

MATERI KULIAH MIKROBIOLOGI STRUKTUR FUNGSI SEL PROKARIOTIK 2

Anna Rakhmawati

Jurdik Biologi FMIPA UNY

Email: anna_rakhmawati@uny.ac.id

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DINDING SEL PROKARIOTIK

- struktur komplek, semirigid, menentukan ukuran sel
 - Mengelilingi lapisan dibawahnya dan melindungi
 - Menjaga sel tdk pecah ketika tekanan air dlm sel lbh besar drpd di luar sel
 - tempat terkaitnya flagella
 - sisi aksi antibiotik
- Komposisi-----membedakan tipe utama bakteri

KOMPOSISI ----- PEPTIDOGLIKAN

-Peptidoglikan (murein)---disakarida yg berulang dikaitkan polipeptida----membentuk kisi-kisi

-bagian disakarida--monosakarida

N-acetylglucosamin (NAG) dan N-acetylmuramic acid

-bagian peptida --- cross-link asam amino--polipeptida

-Gram negatif --- pembentukan ikatan peptida ikt atr grup amino -grup karboksil

ex: *E. coli*

-Gram positif--- peptida interbridge

ex: *S. aureus*

STRUKTUR PEPTIDOGLIKAN GRAM NEGATIF

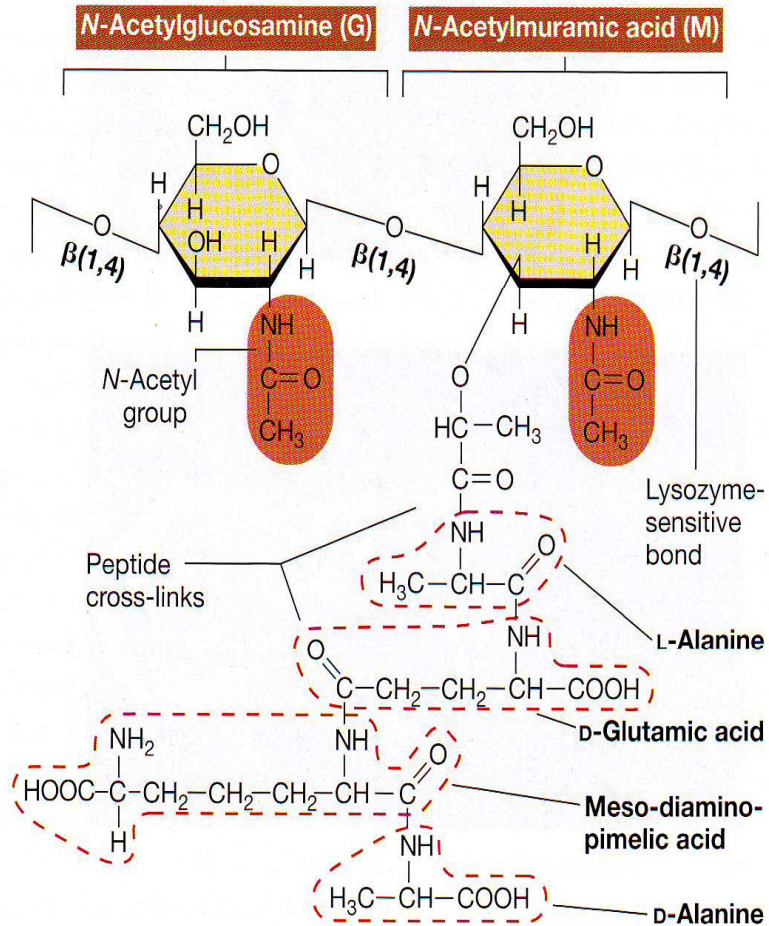
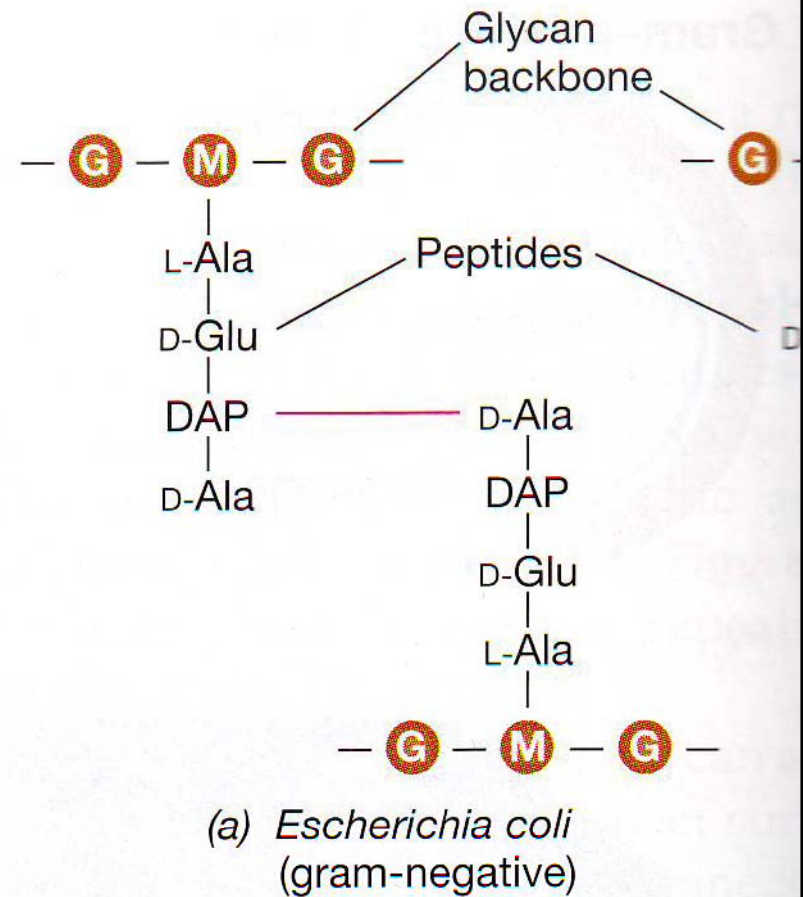
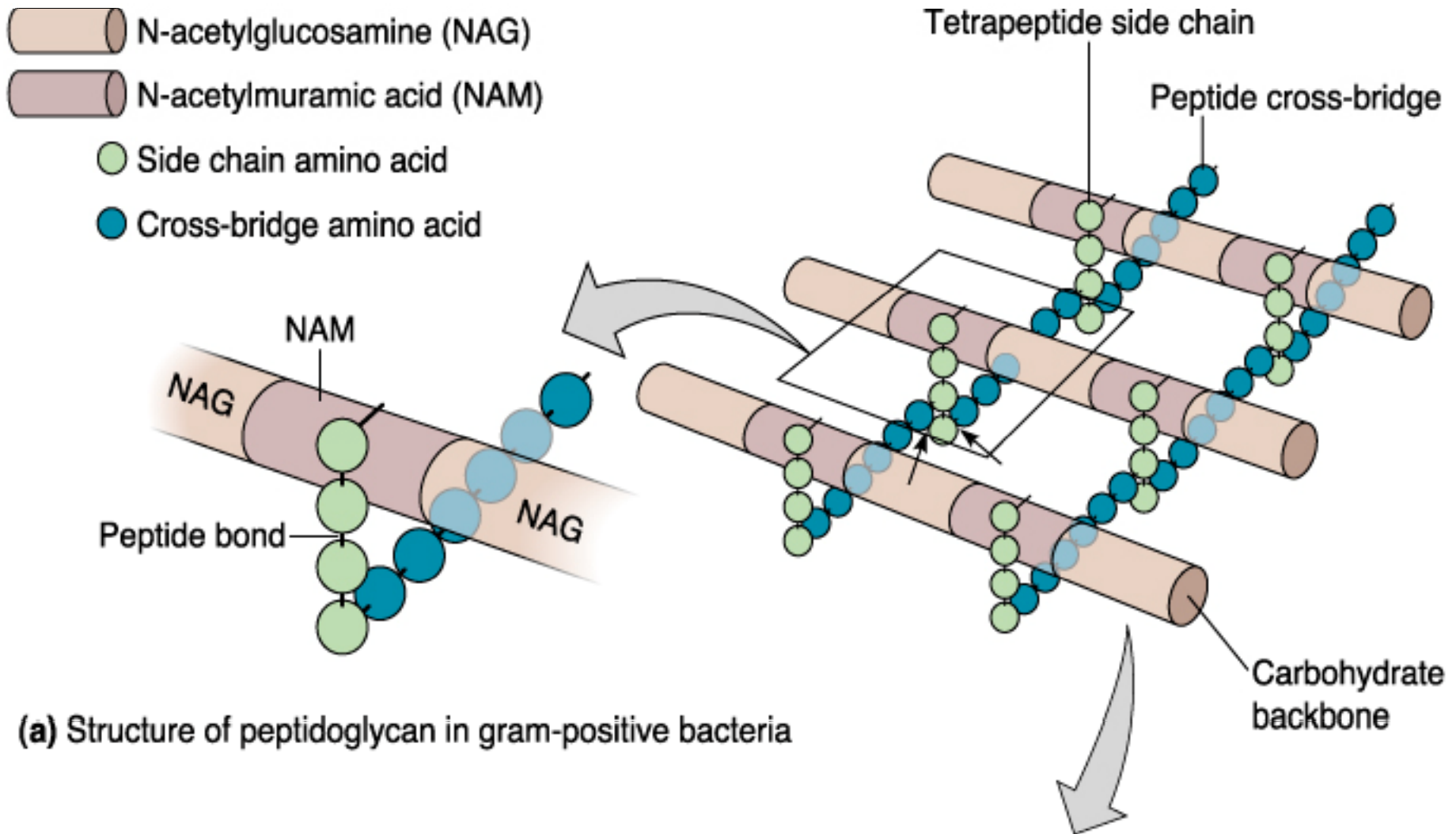


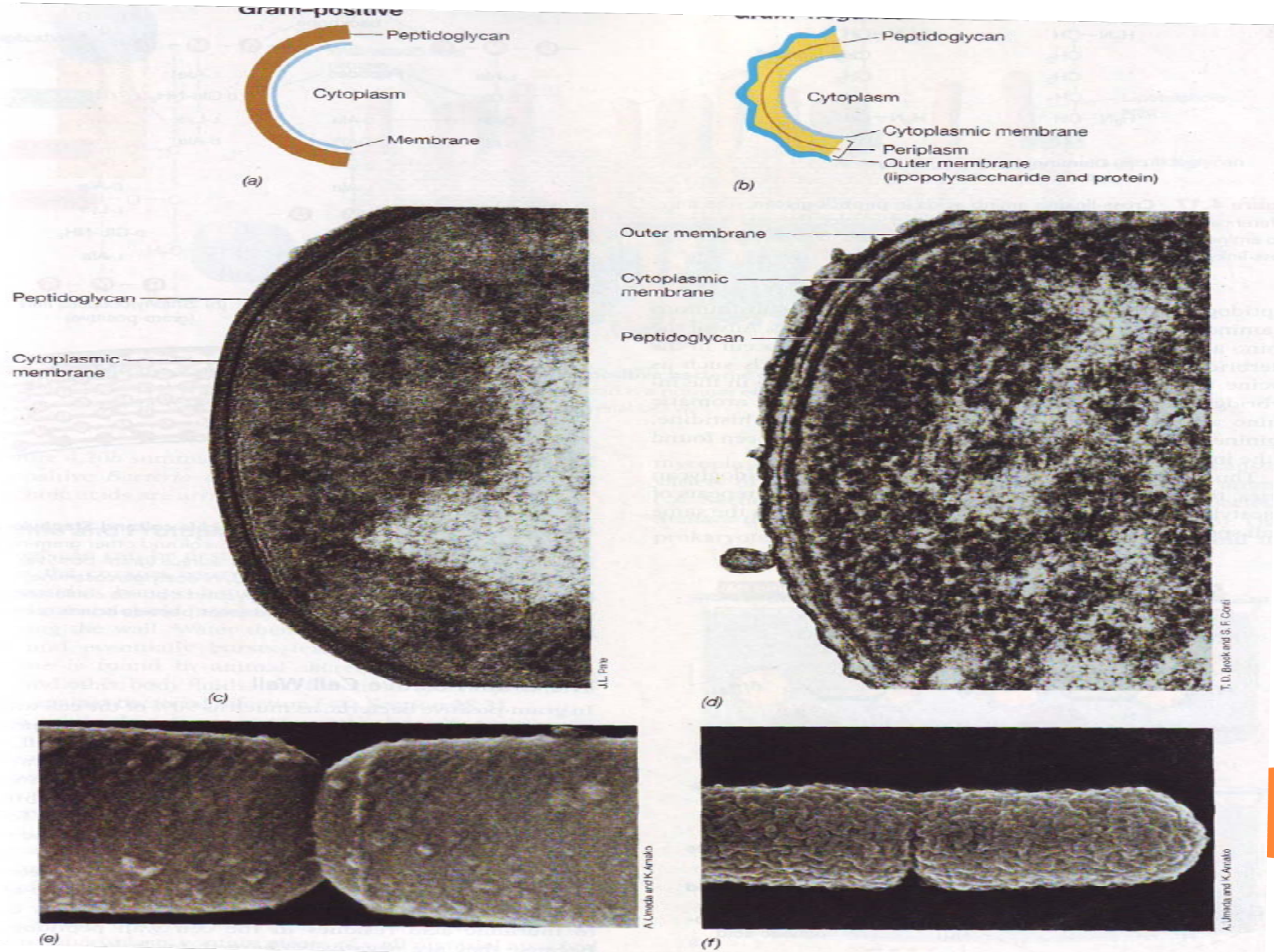
Figure 4.18 Structure of the repeating unit in peptidoglycan, the glycan tetrapeptide. The structure given is that found in *Escherichia coli* and most other gram-negative *Bacteria*. In some *Bacteria*, other amino acids are found.



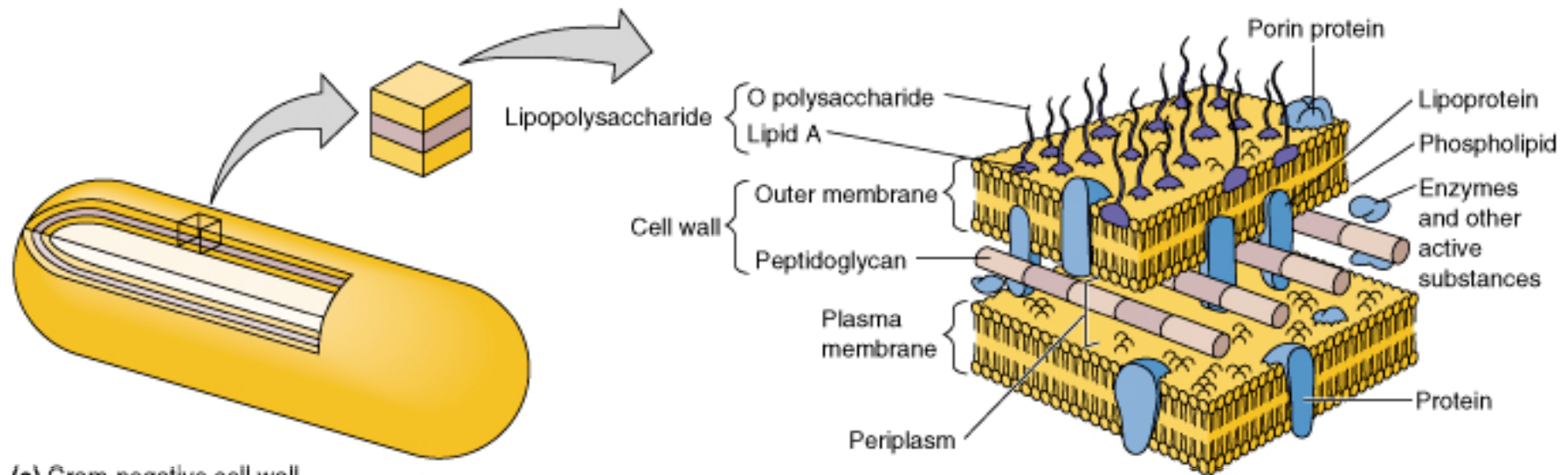


(a) Structure of peptidoglycan in gram-positive bacteria

PERBANDINGAN DINDING SEL



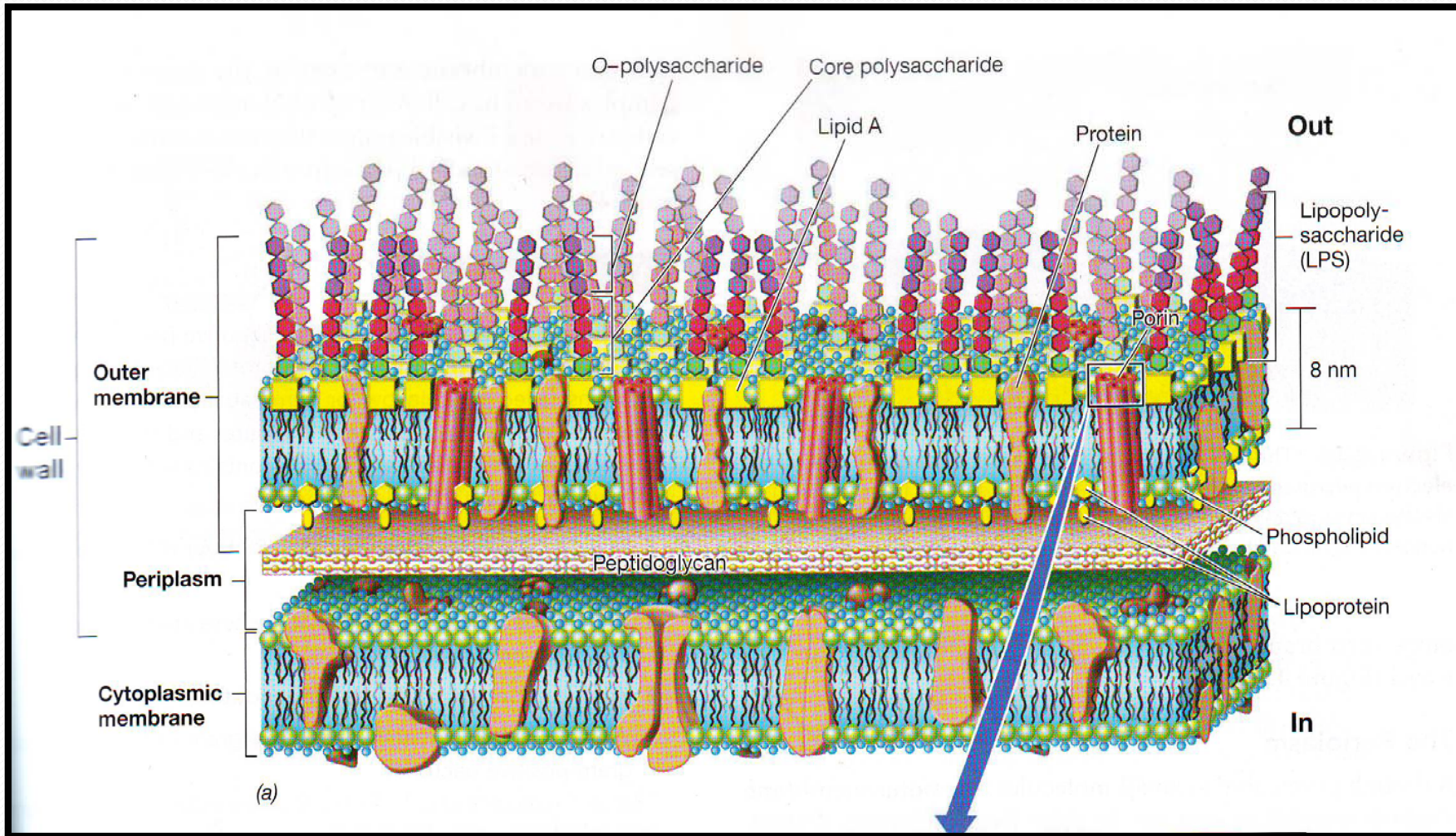
Dinding sel bakteri Gram negatif



(c) Gram-negative cell wall

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Membran luar bakteri Gram negatif



Struktur lipopolisakarida

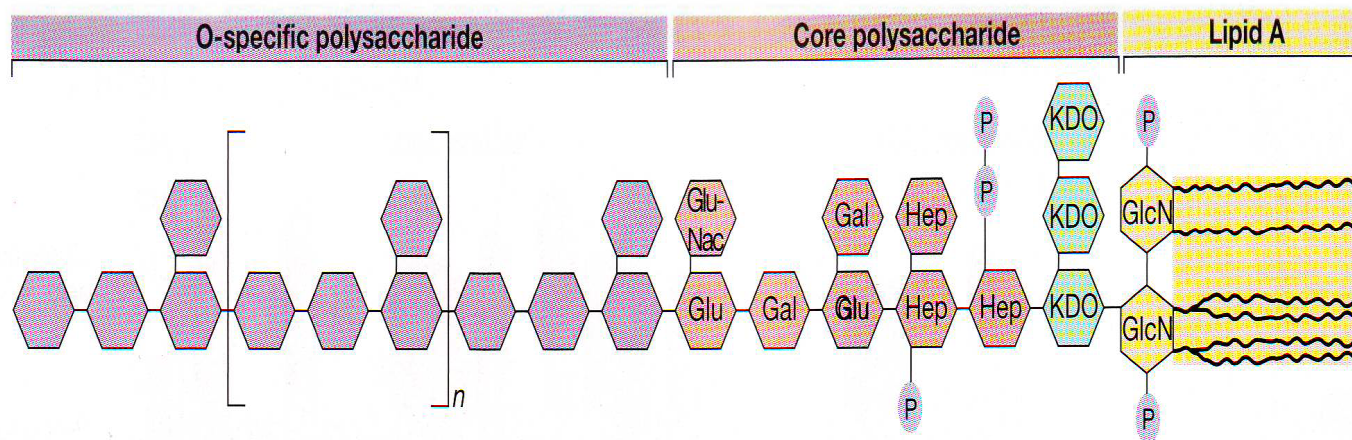


Figure 4.22 Structure of the lipopolysaccharide of gram-negative *Bacteria*. The chemistry of lipid A and the polysaccharide components varies among species of gram-negative *Bacteria*, but the major components (lipid A–KDO–core–O-specific) are typically the same. The O-specific polysaccharide varies greatly among species. KDO, ketodeoxyoctonate; Hep, heptose; Glu, glucose; Gal, galactose; GluNac, N-acetylglucosamine; GlcN, glucosamine; P, phosphate. Glucosamine and the lipid A fatty acids are linked through the amine groups. The lipid A portion of LPS can be toxic to animals and comprises the endotoxin complex. Compare this figure with Figure 4.23 and follow the LPS components by the color-coding.

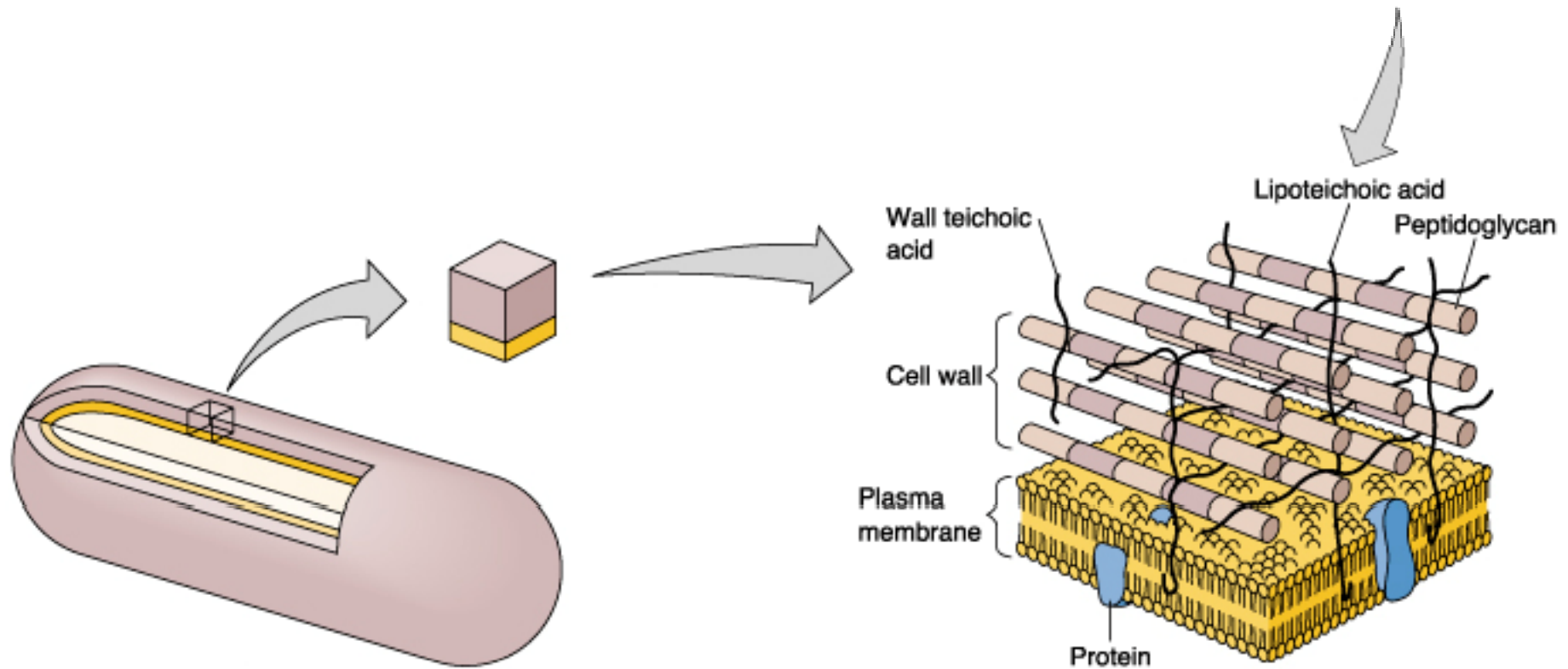
Membran luar bakteri Gram negatif

- second lipid bilayer
- struktur beda dg membran plasma
- relatif lebih permeabel
- tidak permeabel thd enzim atau molekul besar
- Lipopolisakarida---O polisakarida-core polisakarida-lipid A
- Lipid A ---asam lemak-glukosamin-fosfat---(endotoksin)
- lipoprotein-pengikatan antara membran luar & peptidoglikan
- porin- saluran keluar masuk substansi hidofilik BM rendah

Periplasma

- Letak antara permukaan terluar membran plasma & permukaan dalam membran luar
- seperti jeli-konsentrasi protein tinggi
- enzim hidrolitik; *binding* protein; kemoreseptor

Dinding sel bakteri Gram Positif



(b) Gram-positive cell wall

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Dinding sel bakteri Gram positif

asam teikoat-muatan negatif-mengikat ion+
pertumbuhan sel, menjaga kerusakan dinding

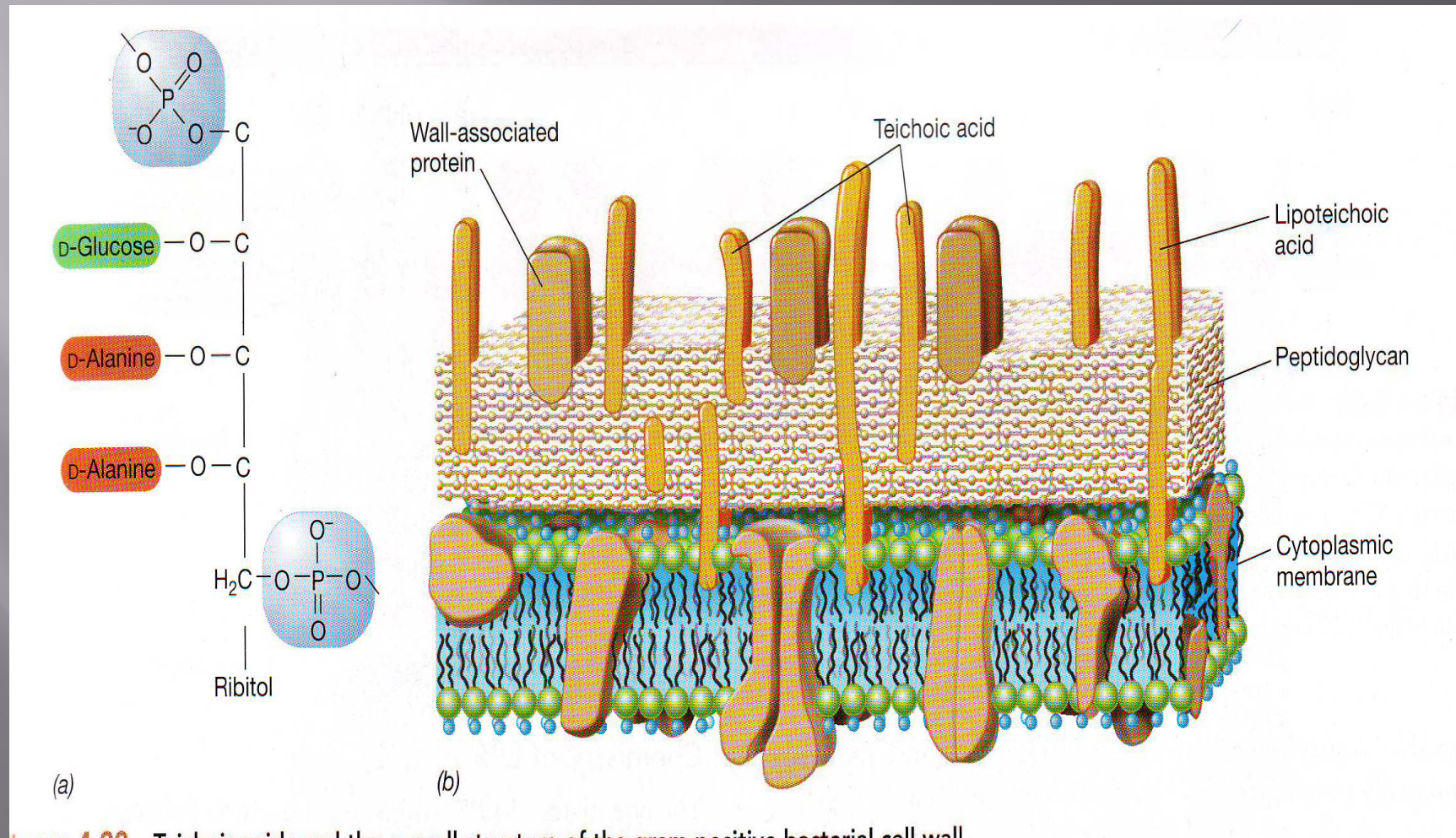
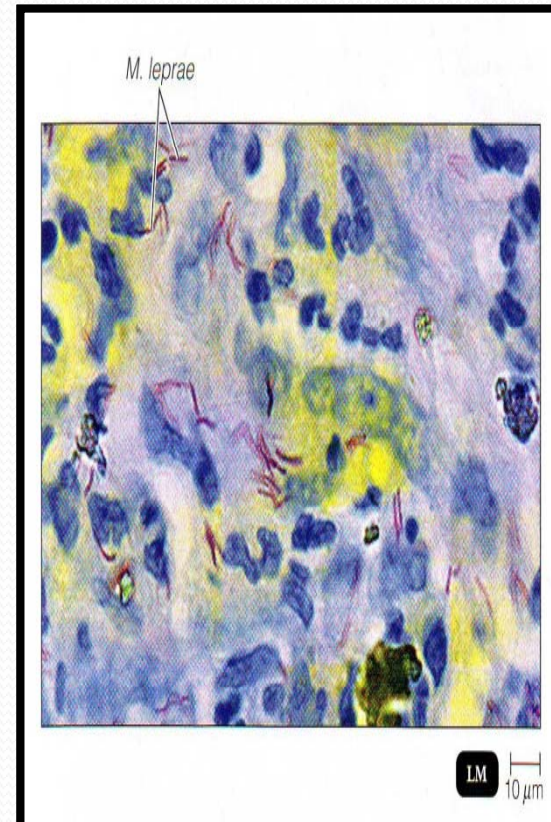


Figure 4.20 Teichoic acids and the overall structure of the gram-positive bacterial cell wall

Dinding sel bakteri lain

- Tidak mpy ddg sel-
Mycoplasma-membran plasma-
sterol
- Tahan asam (acid fast) –senyw
lipid –mycolic acid-
Mycobacterium



Pengamatan sel bakteri

Tidak berwarna pengecatan
Olesan fiksasi cat dicuci keringkan mikroskop
Teknik pengecatan sederhana, diferensial, khusus

Pengecatan Gram

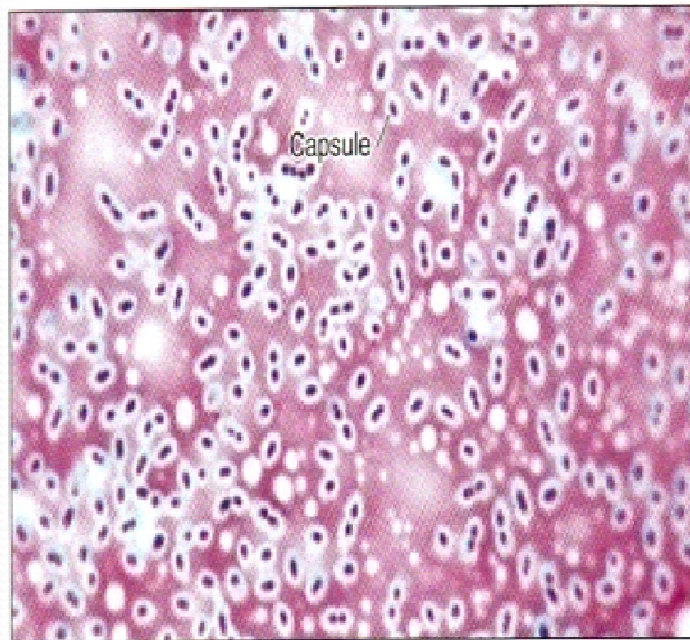
diferensial Gram + (ungu) dan – (merah)

umum digunakan identifikasi

Gram A (cv); B (iod); C (alkohol); D (safranin)

Bentuk sel dan sifat Gram

Pengecatan khusus



(a) Negative staining

LM |-----|
10 μ m



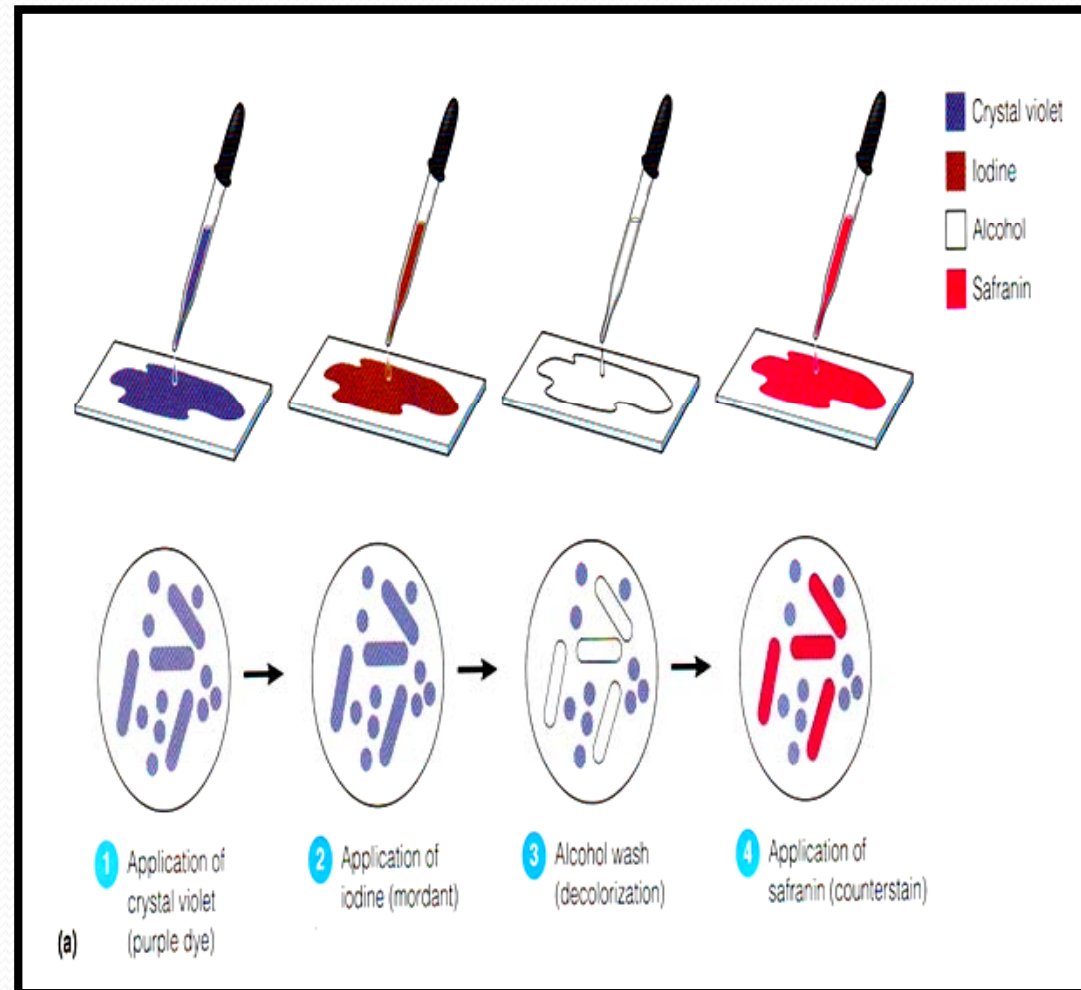
(b) Endospore staining

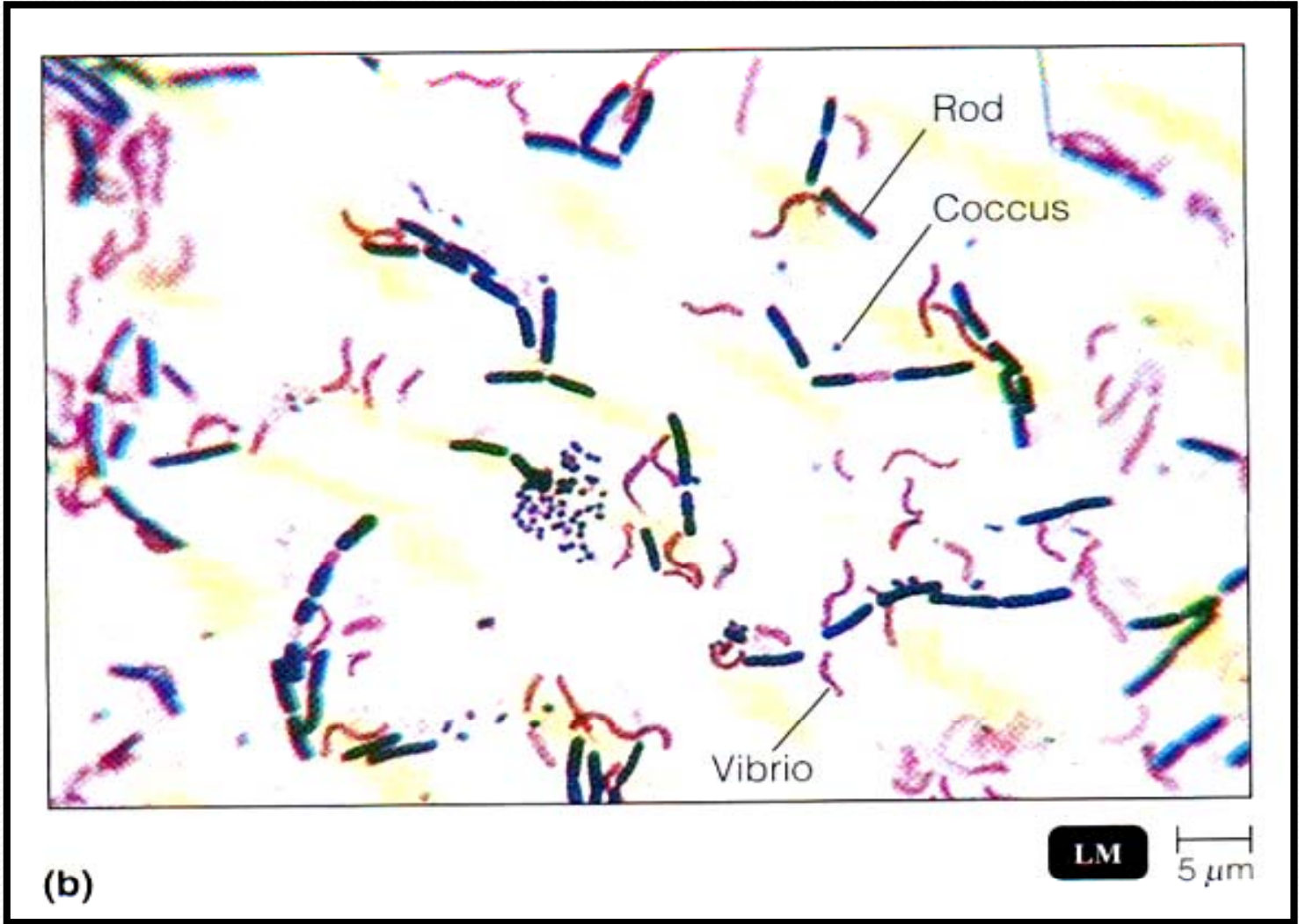
LM |-----|
10 μ m

Pengecatan Gram

CV dinding sel, membran sel
ungu
Kompleks cv-I

Alkohol lipid
Gram - kehil lipid OM
Kompleks cv-I hilang
Gram + dehidrasi
Kopleks cv-I tetap
Safranin merah





Dinding sel archaea

1. Pseudomurein

N-acetylglucosamine-N-acetyltalosaminuronic acid
ikatan glikosidik β -1,3 ex: Methanobacterium

2. Polisakarida

-glukosa, glucorinic acid, uronic acid galactosamin,asetat
ex: Methanosarcina

-+ sulfat yg bermuatan negatif-mengikat Na^+
ex: Halococcus

3. Lapisan S (S layers)

struktur parakristalin-protein/glikoprotein
mayoritas Archaea

4. Glikoprotein

asam amino glutamat tunggal (backbone)-glukosa

Dinding sel Archaea

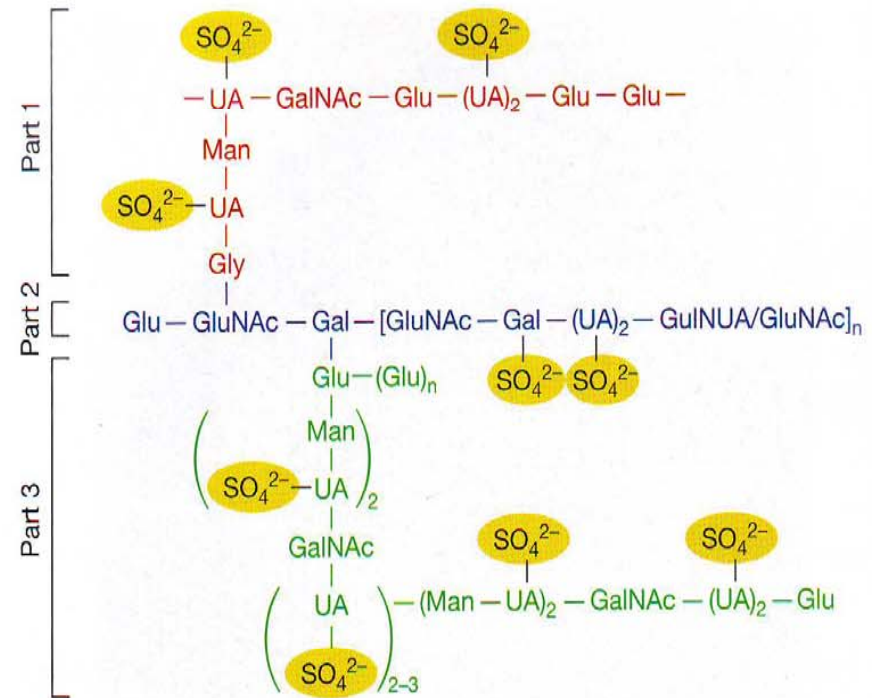
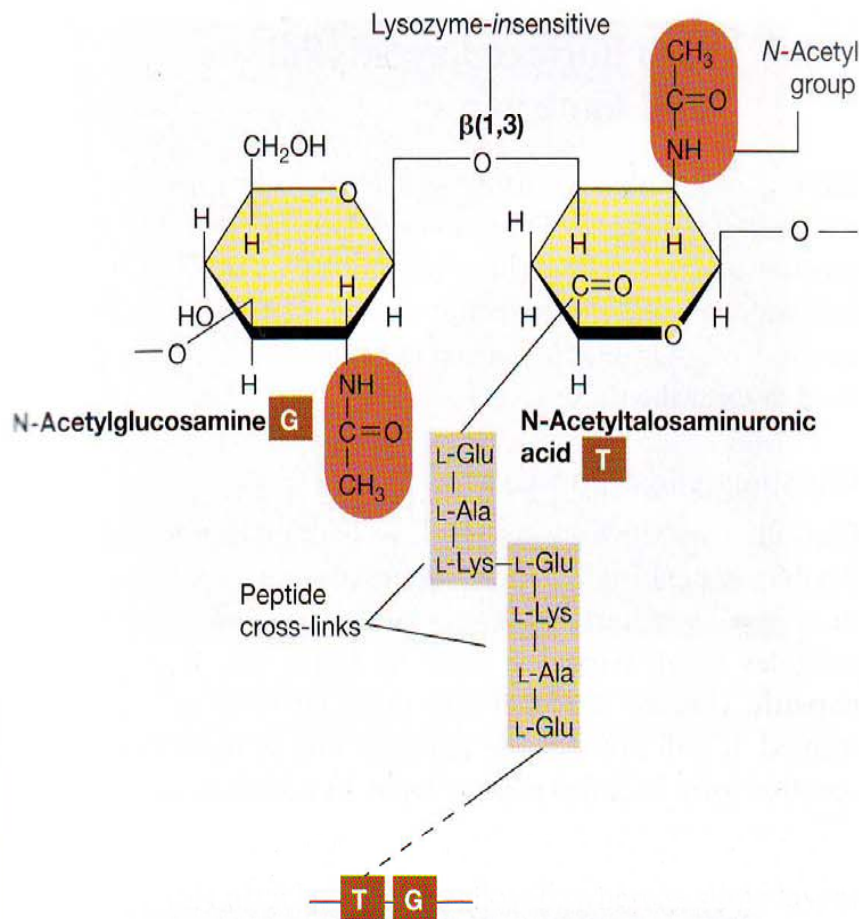
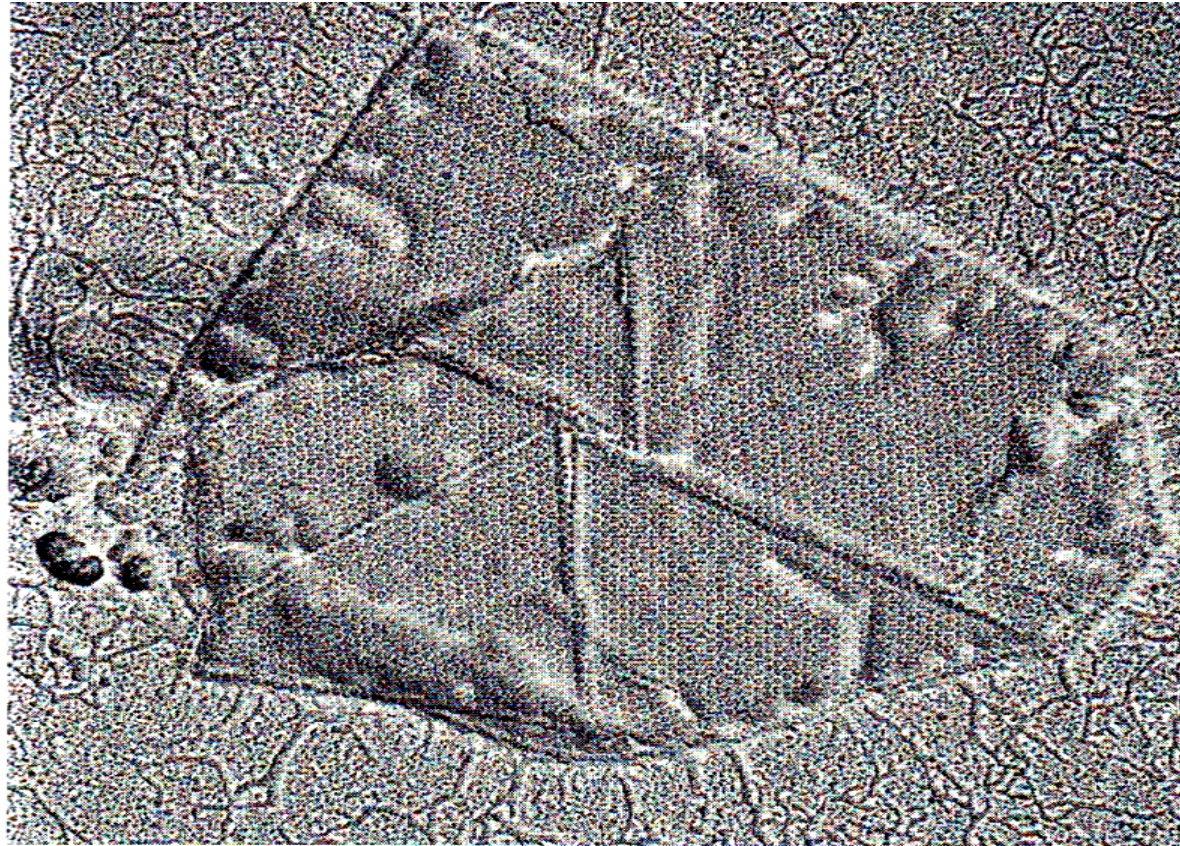


Figure 4.26 Polysaccharide cell walls of Archaea. Shown is the cell wall structure of *Halococcus*, an extreme halophile. The wall consists of a repeating three-part structure. UA, uronic acid; Glu, glucose; Gal, galactose; GluNAC, N-acetylglucosamine, GalNAc, N-acetylgalactosamine; Gly, glycine; GulNUA, N-acetylgulosaminuronic

Lapisan S



Archae-prokariotik,ekstrem

Dinding sel-pseudomurein

Lipid membran-phytanol

