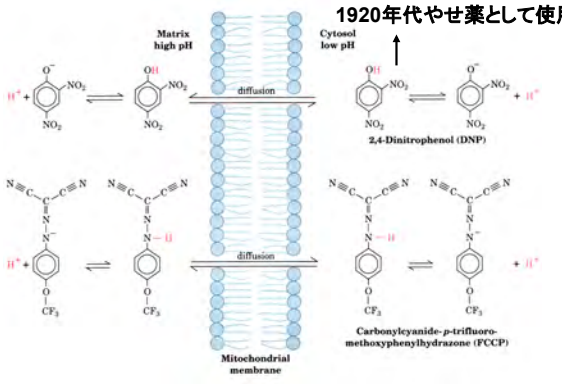
プロトノフォア（脱共役剤）

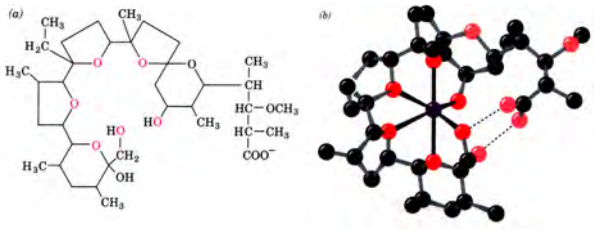
死亡

1920年代やせ薬として使用



モネンシン

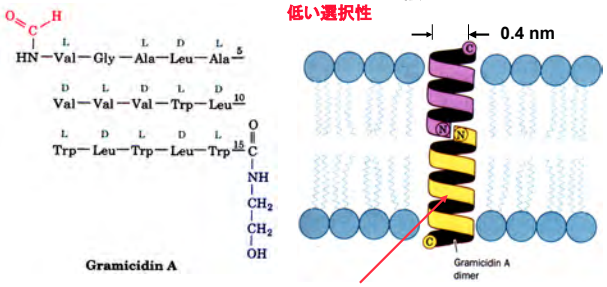
Na⁺と結合する線状ポリエーテルカルボン酸



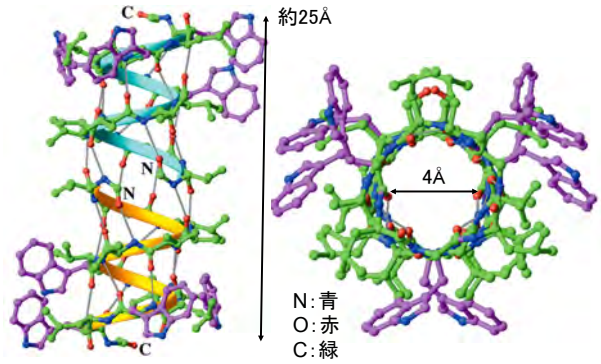
グラミシジン

15アミノ酸からなる直鎖ペプチド
チャネルを作って一価のカチオンを通す

10^7 K⁺ イオン/secで輸送
低い選択性

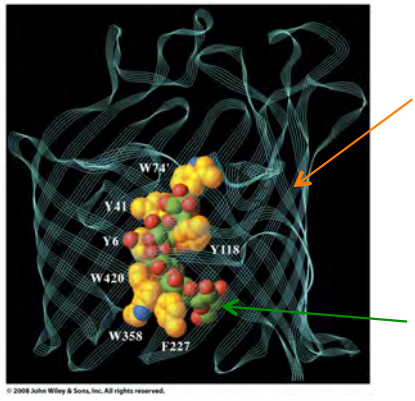


βヘリックス輸送
低い選択性



NMR structure of gramicidin A embedded in a dimyristoyl phosphatidylcholine bilayer.

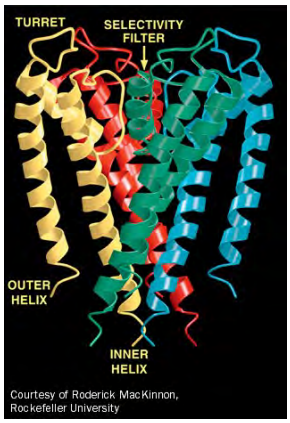
マルトポリンの構造

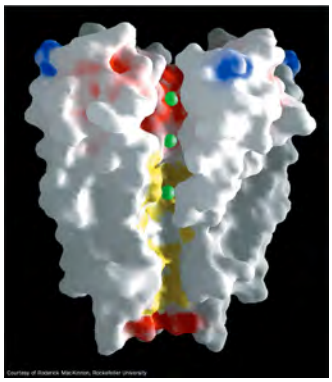


βバレル構造

糖

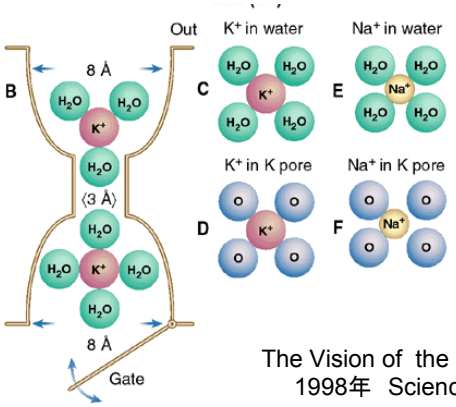
Figure 10-3



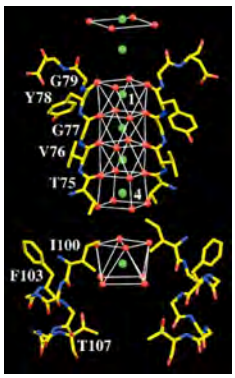


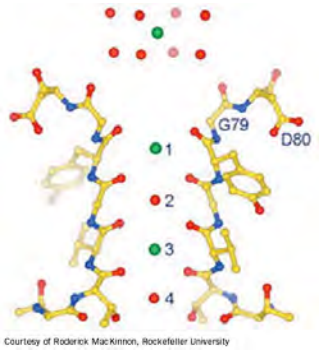
Science v. 280, p. 69 (1998)

X-Ray structure of the KcsA K⁺ channel from *Streptomyces lividans*.

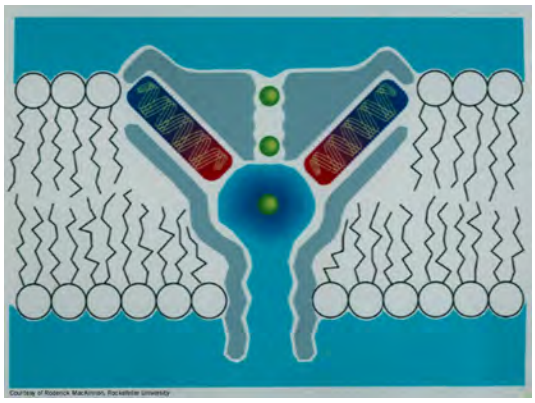


The Vision of the Pore
1998年 Science



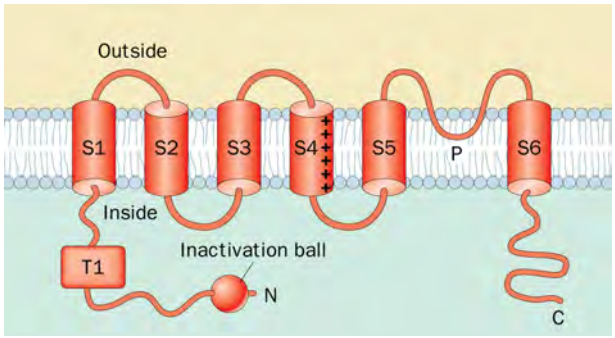


Portions of the KcsA K+ channel responsible for its ion selectivity viewed similarly



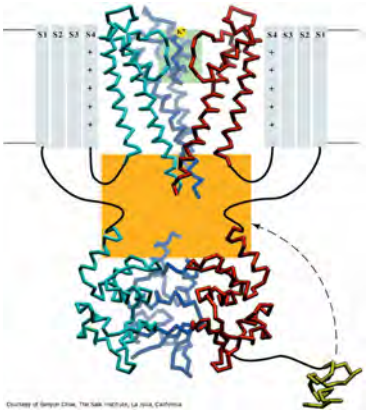
A schematic diagram of the KcsA K+ channel

Predicted secondary structure and membrane orientation of voltage-gated K+ channels.



Kvチャネル

Composite model of the KV channel.



電位依存KV channelのX線構造.

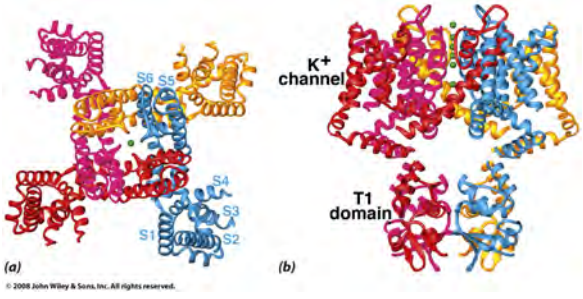


Figure 10-8

電位依存KV channelの膜貫通ドメインの動き.

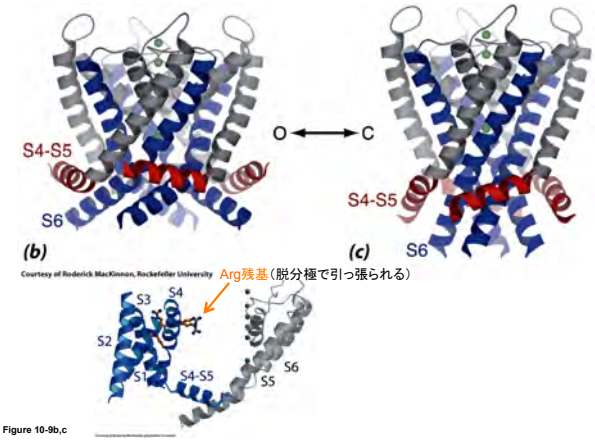


Figure 10-9b,c

Peter Agre

Roderick MacKinnon

The Nobel Prize in Chemistry 2003 was awarded for *"for discoveries concerning channels in cell membranes"* jointly with one half to Peter Agre *"for the discovery of water channels"* and with one half to Roderick MacKinnon *"for structural and mechanistic studies of ion channels"*.

2013年1月　名古屋大学豊田講堂にて

ウシ赤血球アクアポリンAQP1のX線構造

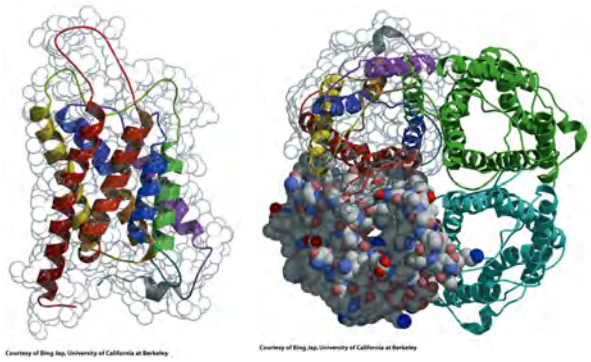


Figure 10-11a

アクアポリンAQP1の水分子透過機構のモデル

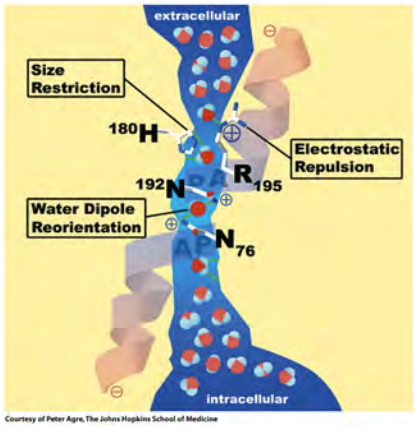
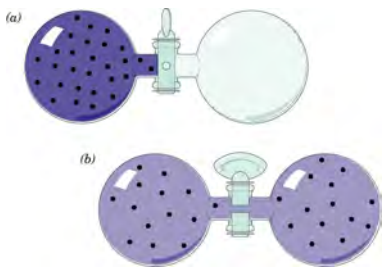


Figure 10-12

Thermodiynamic Principles



熱力学の法則

1）エンタルピーの定義：$H = U + PV$

U：エネルギー
P：圧力
V：体積
Q：熱
W：仕事

$\Delta H = \Delta U + P\Delta V$,　$\Delta U = \Delta Q - \Delta W$
（第一法則）

$\Delta H = \Delta Q - \Delta W + P\Delta V = \Delta Q - \Delta W'$

2）エントロピー：S　$dS = dQ/T$ (可逆過程)

蒸気になるときの
エンタルピー変化

水の蒸発のΔH_{vap}=40.7 $kJmol^{-1}$で
T=373 °Kであるから
→ ΔS_{vap}= 109.1 JK^{-1}

1N = 1 Kg･m･s^{-2}
[N･m] = [J]

3）ギブスの自由エネルギー：$G = H - TS$

$\Delta G = \Delta H - T\Delta S$（等温条件）

0.24 cal = 1J = 1 Kg･m^2･s^{-2}

$1/2 \cdot mv^2 = 1/2 \cdot (2\ kg) \cdot (1\ m \cdot s^{-1})^2 = 1\ Kg \cdot m^2 \cdot s^{-2} = 1Nm$

質量2 kgが1 m･s^{-1}の速さで動いているものの
運動エネルギーに1Jが対応