

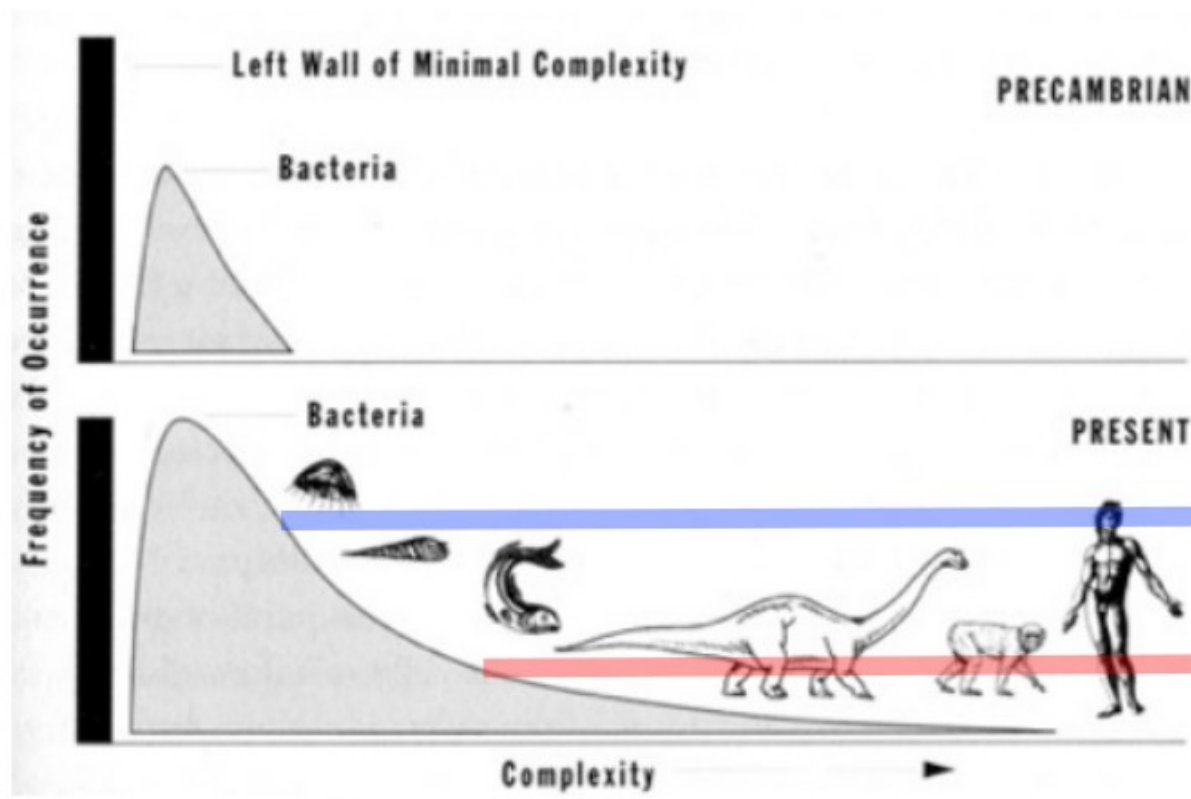
Bađışık yanıt

"Self" - "Non-self" ayrımı önemli

Biyotik
etkileşimler

Antagonistik
birlikte evrim

Çevresel
pertürbasyonlar



Bağışıklık sistemine sahip olmak
ve bağışık yanıt oluşturmak
ÇOK PAHALI

YETERSİZ
YANIT

**UYGUN
YANIT**

PARALİZ

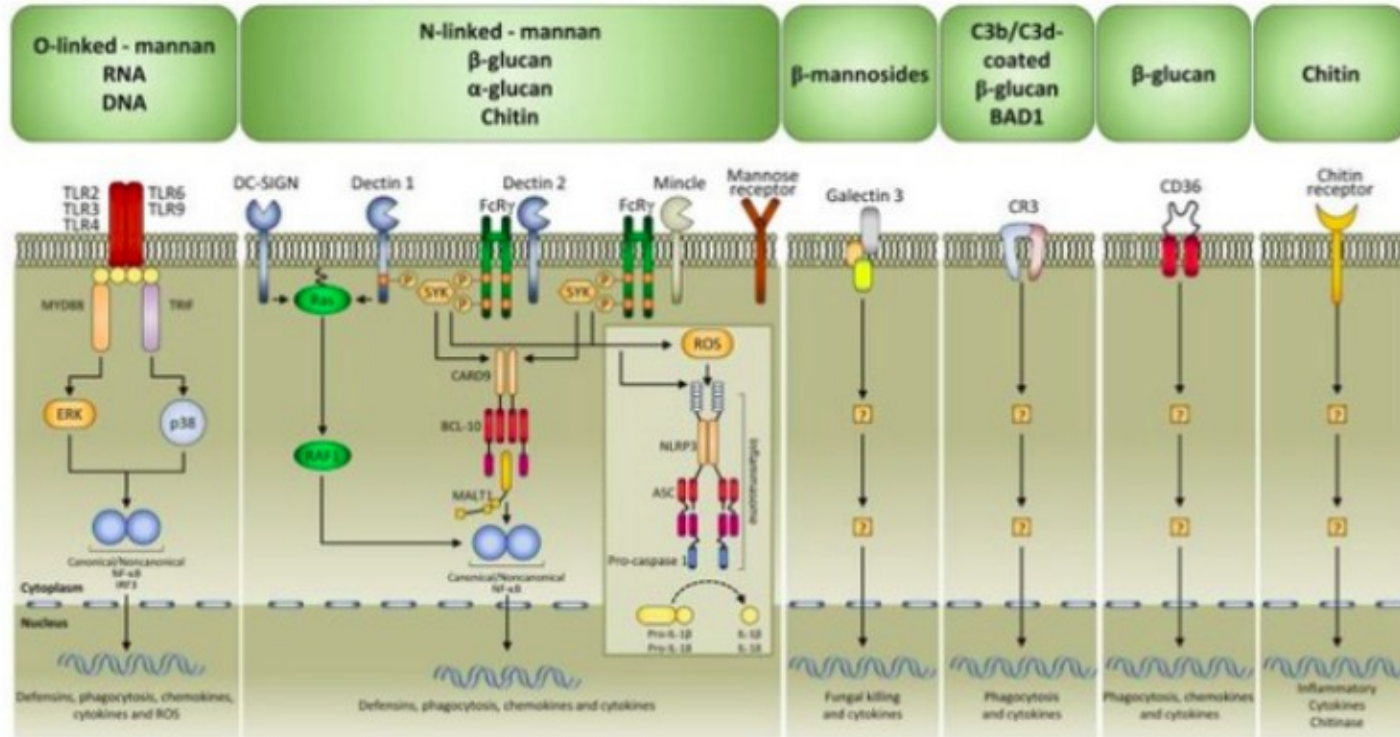
OTOİMMÜNİTE

Uygunsuz yanıt maliyetleri yükseltir...

DAMP signaling in fungal infections and diseases

September 2012 Frontiers in Immunology 3:286

PAMP's Recognition



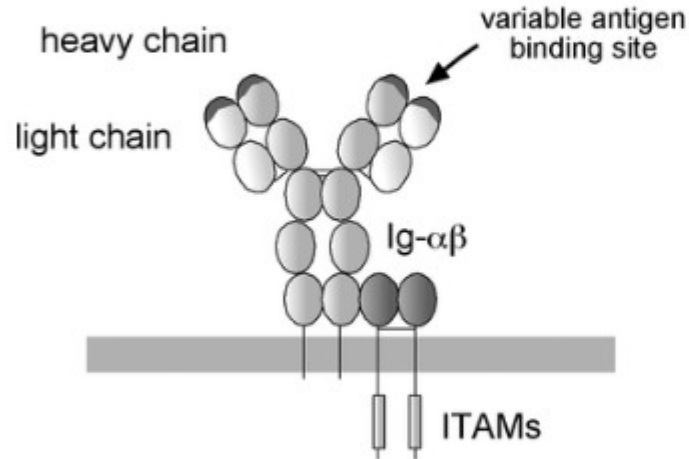
Çok sayıda
patojen geni

vs

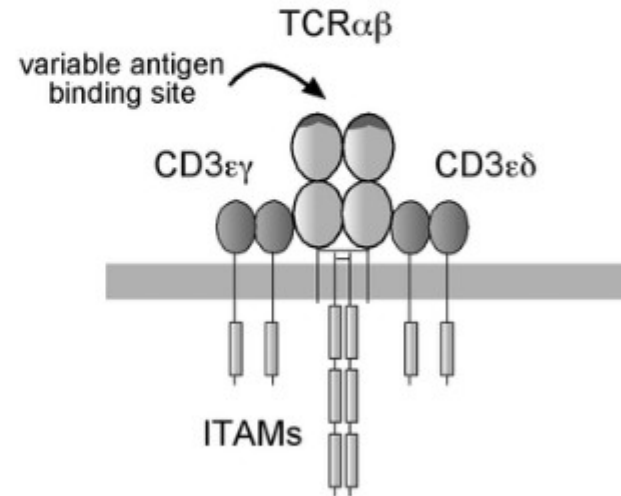
sınırlı sayıda
konak geni

1 patojen geni vs 1 konak geni

B cell antigen receptor



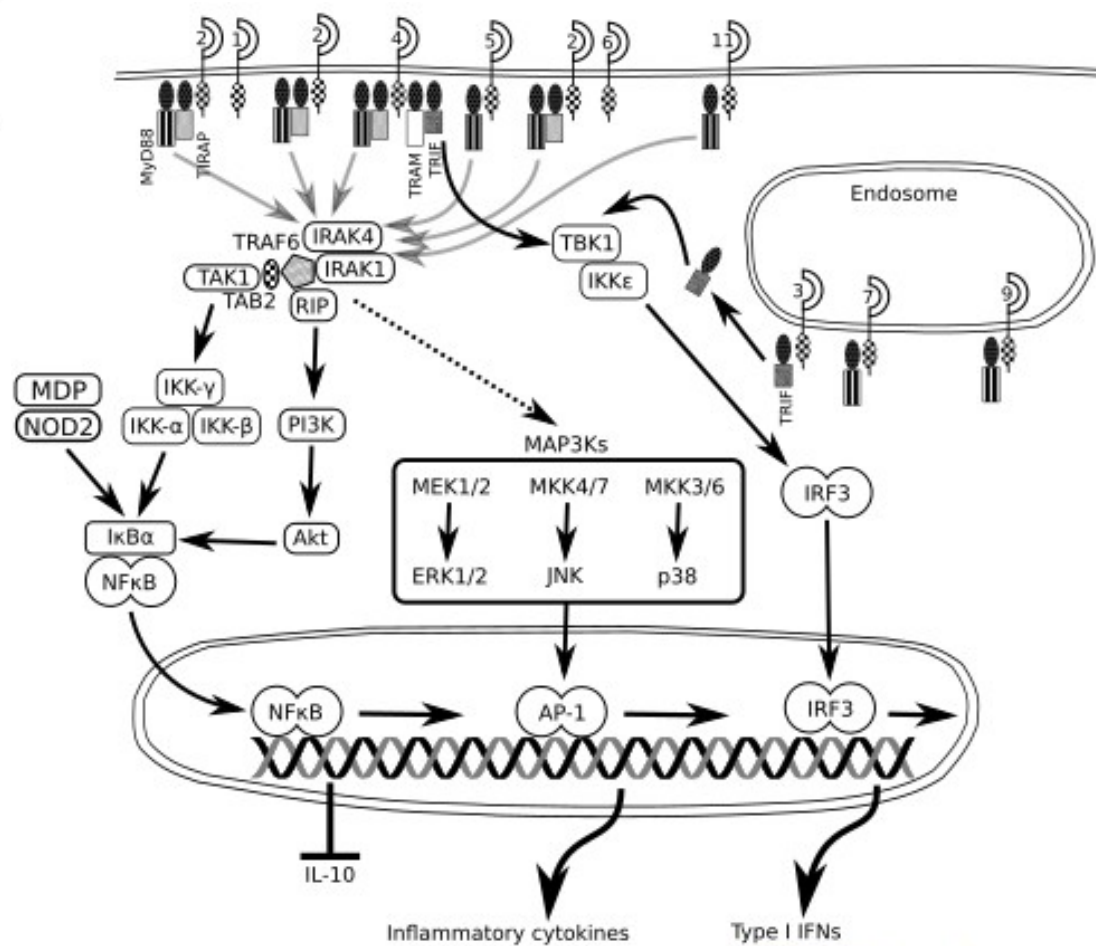
T cell antigen receptor



Models of Antigen Receptor Activation in the Design of Vaccines
October 2009 Current pharmaceutical design 15(28):3237-48



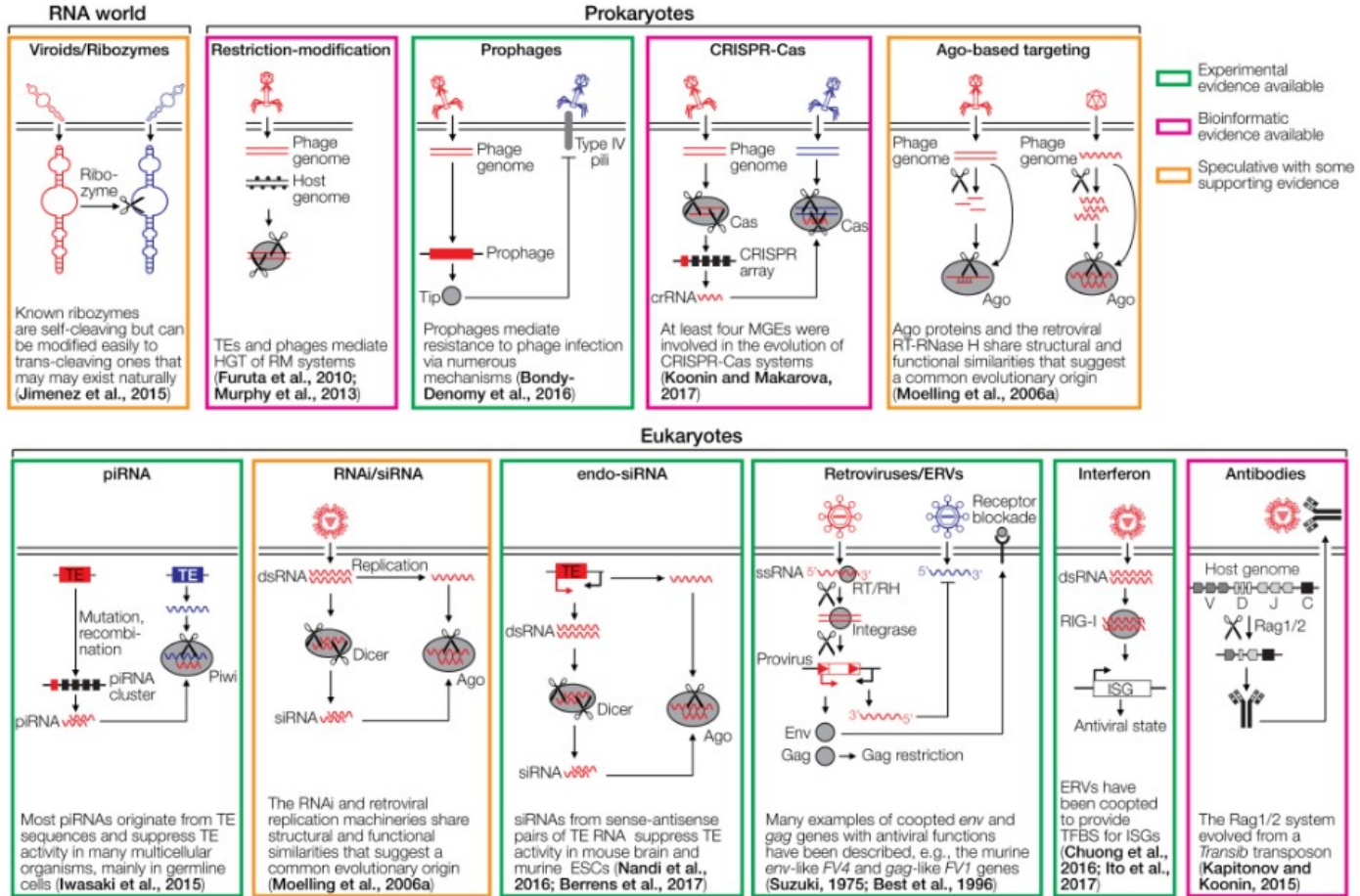
	TLR1	TLR2	TLR4	TLR5	TLR6	TLR10	TLR11	TLR3	TLR7	TLR8	TLR9	TLR12
Monocytes	•	•	•	•	•				•	•	•	
Macrophages	•	•	•	•	•	•	•		•	•	•	•
Dendritic cells	•		•	•	•		•	•				•
Mast cells	•	•	•	•	•					•		
PDC									•		•	
IEC				•	•							
Trophoblasts						•	•					
HEK							•					
	S	S	S	S	S	SP	SEr	E	E	E	E	Er
	Triacyl lipopeptide	Triacyl lipoprotein	LPS	Flagellin	Diacyl lipopeptide		Uropathogenic bacteria	dsRNA	ssRNA		CpG DNA	



Transpozisyon ile aktarılabilen genetik elementler Mobil Genetik Elementler - RNaz-H benzer genler...

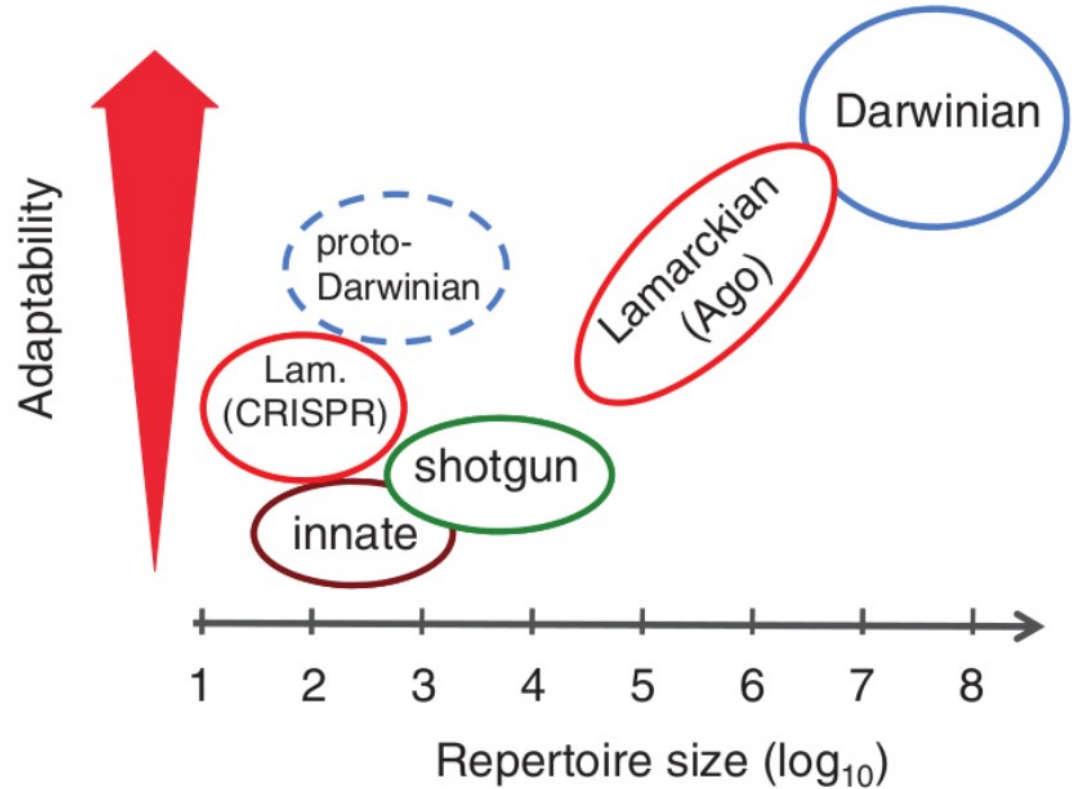
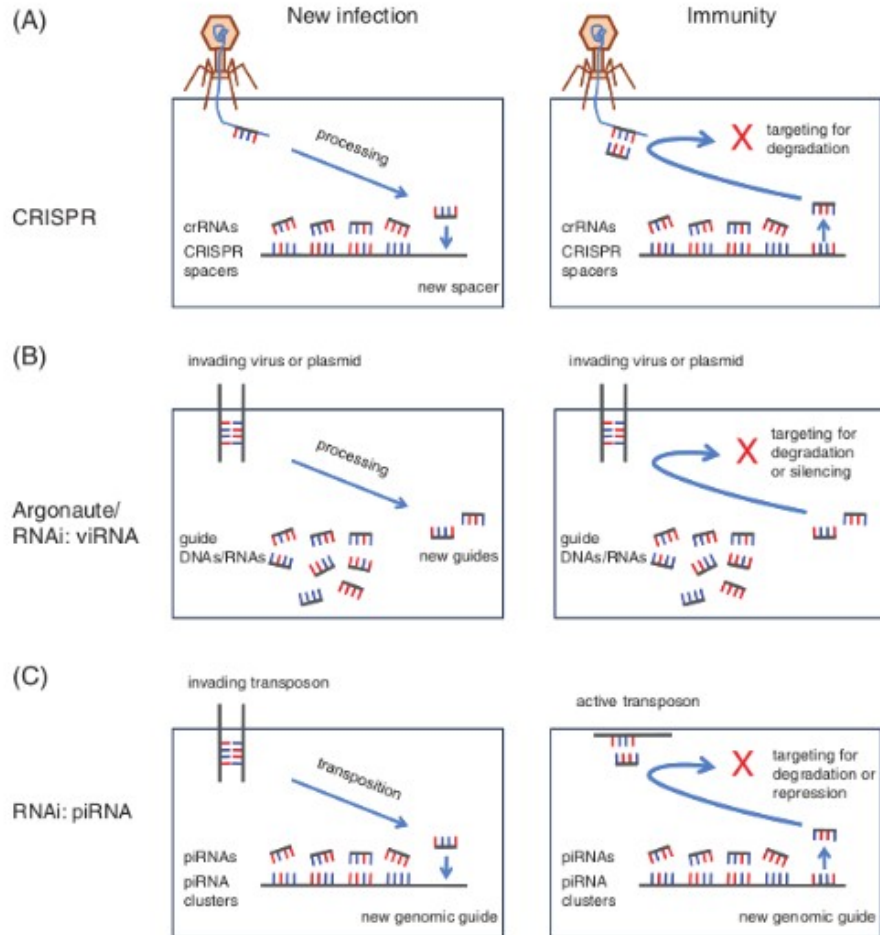
Evolution of Immune Systems From Viruses and Transposable Elements

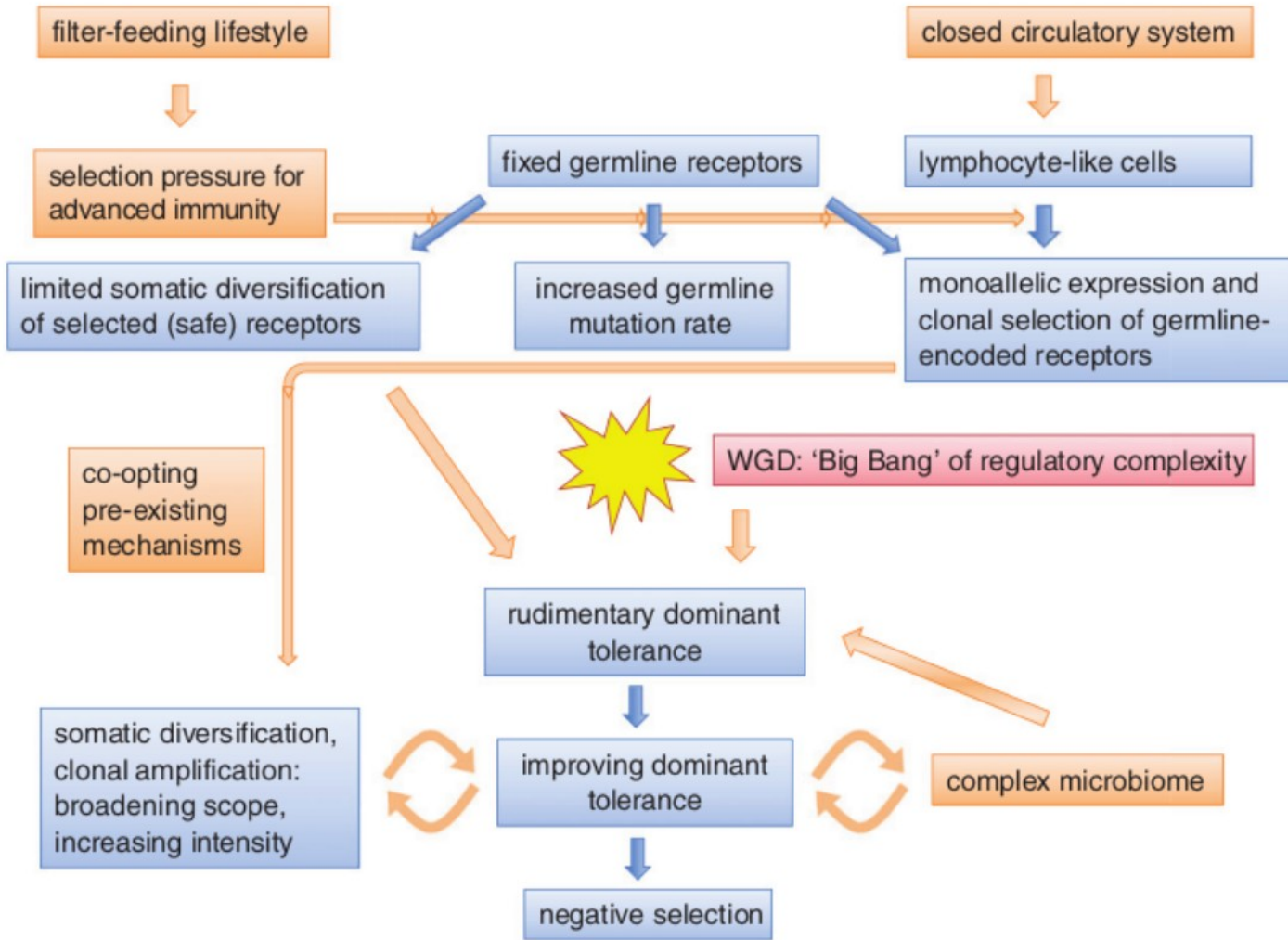
Felix Broecker^{1*} and Karin Moelling^{2,3}



BIOLOGICAL REVIEWS

Biol. Rev. (2018), **93**, pp. 505–528.
doi: 10.1111/brv.12355





ÖNEMLİ OLAYLAR:

Daha seçici hedefleme

reseptörleri çeşitlendirerek:
Shotgun immünite

Çeşitlendirilmiş reseptörler
arasında seçim:
Proto-Darwinian Immünite

Tüm genom duplikasyonu
İmmün-genlerin regülasyonu

Darwinian Immünite &
TOLERANS

Hydractinia echinata

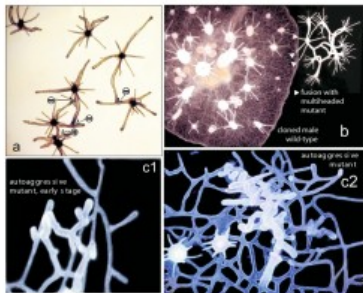
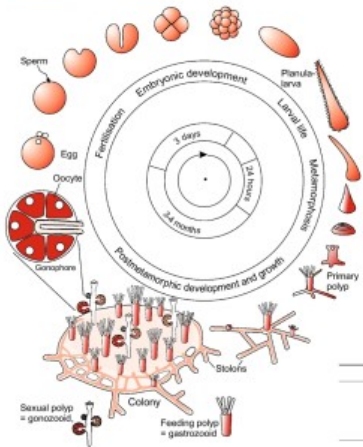
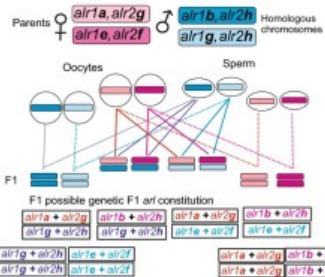


Figure 1. Published 12 June 2010
Cell Communication-mediated Nonself-Recognition and Intolerance in Representative Species of the Animal Kingdom

Reiss A, Huber T, Nüssli-Baumann C
Journal of Heredity 91(6): 601-610 (2010)



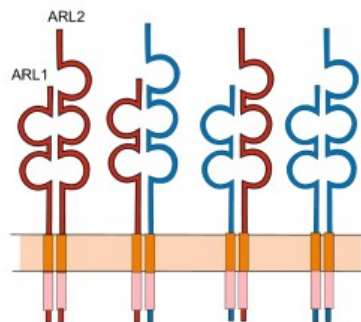
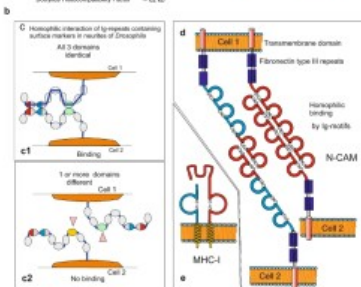
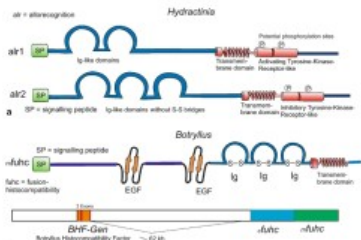
a Gene loci *air1* and *air2* are on both homologous chromosomes but in form of different alleles



b Array of histocompatibility among F1 siblings

Expressed ARL proteins	♀	♀	♀	♀	♀	♀	♀	♀
sister + brother	1a+2g	1b+2h	1a+2g	1b+2h	1a+2g	1b+2h	1g+2h	1e+2f
♂ 1a+2g	++	--	+-	--	+-	--	--	--
♂ 1b+2h	--	++	--	+-	--	+-	--	--
♂ 1a+2g	+-	--	++	+-	+-	--	+-	--
♂ 1b+2h	--	+-	--	++	--	+-	--	--
♂ 1a+2g	+-	--	+-	--	++	+-	--	+-
♂ 1b+2h	--	+-	--	+-	+-	++	--	+-
♂ 1g+2h	--	--	+-	--	--	--	++	--
♂ 1e+2f	--	--	--	--	+-	+-	--	++

Protein Type	Structural Family	Pharmacological Group ¹	
Enzymes	Endonuclease D	Unknown	
	Phospholipase type A ₂ (PLA ₂)	PLA ₂	
	Serine protease S1	Unknown	
Non-enzymatic proteins	Actinoporins	Type II cytolytins	
	CAP	Unknown	
	WSC domain proteins	Unknown	
Peptide neurotoxins	ATX-III	Nay, type 3	
	β-defensin-like	ASIC	K _v type 3
		Nay, type 1	Nay, type 1
		Nay, type 2	Nay, type 2
		Nay, type 4	Nay, type 4
	Boundless β-hairpin (BBH)	ASIC	K _v type 4
	Epidermal growth factor-like (EGF-like)	EGF activity	TRPV1
		Inhibitor cystine-knot (ICK)	ASIC
	Kunitz-domain	K _v type 2	TRPV1
		Protease inhibitor	
Pseudo-β-hairpin (PHAB)	K _v type 6		
	Small cysteine-rich peptides (SCRPs)	TRPA1	
ShK	K _v type 1		



Coded by the maternal or paternal homologous chromosome with its particular allele

air1 + *air2* *air1* + *air2* *air1* + *air2* *air1* + *air2*

air1g + *air2h* *air1g* + *air2h* *air1g* + *air2h*
air1g + *air2h* *air1g* + *air2h* *air1g* + *air2h*

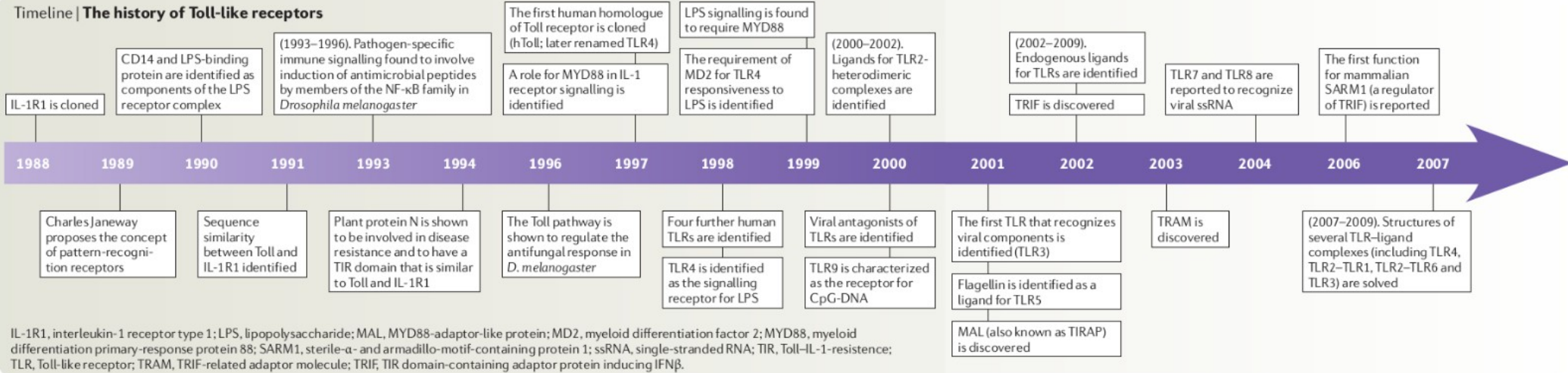
¹CAP = CRFP (cysteine-rich protein), allergen (Ag-S), and pathogenesis related (PR-1); Nay, = voltage-gated sodium channel; TRPA1 = transient receptor potential channel type A1; TRPV1 = transient receptor potential channel type V1.

TIMELINE

The history of Toll-like receptors — redefining innate immunity

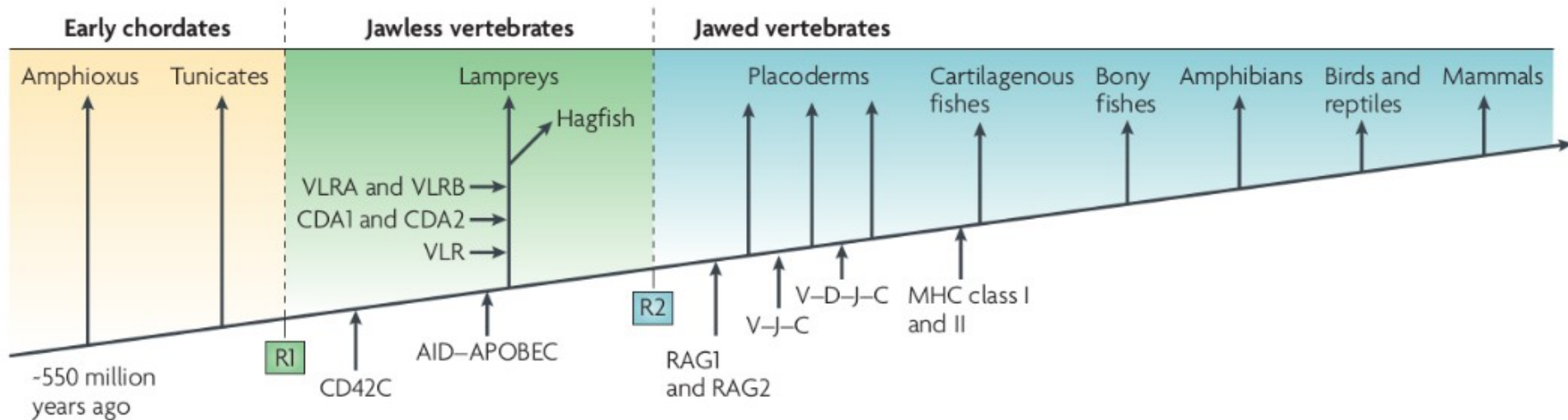
Luke A. J. O'Neill, Douglas Golenbock and Andrew G. Bowie

Timeline | The history of Toll-like receptors



DOĞAL BAĞIŞIKLIK VS KAZANILMIŞ BAĞIŞIKLIK

How did our complex immune system evolve?
Max Cooper and Brantley Herrin
Nature JANUARY 2010 | VoLUME 10



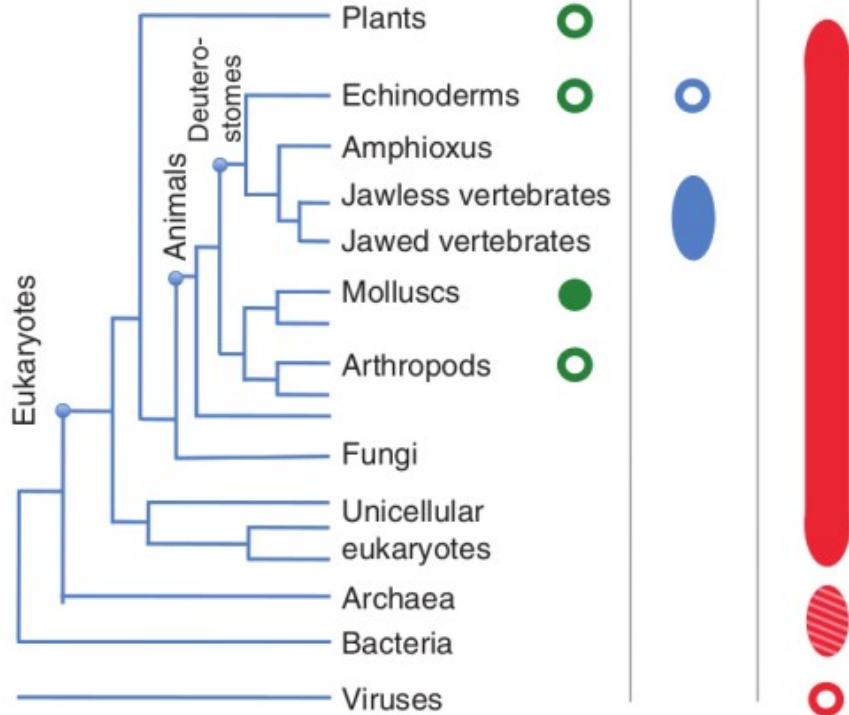
WHOLE GENOME DUPLICATION #1

leucine-rich repeat (LRR)-based
receptor for antigen recognition:
variable lymphocyte receptor A & B
(VLRA - VLRB)

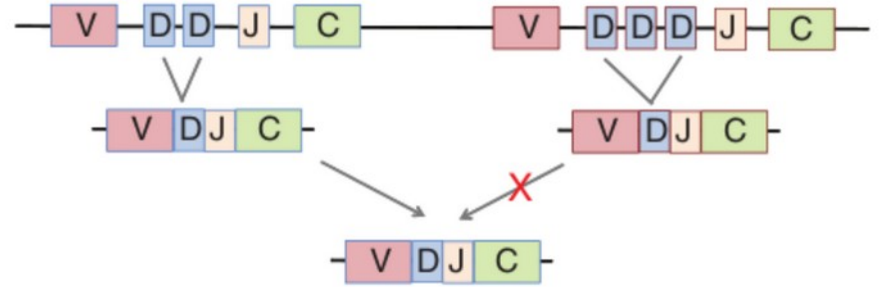
WHOLE GENOME DUPLICATION #2

*immunoglobulin-based
adaptive immune system*
Recombination-activating gene 1 & 2
(RAG1 - RAG2)
B cell receptor and T cell receptor
V, D, J and C genes
MHC class I and II genes

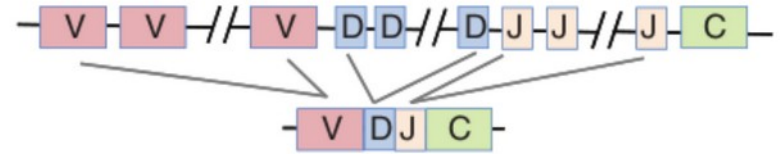
	Somatic çeşitlenme	Klonal seleksiyon	Yeni bilgi sistemi	Açık uçlu repertuar
Lamarckian	+	-	-	+
Shotgun	+	-	-	-
Darwinian	+	+	+	+
Proto-Darwinian	-	+	+/-	-



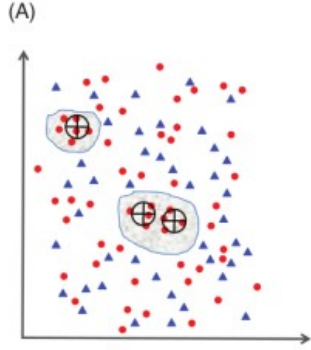
(A) cluster: somatic re-arrangement + allelic exclusion



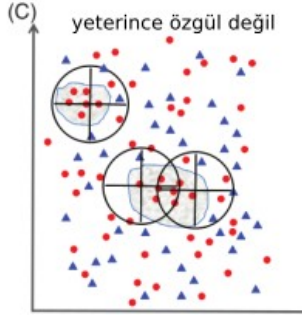
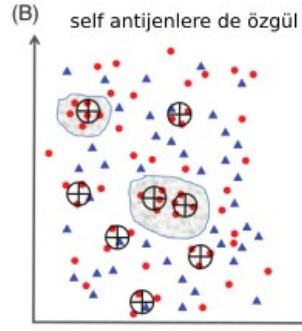
(B) translocon: somatic re-arrangement



epitop uzayında...



...bir yanıt



TOLERANS

vs OTOİMMÜNİTE



Uygunsuz yanıt maliyetleri yükseltir...