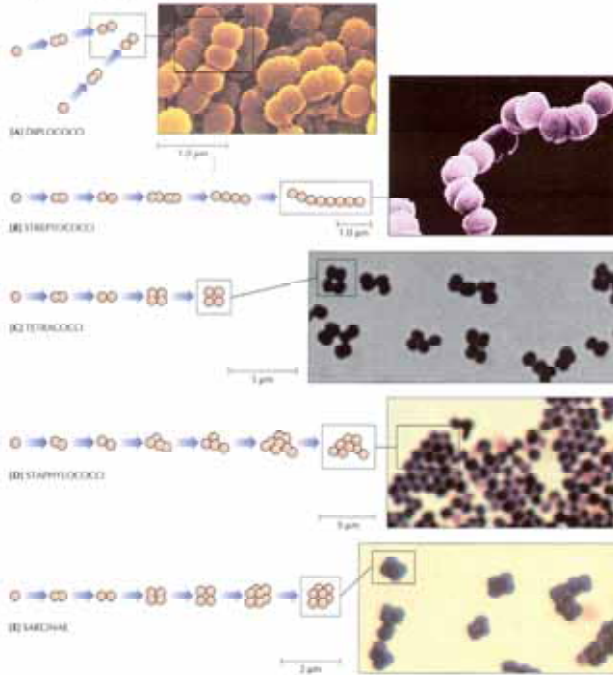


Observació Microscòpica

Agrupament de Cocs

FIGURE 4.4

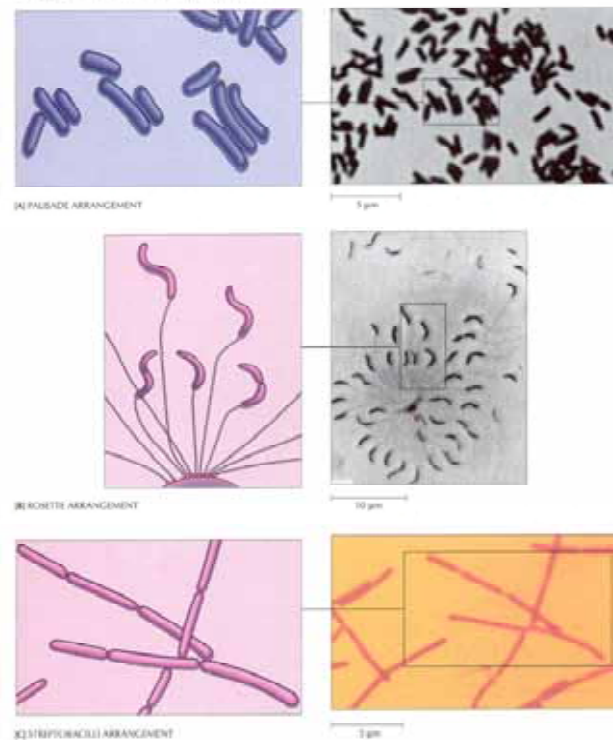
Characteristic arrangements of cocci, with schematic illustrations of patterns of multiplication. (A) Diplococci: cells divide in one plane and remain attached predominantly in pairs (scanning electron micrograph). (B) Streptococci: cells divide in one plane and remain attached to form chains (scanning electron micrograph). (C) Tetrads: cells divide in two planes and characteristically form groups of four cells. Spores shown in *Caulobacter* tetrad. (D) Staphylococci: cells divide in three planes, in an irregular pattern, producing "bunches" of cocci. Species shown is *Staphylococcus aureus*. (E) Sarcinae: cells divide in three planes, in a regular pattern, producing a cuboidal arrangement of cells.



Agrupament de Bacils

FIGURE 4.5

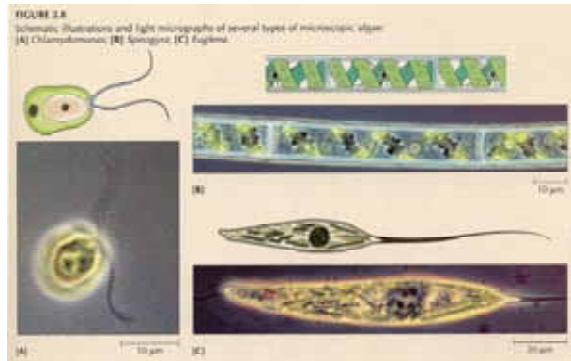
Patterns of arrangements of bacilli. (A) Palisade arrangement of *Corynebacterium diplosteris*. (B) Rosette arrangement of *Caulobacter* with enlargement of cell attachment sites. (C) Streptobacilli arrangement of *Streptobacillus*.



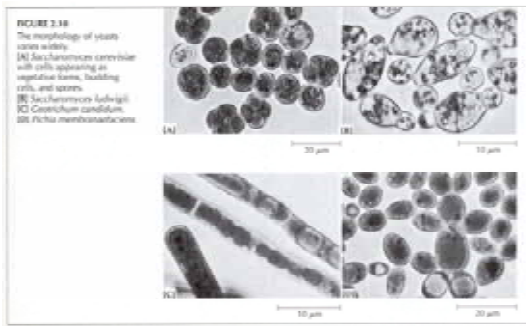
Algues: Microscòpiques i Macroscòpiques



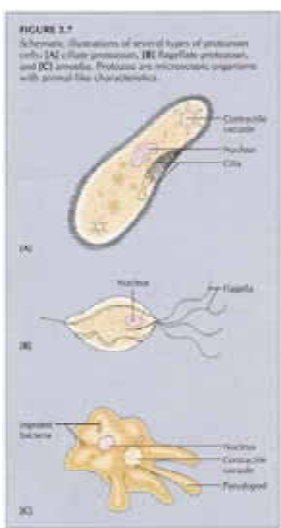
Figure 1.4. Todas les algues són fotosintetitzants. Algunes són microscòpiques i altres macroscòpiques. La El Rhodoglossum, la base de la cadena alimentària marítima, són algues unicel·lulars. A l'esquerra són tan abundants que omplen el fons. (2) Moltes algues macroscòpiques que es troben a una platja. El gelatinós és un alga paràsita, multicel·lular i multicel·lular, que creix en el Cladophora Pauciflorus.



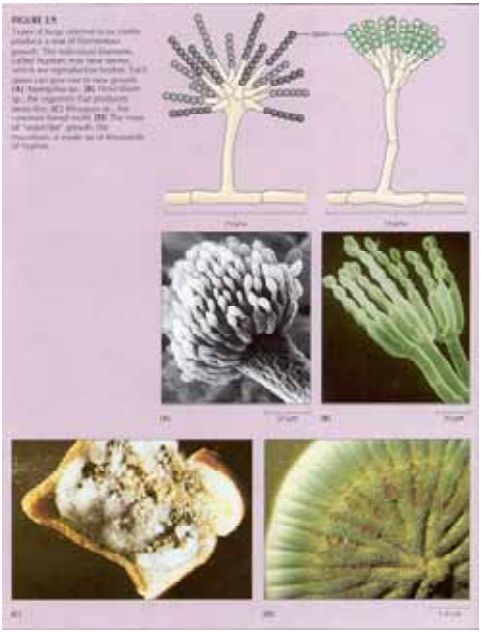
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Protozoans

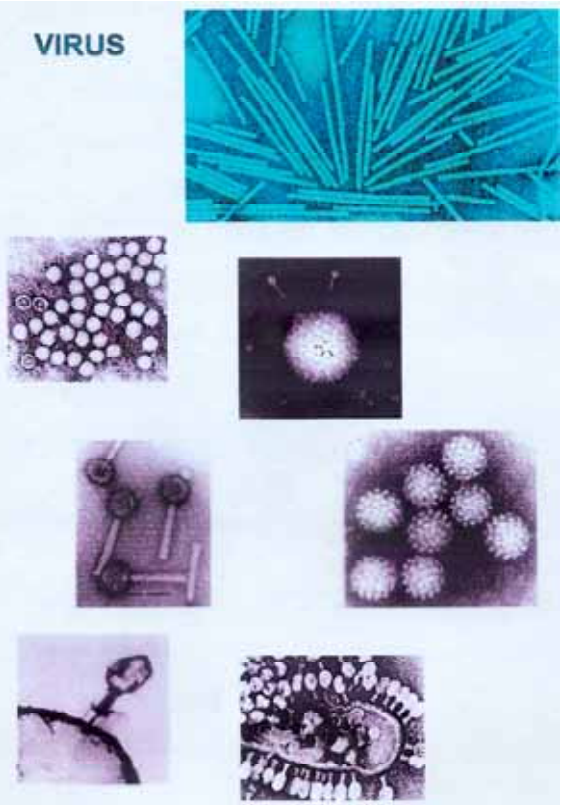


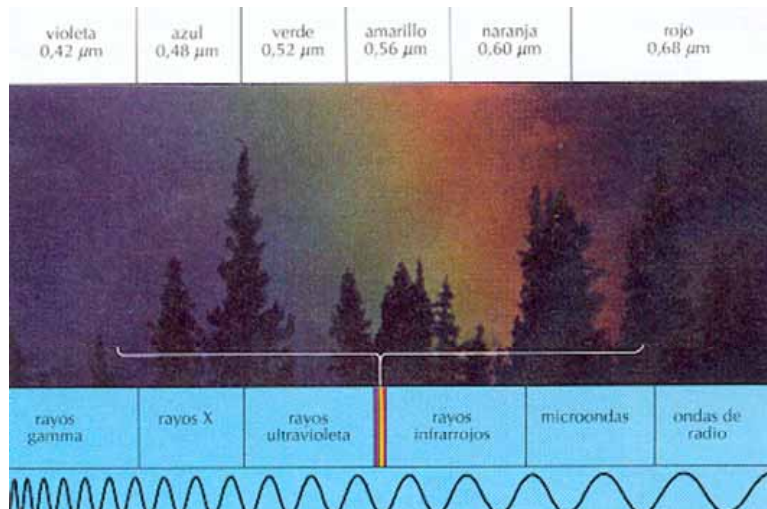
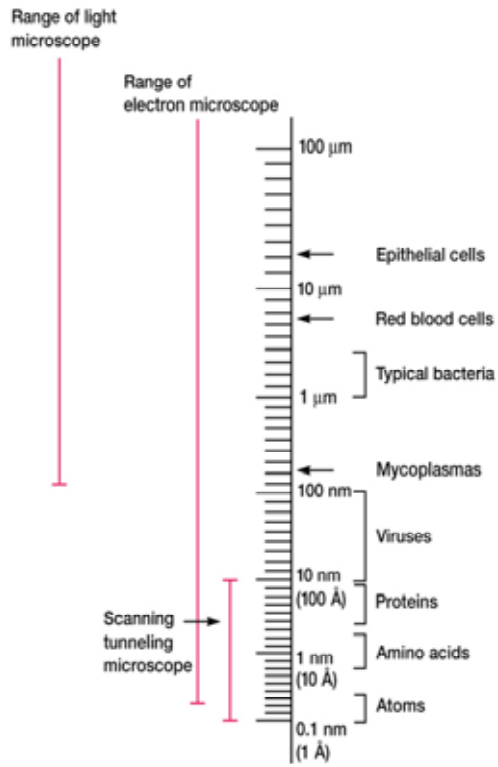
Fongs



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VIRUS



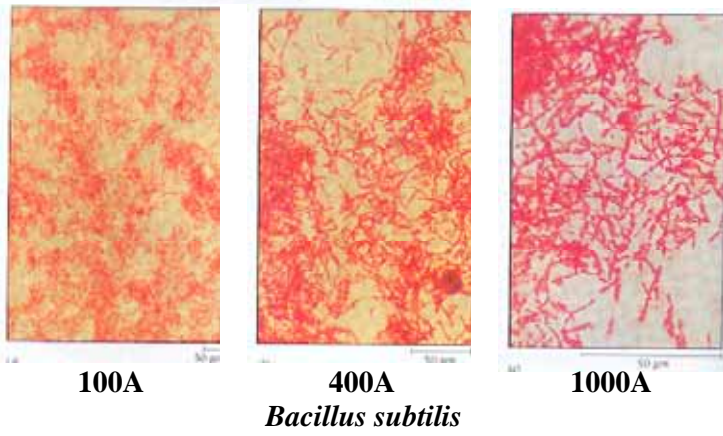
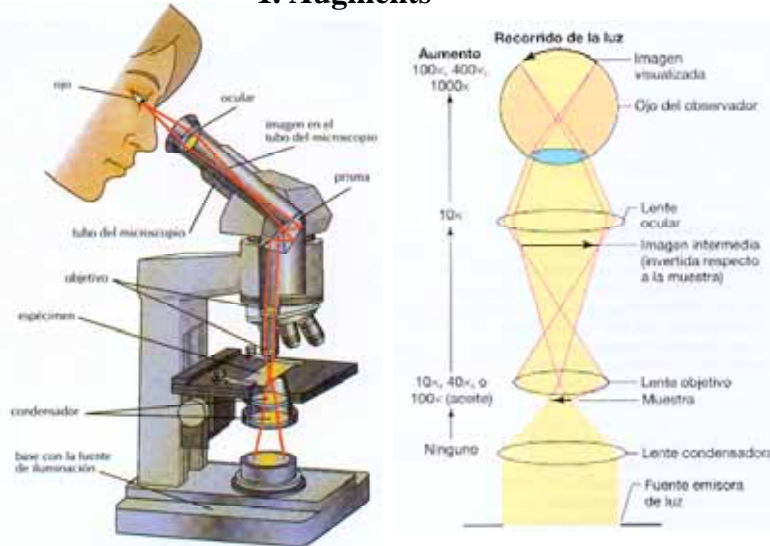


Llum visible (400-700 nm)

Per a realitzar una bona observació de la mostra cal tenir en compte:

- 1) Augment**
- 2) Resolució**
- 3) Contrast**

1. Augments



2. Resolució

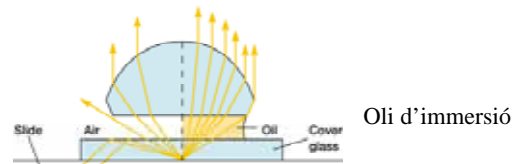
Poder de Resolució: és la distància mínima amb la que es poden visualitzar dos punts adjacents com a entitats separades.

Depèn de:

- tamany de l'objectiu
- longitud d'ona utilitzada per il·luminar la mostra (λ)
quan més curta millor
- índex de refracció del medi entre objectiu i la mostra (aire)

$$\text{Aire IR}=1$$

$$\text{Oli immersió IR}=1,5$$



3. Contrast

Propietat de l'objecte estudiat

*** en microorganismes pigmentats**



Alga verda (eucariota)
Cèl·lules de 15 μm de diàmetre



Bacteri fototròfic vermell (procariota)
Cèl·lules de 5 μm de diàmetre

*** en microorganismes no pigmentats:**
TINCIONS

Tinció Simple

Fixació de la Mostra:

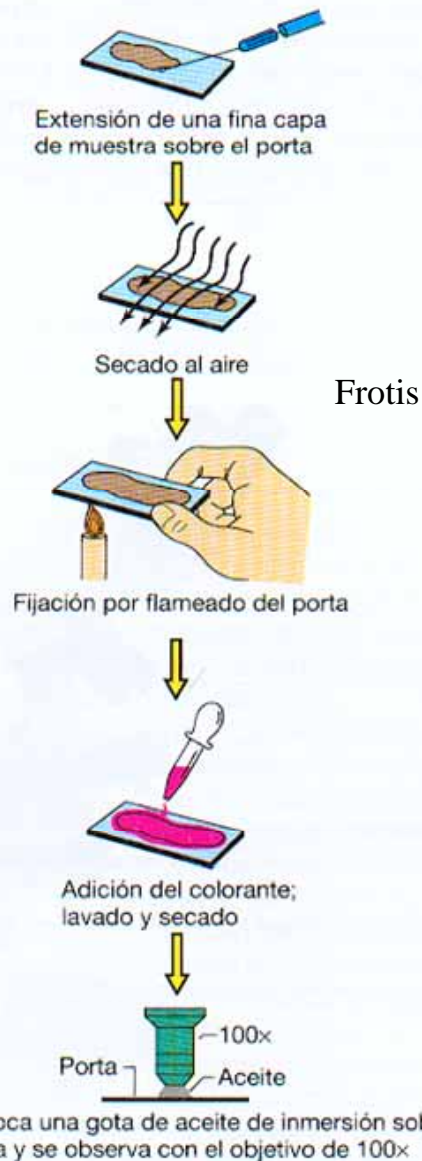
- Calor (flama)
- Química (fixadors químics)

Colorants:

- Bàsics (+), pH alts
 - Blau de metilè
 - Cristall Violeta
 - Safranina
 - Fucsina Bàsica
- Àcids (-), pH baixos
 - Eosina
 - Vermell Congo
 - Fucsina Àcida

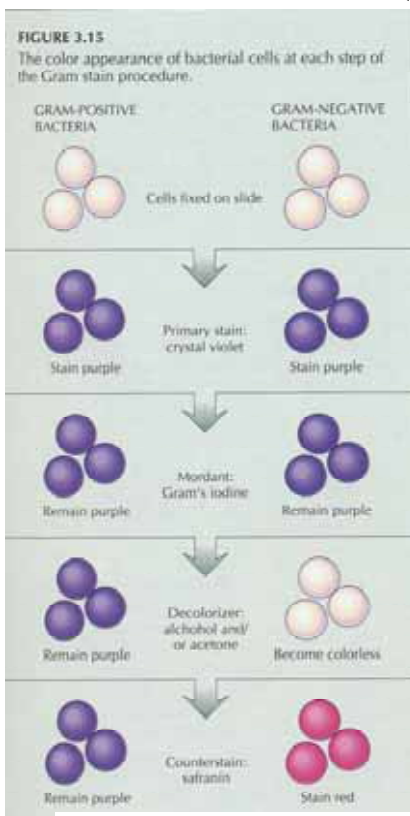
Tinció de la Mostra:

- Tinció Simple
 - tamany
 - forma
 - agrupament



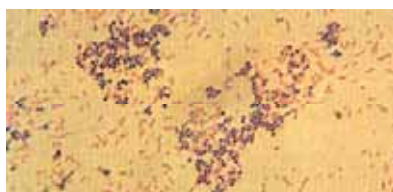
Tinció Diferencial

Tinció de GRAM (Christian Gram (1884))



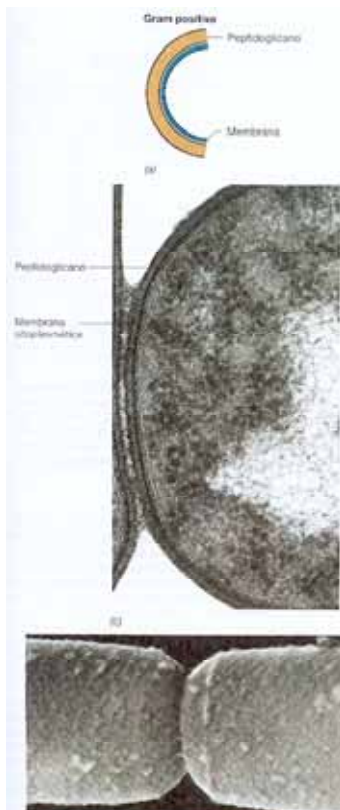
GRAM, Hans Christian Joachim (1853 - 1938)

Gram + Blau-Violeta
Gram - Vermell-Rosat



Staphylococcus aureus (G+)
Escherichia coli (G-)

Gram Positiu



Gram Negatiu



Tincions

TABLE 3.2
Summary of Preparations for Examination by Light Microscopy

Technique	Preparation	Application*
Wet mount and hanging drop	Drop of fluid containing the organisms on glass slide or cover slip	Study morphology, internal cell structures, motility, or cell changes
Staining procedure	Suspension of cells fixed to slide as a film, usually by heat	Various staining procedures
Simple stain	Film stained with a single dye solution	Shows size, shape, and arrangement of cells
Differential stains:	Two or more reagents used in staining process	Difference observable between cells or parts of cells
Gram	Primary stain (crystal violet) applied to film and then treated with reagents and counterstained with safranin	Characterizes bacteria in one of two groups: 1. Gram-positive—deep violet 2. Gram-negative—red
Acid-fast	Film stained with carbolfuchsin, decolorized, and counterstained with methylene blue	Separate acid-fast bacteria, those not decolorized when acid solution is applied (e.g., mycobacteria), from non-acid-fast bacteria, which are decolorized by acid
Giemsa	Stain applied to blood smear or film of other specimens	Observation of protozoa in blood smear; rickettsia (small parasitic bacteria) in certain cells of the host; nuclear material in bacteria
Endospore	Primary stain (malachite green) applied with heat to penetrate spores; vegetative cells counterstained with safranin	Endospores can be seen in <i>Bacillus</i> and <i>Clostridium</i> species
Capsule	Smear stained following treatment with copper sulfate	Capsule can be observed as a clear zone surrounding cells of capsulated microorganisms
Flagella	Mordant acts to thicken flagella before staining	Observe flagella on bacteria
Negative staining	Specimen mixed with India ink and spread into thin film	Study morphology; staining procedure and reagents are very mild in their effect on the microorganism; called a negative stain because the microorganism is unstained and is made visible because the background is dark

*The bacterial structures referred to are described in Chapter 4.

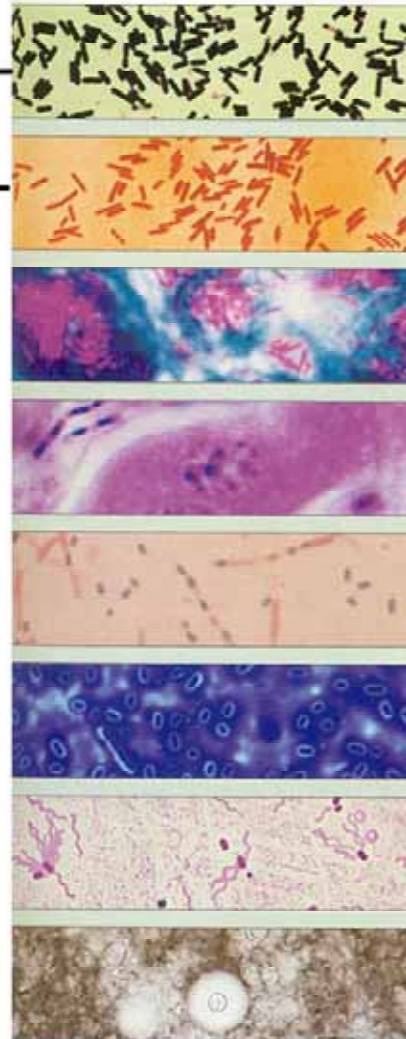
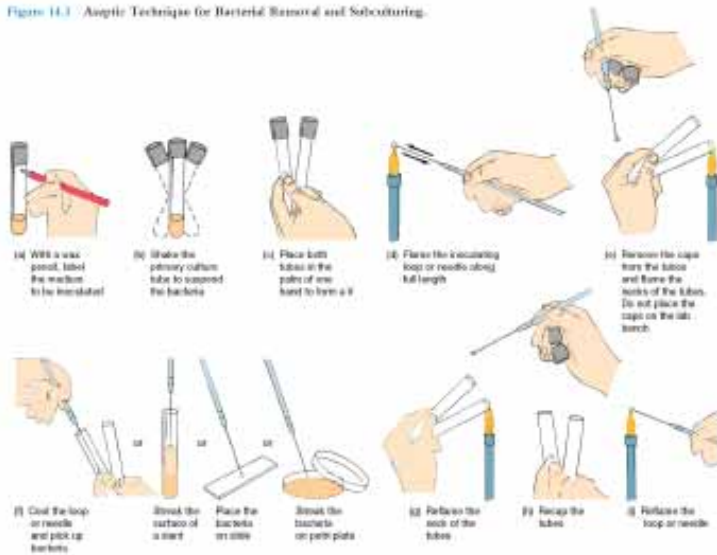


Figure 14.3 Aseptic Technique for Bacterial Removal and Subculturing.



Tècnica i Transferència Asèptica

Líquid a líquid
 Líquid a Sòlid
 Sòlid a Sòlid
 Sòlid a Líquid

Nansa de Kolle

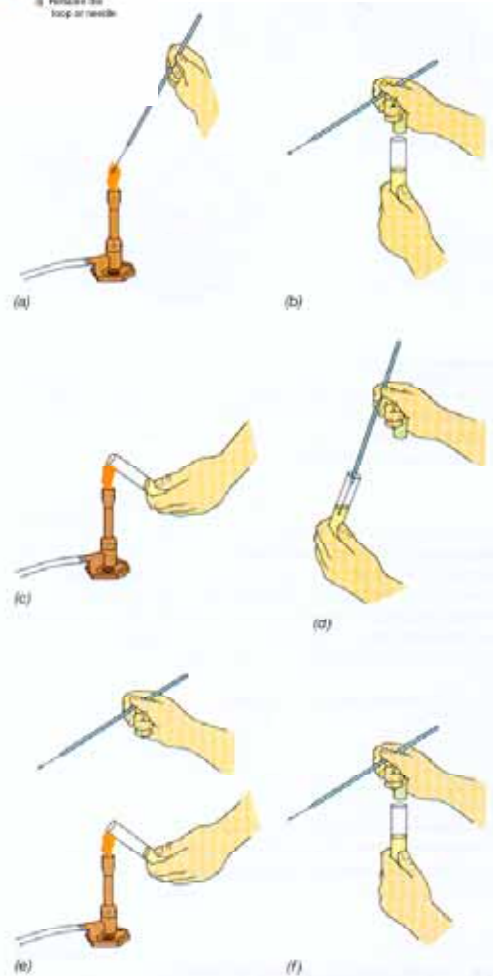
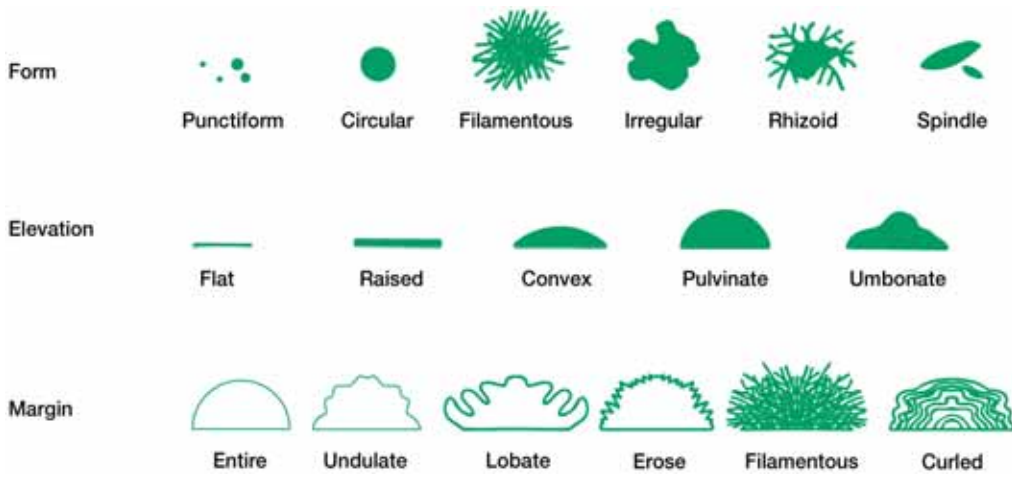


Figura 5.3 Transferència asèptica. (a) El asa de siembra se calienta hasta la incandescencia y se enfría brevemente al aire. (b) El tubo se destapa. (c) Se pasa el extremo del tubo por la llama. (d) Se extrae la muestra con el asa esterilizada. (e) Tras tomar la muestra con el asa, se vuelve a flamear el extremo del tubo y la muestra se deposita en un medio estéril. (f) Se vuelve a tapar el tubo. El asa se recalienta de nuevo antes de finalizar su utilización.

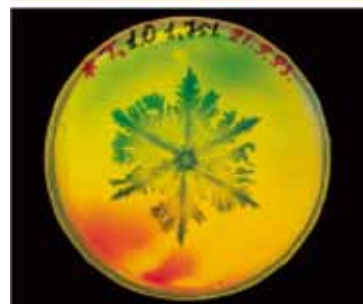
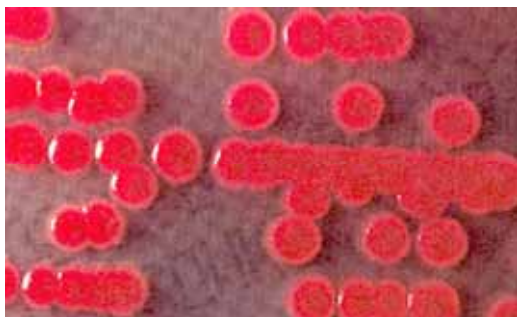
Creixement en Placa: Colònies

FIGURE 3.1

Colonies of microorganisms that have grown on a nutrient agar plate after being exposed to room air.



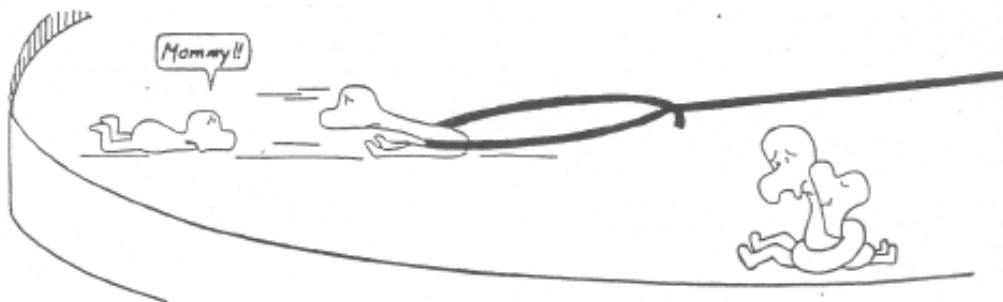
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The isolated bacteria give rise to single colonies of genetically identical, listless individuals.

COLÒNIA



Torn from their families, a few poor, pathetic souls are isolated onto agar plates.

However, sometimes there are fast familial ties that cannot be broken.