

## BIOTECHNOLOGY

- Improvement of fermentation processes
- Overproduction of metabolites
- Mixed processes (chemistry / biotechnology)
- Identification of drug targets
- Models of human diseases
- Identification of new active gene products
- Diagnostic (DNA, 2D protein electrophoresis)
- Labelling of GMOs
- ...

Genomes in silico



## FROM GENES TO FUNCTIONS

Reverse genetics  
"Industrial" screening  
Analysis in silico  
Metabolic reconstruction

caveat

Structure ≠ Function (ex: crystallins)  
Inductive vs Hypothetico deductive approaches

Genomes in silico



## GENOME ENGINEERING

Ad hoc genome construction

- Safe genomes
- Genomes for bioprocesses
- Small genomes
- Hybrid genomes
- Artificial life

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## WHICH GENOMES ?

### COMPLETE GENOMES

Escherichia coli	8/97 (UWisc/Japan)
Bacillus subtilis	7/97 (Europe/Japan)
Helicobacter pylori	6/97 (TIGR)
Archaeoglobus fulgidus	6/97 (TIGR)
Methanobacterium thermoautotrophicum	5/97 (GTC)
Mycoplasma pneumoniae	11/96 (Germany)
Synechocystis sp. PCC6803	9/96 (Japan)
Methanococcus jannaschii	8/96 (TIGR)
Saccharomyces cerevisiae	4/96 (Europe)
Mycoplasma genitalium	10/95 (TIGR)
Haemophilus influenzae	8/95 (TIGR)

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## WHICH GENOMES ?

### MODEL GENOMES

EUBACTERIA	EUKARYA	ARCHAEA
Escherichia coli	Saccharomyces cerevisiae	No Model
Bacillus subtilis	Schizosaccharomyces pombe	
	Drosophila melanogaster	
	Arabidopsis thaliana	
	Mus domesticus	

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## DISEASES

Neisseria meningitidis	TIGR/Sanger	2.3 M
Neisseria gonorrhoea	U. Oklahoma	2.2 M
Chlamydia trachomatis	Stanford U.	1.2 M
Mycoplasma capricolum	George Mason U	1.2 M
Ureaplasma urealyticum	U. Alabama/ABI	0.8 M
Enterococcus faecalis	TIGR,GTC (?)	3.0 M
Streptococcus pyogenes	U. Oklahoma	1.8 M
Streptococcus pneumoniae	TIGR,GTC (?)	2.5 M
Mycobacterium tuberculosis	TIGR/Sanger	4.2 M
Mycobacterium leprae	GTC,Sang/Pasteur	2.8 M
Treponema pallidum	TIGR/U.Texas	1.1 M
Borellia burgdorferi	TIGR	1.0 M
Escherichia coli O157:H7	Japan	4.6 M
Vibrio cholerae	TIGR	2.0 M
Porphyromonas gingivalis	TIGR	2.2 M
Pseudomonas aeruginosa	TIGR	5.8 M

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## ONGOING PROJECTS

Aquifex aeolicus	RBI	1.5 M
Crenarchaeum symbiosum	RBI	7 M
Borellia burgdorferi	TIGR	1.0 M
Deinococcus radiodurans	TIGR	3.3 M
Enterococcus faecalis	TIGR,GTC (?)	3.0 M
Mycobacterium tuberculosis	TIGR/Sanger	4.2 M
Methanococcus jannaschii	TIGR	1.8 M
Neisseria meningitidis	TIGR/Sanger	2.3 M
Porphyromonas gingivalis	TIGR	2.2 M
Salmonella typhimurium	TIGR	4.5 M
Streptococcus pneumoniae	TIGR,GTC (?)	2.5 M
Thermotoga maritima	TIGR	7 M
Treponema pallidum	TIGR/U.Texas	1.1 M
Vibrio cholerae	TIGR	2.0 M
Pseudomonas aeruginosa	TIGR	5.8 M

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## ONGOING PROJECTS

Halobacterium salinarum	Max Plank	2.2 M
Streptomyces coelicolor	Sanger	7 M
Pyrococcus horikoshii (shinkai)	Japan	2.0 M
Sulfolobus solfataricus	Canada	3.0 M
Synechococcus	Japan	2-3 M
Thermoplasma acidophilum	Max Plank	1.5 M
Chlamydia trachomatis	Stanford U.	1.2 M
Mycoplasma capricolum	George Mason U	1.2 M
Neisseria gonorrhoea	U. Oklahoma	2.2 M
Pyrococcus furiosus	U. Utah/Maryland	2.0 M
Pyrobaculum aerophilum	CalTech/UCLA	1.9 M
Rhodobacter capsulatus	U. Chicago	4.0 M
Rhodobacter sphaeroides	U. Texas, Houston	3.8 M
Streptococcus pyogenes	U. Oklahoma	1.8 M
Ureaplasma urealyticum	U. Alabama/ABI	0.8 M
Mycobacterium leprae	GTC,Sang/Pasteur	2.8 M

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