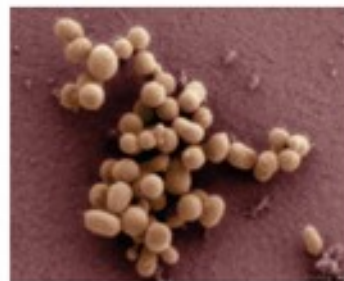
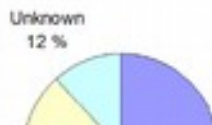
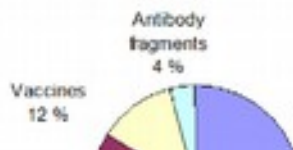
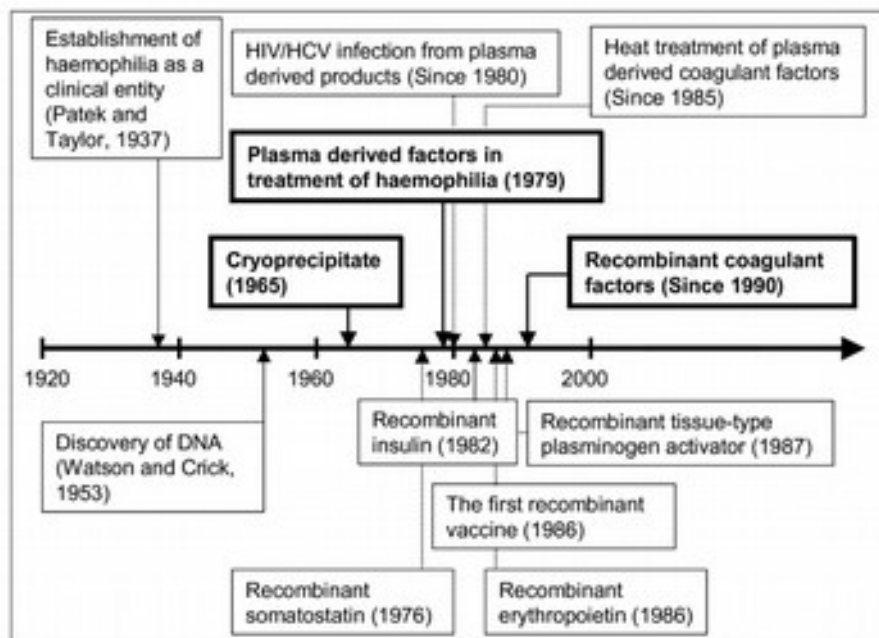


SENTETİK BİYOLOJİ ÇAĞI



Mycoplasma laboratorium

Sleator RD. The story of Mycoplasma mycoides JCVI-syn1.0. *Bioeng Bugs*. 2010;1(4):229-30.

Mycoplasma genitalium
600,000 bç genom
485 gen
-100 gen yaşam için gerekli olmayabilir...
-400 gen: minimal gen seti :)

2007:
Venter ve ark. Mycoplasma mycoides minimal genomunu sentezleyerek M. capricolum'un genomu yerine "transplante" ettiler
JCVI-syn1.0

1000 bç uzunluğunda parçalar sentezlendi (80 bç örtüşen uçlar)
1075 adet segment maye hücrelerinde birleştirildi: YAC

15 yıllık projenin toplam maliyeti: ~\$40,000,000

"To live, to err, to fall, to triumph, to recreate life out of life."

1912



Yaşamın fiziksel ve kimyasal esasları

1912'ler için çok devrimsel...

1953 DNA structure proposed by James Watson and Francis Crick

1960 Arthur Kornberg synthesizes DNA in vitro

1970 Hamilton Smith and Kent Wilcox isolate the first restriction enzyme

1971 The first biological engineering company, Cetus, founded

1972 Paul Berg uses a restriction enzyme to form a hybrid circular DNA

1973 Stanley Cohen and Herbert Boyer develop DNA cloning

1975 Asilomar Conference discusses the ethics of recombinant DNA

1976 Robert Swanson and Herbert Boyer found Genentech
Guidelines from the US National Institutes of Health (NIH) categories of recombinant DNA experiments

1977 Genentech clones the hormone somatostatin in bacteria
protein using a synthetic recombinant gene

1978 Biogen founded, now the oldest independent biotech co.
Genentech and City of Hope National Medical Center announce production of human insulin

1979 NIH recombinant DNA guidelines released
Genentech clones human growth hormone

IN THE SEARCH OF THE WASTEFUL STRAIN

Protein
Nükleik asit
Karbonhidratlar
Yağ asitleri
1° & 2° metabolitler

Mikroorganizmalardan
elde ettiğimiz ürünler

Şeker $\xrightarrow{\text{maya}}$ Alkol (Bira)
?? MÖ
@ Sümer/Mezopotamya

Sarap Üretimi
3500 MÖ
@ Asur

Mayalı Hamur
4000 MÖ
@ Mısır



Yoğurt Kefir Peynir Kej...

SİHİR $\xrightarrow{\text{Bilim}}$ TEKNOLOJİ
Dönüşümü henüz gerçekleşmedi



Louis Pasteur
John Tyndall



Spontan jenerasyon
VS
Mikroorganizmaların
etkinliği

4

Fermentasyon

Çevresel
Biyoteknoloji

Gıda & kimyasal
üretimi

Mikrobiyal
Biyoteknoloji

Biyomedikal
araştırma

Sağlık
Endüstrisi

Temel
araştırmalar

mono & polisakkaridler

fruktoz
riboz
sorboz
mannitol
eritritol
ksilitol

ksantan
jellan

alkoller

ETANOL

diğer alkoller

antibiyotikler

sentetik / yarı sentetik

biyokatalistler / enzimler

son ürün dabileceği gibi, farklı ürünlerin sentezinde önemli özellikte stereo-selektif enzimler * * *

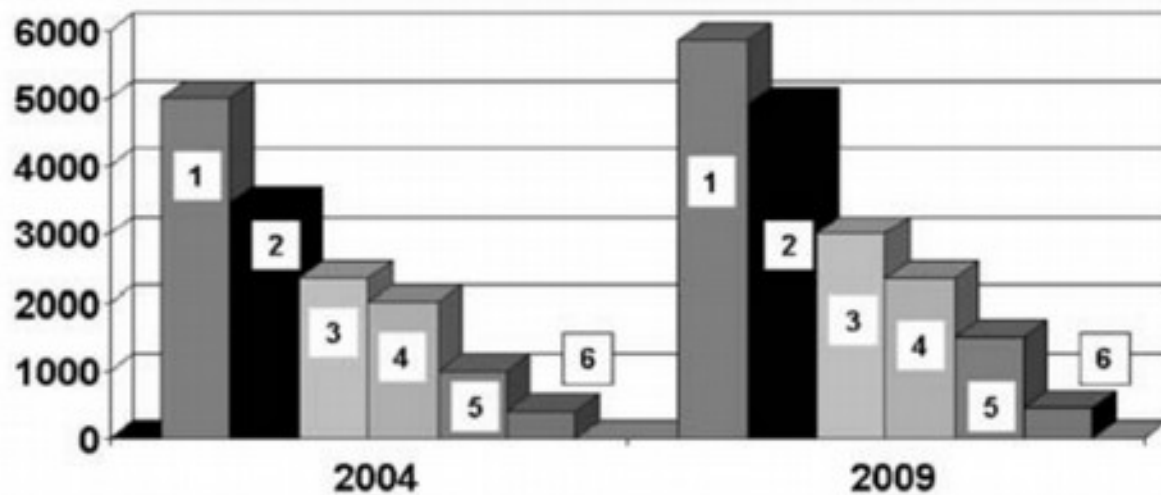
BIYOKÜTLE

Biyoremediasyon
Biyotransformasyon
...

rekombinant protein üretimi

biyofarmasötikler * * *
enzimler

US\$ millions



1 Crude antibiotics

2 Amino acids

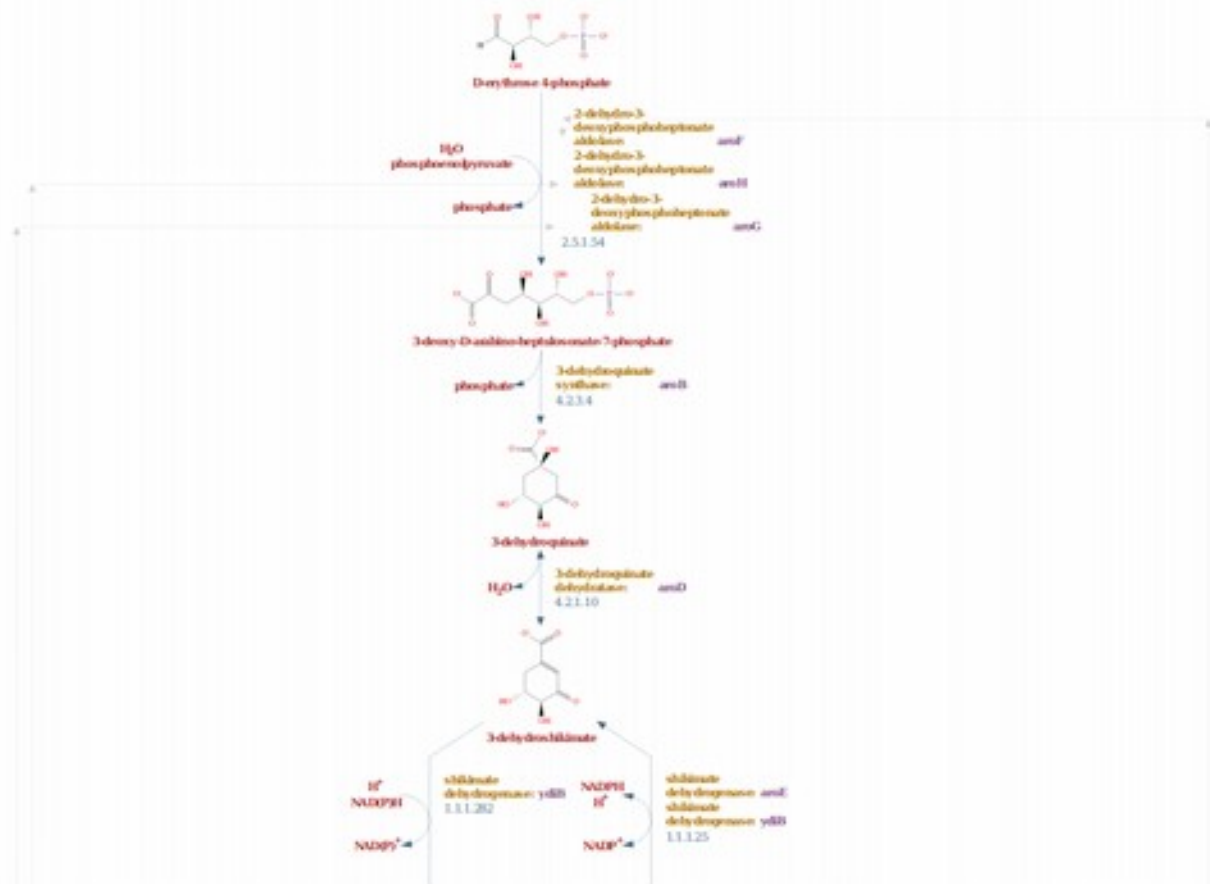
3 Organic acids

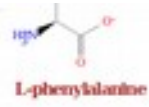
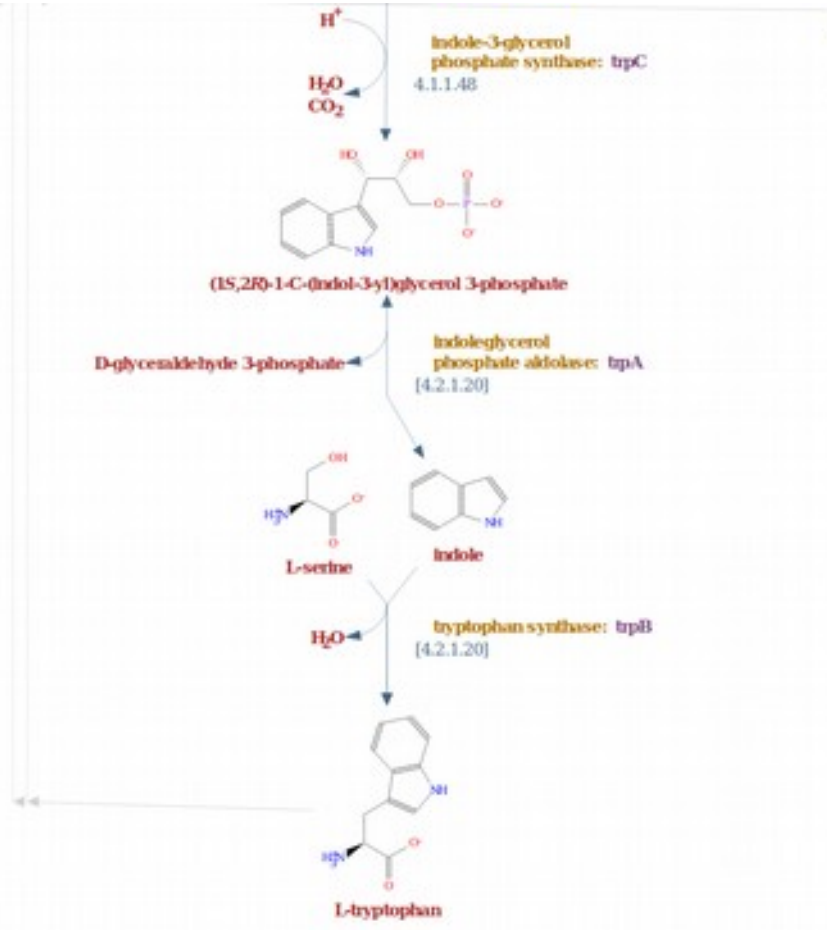
4 Enzymes

5 Vitamins

6 Xanthan

Triptofan biyosentezi:





Gu P, Yang F, Kang J, Wang G
 inactivation and promoter sw
 in Escherichia coli. Microbial

AĞI

1912



Yaşamın fiziksel ve kimyasal esasları

1912'ler için çok devrimsel...

1953



Triptofan biyosentez



1912'ler için çok devrimsel...

111, BOULEVARD SAINT-MICHEL PARIS
1912

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12
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NIH recombinant DNA guidelines relaxed

Genentech clones human growth hormone

1980

13
er
1980

Amgen founded

Leroy Hood and Mike Hunkapiller develop protein sequencer

Fred Sanger and colleagues develop the shotgun method for sequencing genomes

Bayh–Dole Act passes, encouraging technology transfer

US Supreme Court decrees that life forms are patentable

1983

Kary Mullis invents the polymerase chain reaction

1986

US Environmental Protection Agency approves release of genetically altered tobacco, the first genetically engineered crop

1987

Susan Horvath, Mike Hunkapiller and Leroy Hood develop DNA synthesizer

1988

Philip Leder and Timothy Stewart are awarded patent for mouse breast-cancer model, the first patent given for a genetically altered animal

1993

1993

The Biotechnology Industry Organization (BIO) formed

1994

US Food and Drug Administration deems the Flavr Savr, a genetically modified tomato, safe, thus bringing to market the first transgenic food product

1997

Roslin Institute scientists clone Dolly the sheep, the first mammal to be cloned successfully from an adult cell

1998

Independent teams led by James Thomson and John Gearhart are the first to grow embryonic stem cells successfully

2001

Public and private teams publish draft versions of the human genome sequence

2002

Over 200,000 jobs exist across 4,000 biotech companies worldwide, according to analysts Ernst & Young

(<http://www.nature.com/naturejobs/science/articles/10.1038/nj6921-456a>)

INT
THE

Protein

