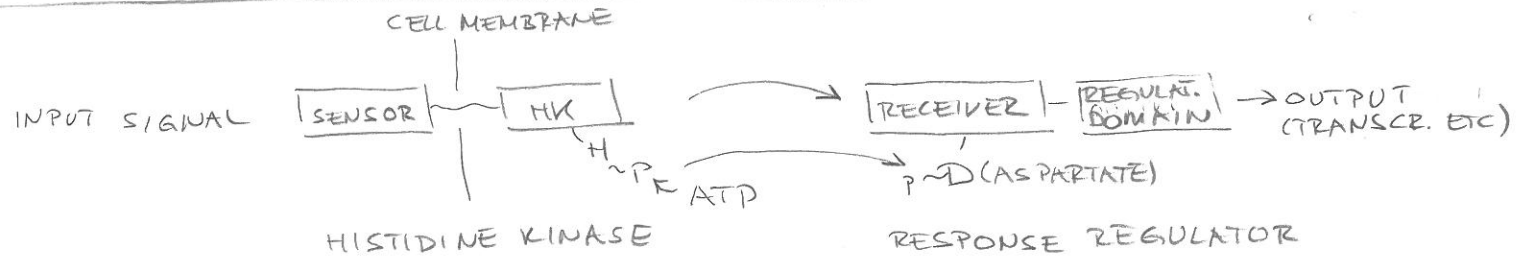


5.4 BACTERIAL TWO-COMPONENT SYSTEMS



REACTIONS

(1) ^{CROSS-}AUTOPHOSPHORYLATION (IN DIMER)



(2) PHOSPHOTRANSFER

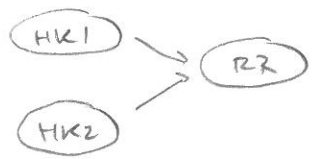


(3) DEPHOSPHORYLATION



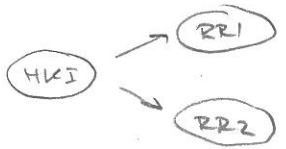
- A FEW RESIDUES DETERMINE SPECIFICITY OF HK-RR INTERACTIONS
- HK AND RR HAVE MODULAR SUBSTRUCTURE
- PHOSPHOR AS UNIVERSAL SIGNAL (~CHARGE)
- E. COLI: 30 HK, 32 RR

FAN-IN

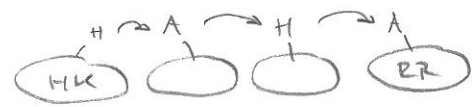


(E.G. QUORUM SENSING IN VIBRIO)

FAN-OUT

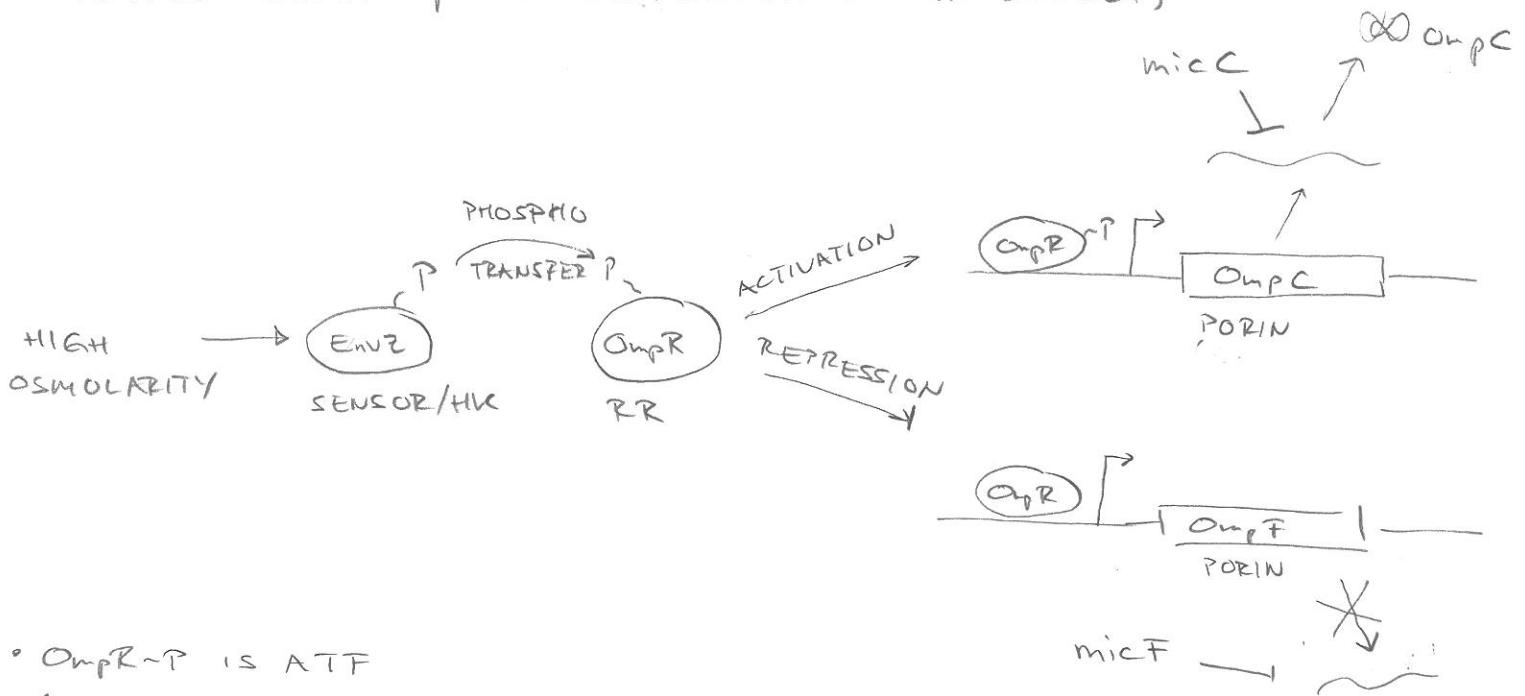


CASCADES / PHOSPHORELAYS



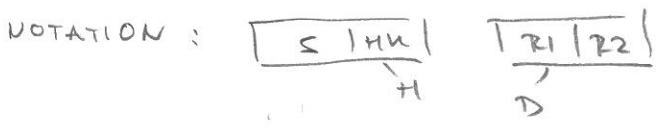
(SPORULATION IN BACILLUS SUBTILIS)

EXAMPLE: EnvZ/OmpR (OSMOREGULATION IN E. COLI)



- OmpR-P IS ATF (ACTIVATOR FOR OmpC, REPRESSOR FOR OmpF)
- OmpC/OmpF ARE PORINS (OmpC: LARGE PORE, OmpF: SMALL PORE)

SYNTHETIC TWO-COMPONENT SYSTEMS (PREVIEW)



BIOLOGICAL COMPONENTS:

INPUT:	SENSOR	RR	OUTPUT	ORGANISM
OSMOLARITY	EnvZ (S1 HK1)	OmpR (R1 R21)	GENE REG. (PORE PROT.)	E. COLI
RED LIGHT	CphI (S2 HK2)	Rcpl (R12 R22)		SYNECHOCYSTIS

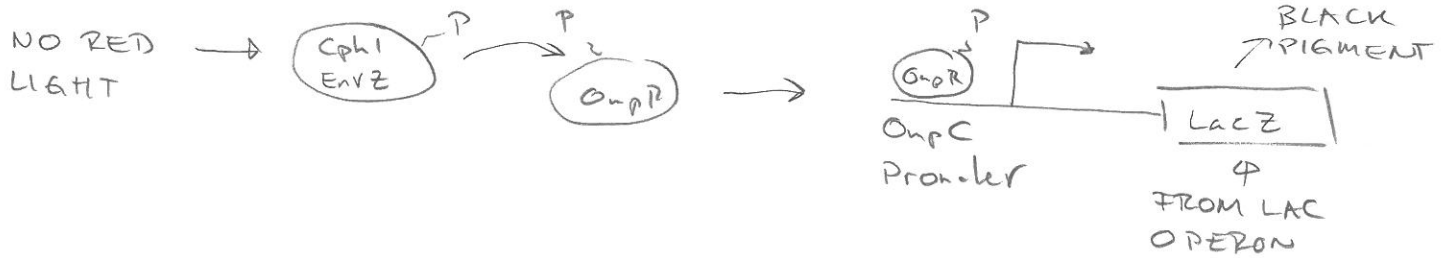
Cph: PHYTOCHROME

SYNECHOCYSTIS: Freshwater cyanobacterium (blue-green algi)
Does photo synthesis

SYNTHETIC SYSTEM:

INPUT	SENSOR	RR	OUTPUT	ORGANISM
RED LIGHT	S2-HK1 (CHIMERIC)	R11-R21 (OmpR)	GENE REG.	E. COLI

(LEVSKAYA, CHEVALIER ET AL. NATURE 2005)



S.S EUKARYOTIC MAP KINASES

MAP KINASE: MITOGEN ACTIVATED PROTEIN KINASE

SERINE/THREONINE-SPECIFIC

RESPOND TO STIMULI

STRUCTURE

