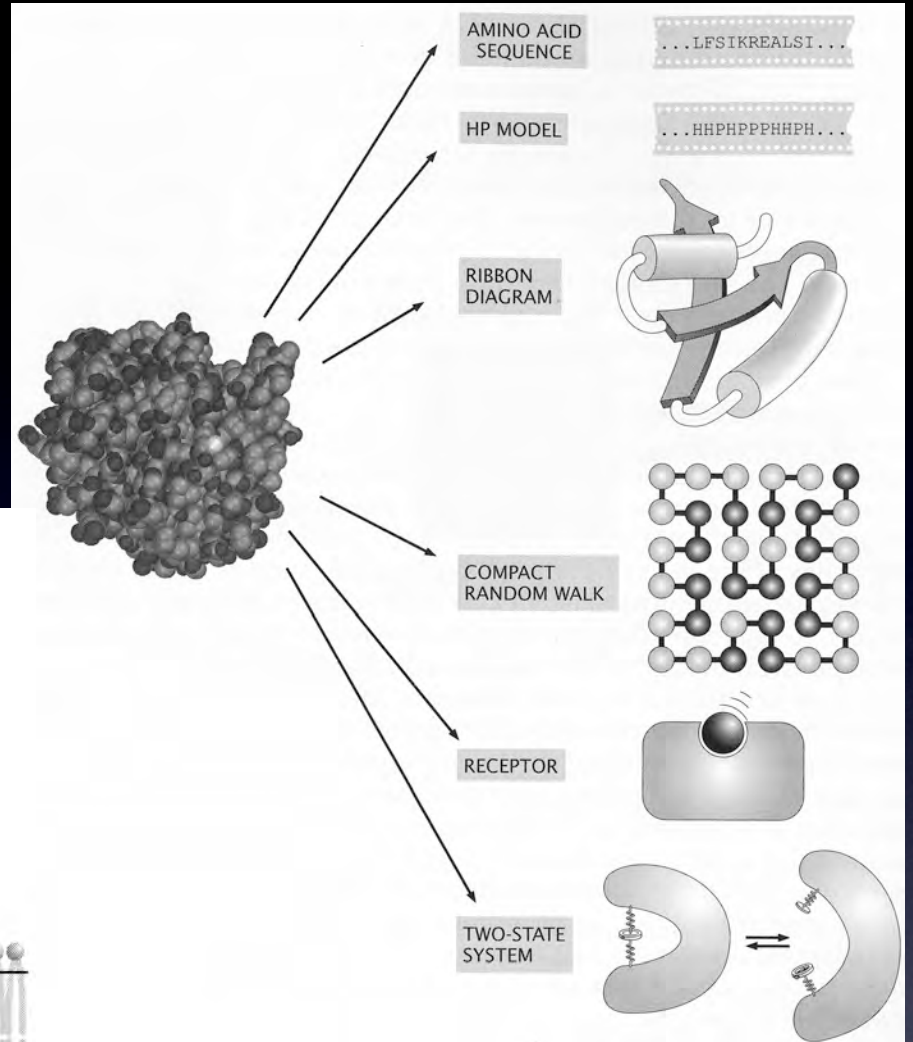
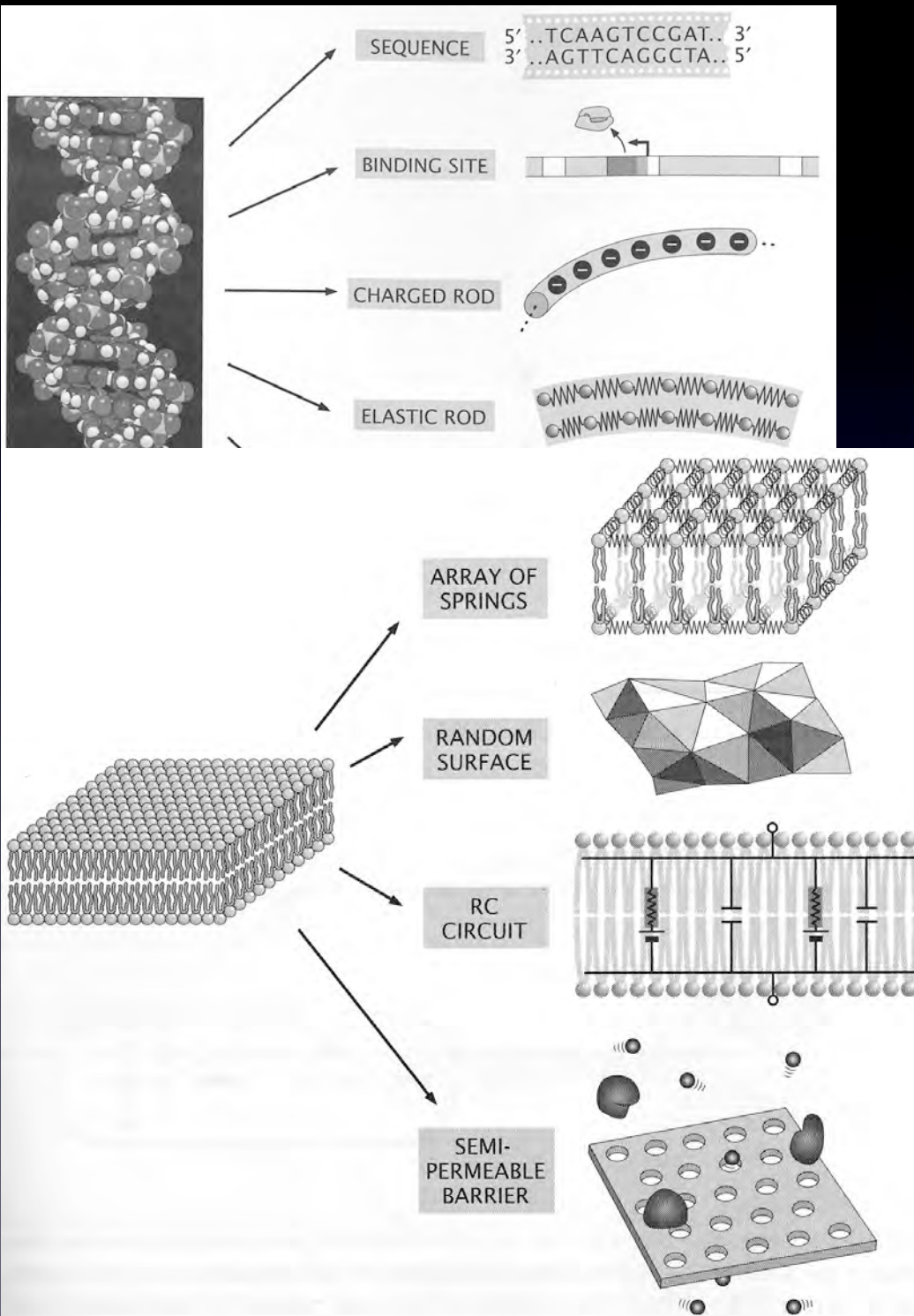
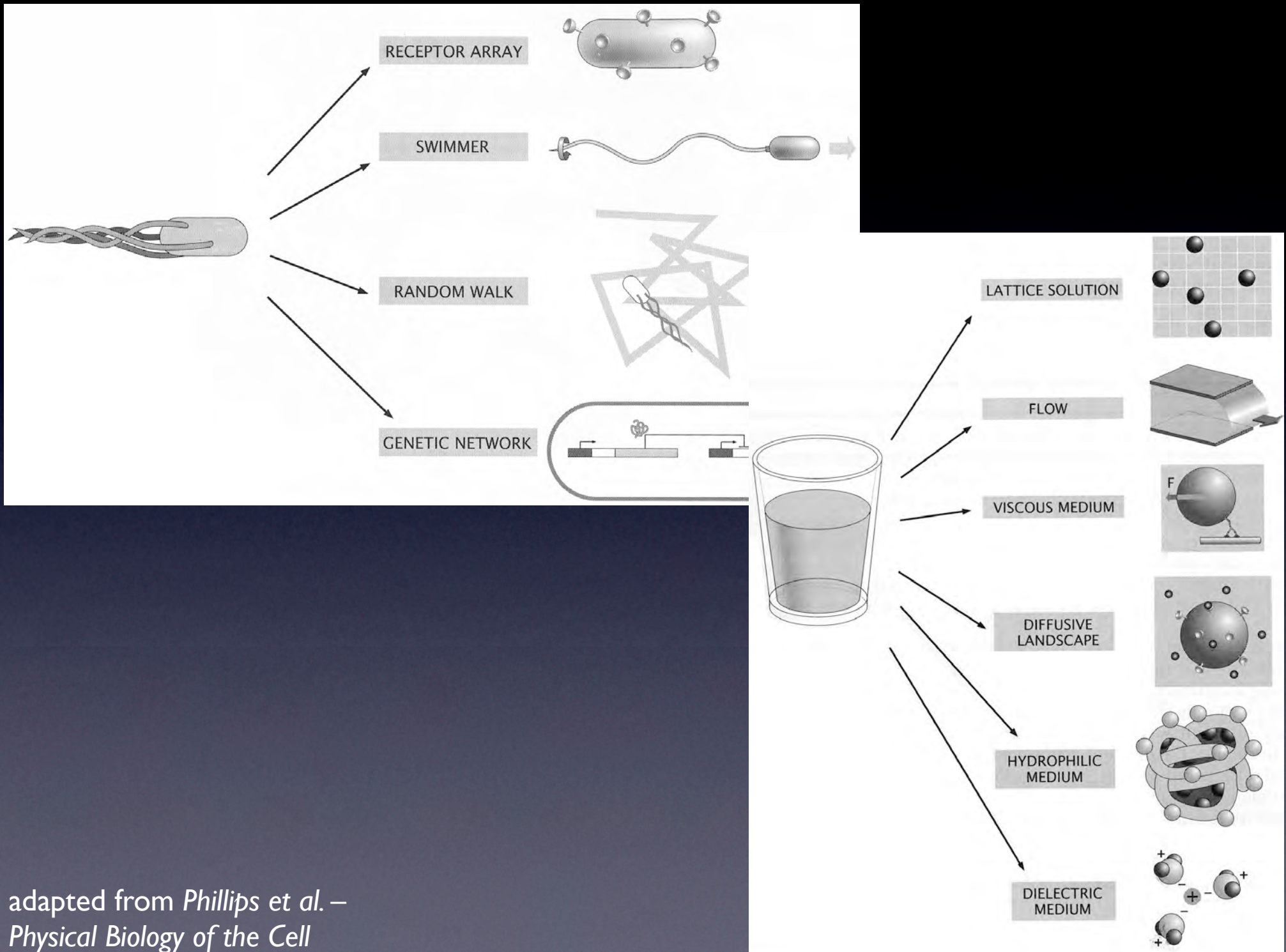




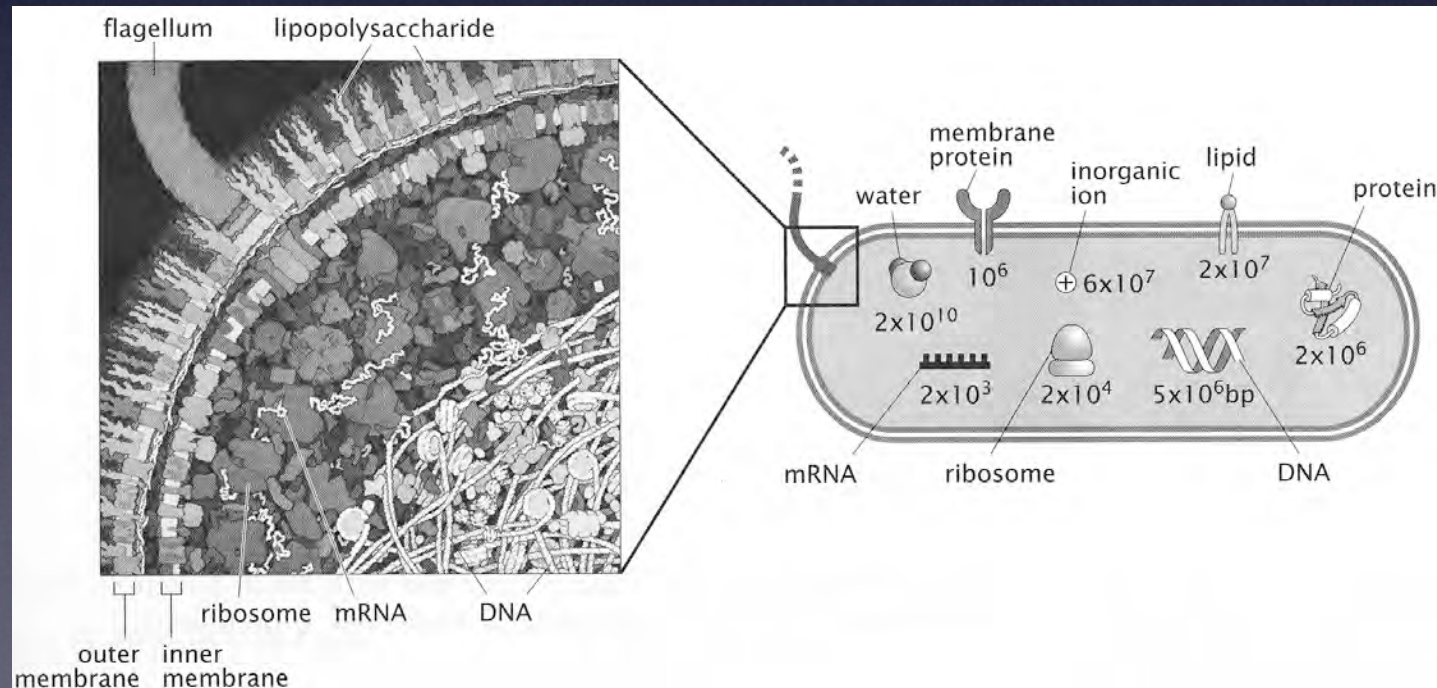
adapted from Phillips et al. –
Physical Biology of the Cell



E. coli

adapted from Phillips et al. –
Physical Biology of the Cell

cell volume	$V_{E\ coli}$	$1\ \mu\text{m}^3$
cell mass	$m_{E\ coli}$	$1\ \text{pg}$
repl cycle time	$t_{E\ coli}$	$3,000\ \text{s}$
surface area	$A_{E\ coli}$	$6\ \mu\text{m}^2$
genome length	$N_{E\ coli}$	$5 \times 10^6\ \text{bp}$
swimming speed	$V_{E\ coli}$	$20\ \mu\text{m/s}$



double-stranded DNA

length per bp	l_{bp}	0.34 nm
volume per bp	V_{bp}	1 nm ³
charge density per unit length	λ_{DNA}	2 e/0.34 nm
persistence length	ξ_{DNA}	50 nm

amino acids and proteins

typical diameter	$d_{protein}$	4–5 nm
typical volume	$V_{protein}$	25 nm ³
avrg. mass of AA	M_{AA}	100 Da
typ. protein mass	$M_{protein}$	30 kDa
protein conc in cell	$c_{protein}$	300 mg/mL
diffusion const in water	$D_{protein}$	100 $\mu\text{m}^2/\text{s}$

lipid bilayers

thickness	d_{bl}	5 nm
area per lipid	A_{lipid}	0.5 nm ²
lipid mass	m_{lipid}	800 Da
self-diffusion const	D_{lipid}	5 μm ² /s