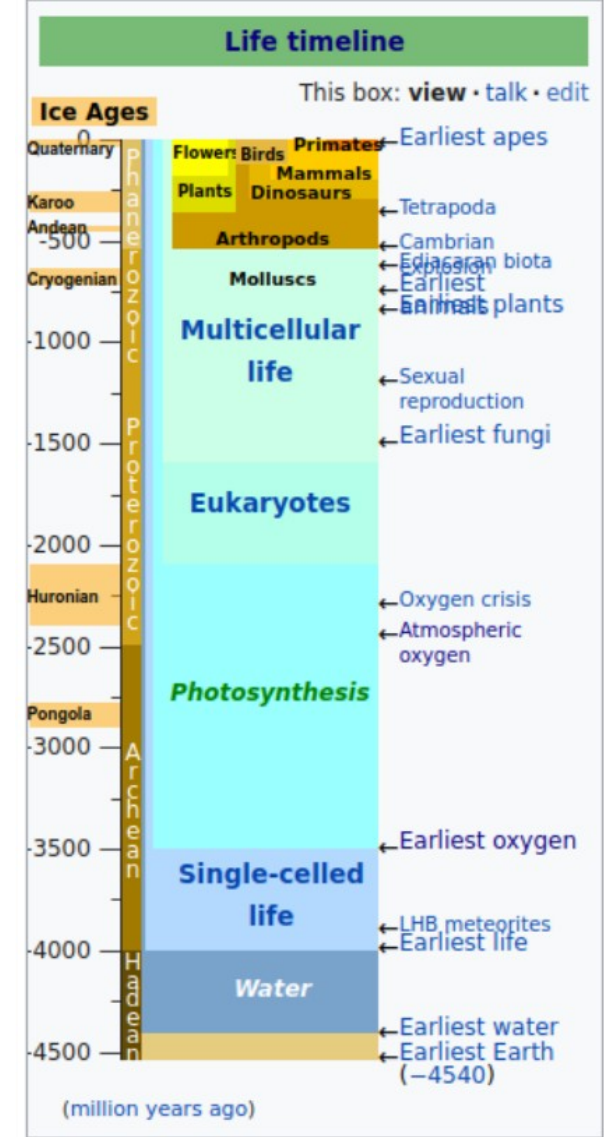
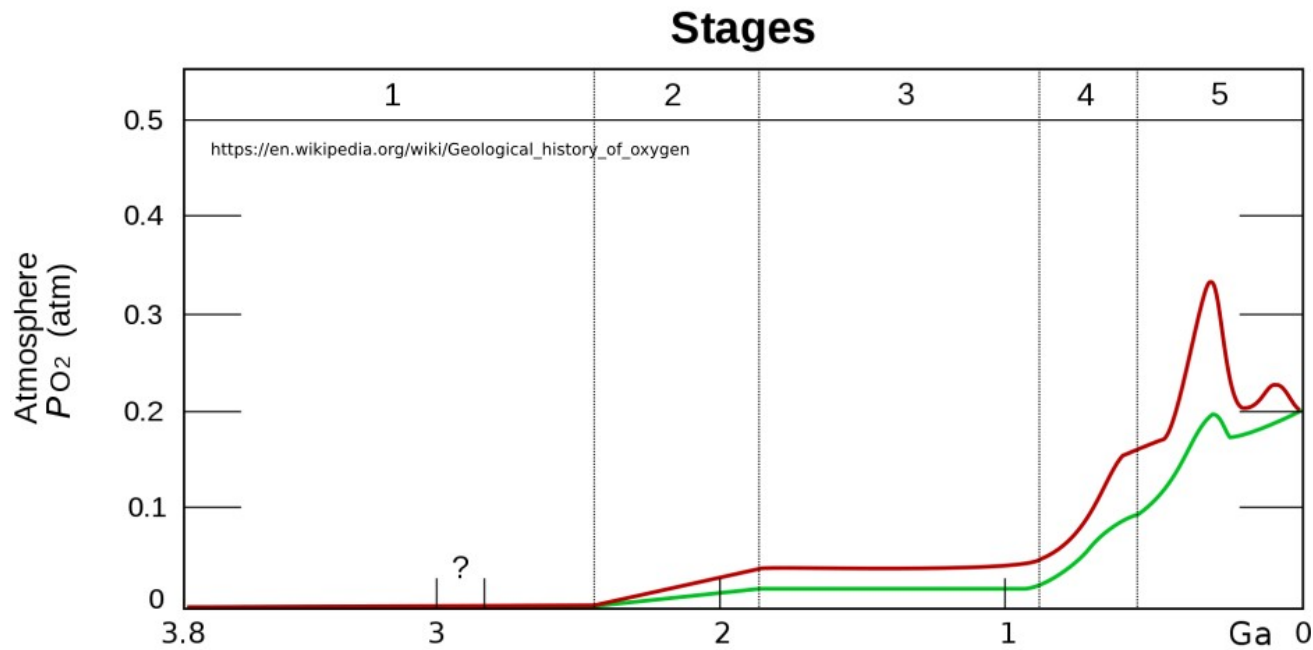


Bađıřıklık sisteminin iřleyiřine evrimsel perspektiften bakıř



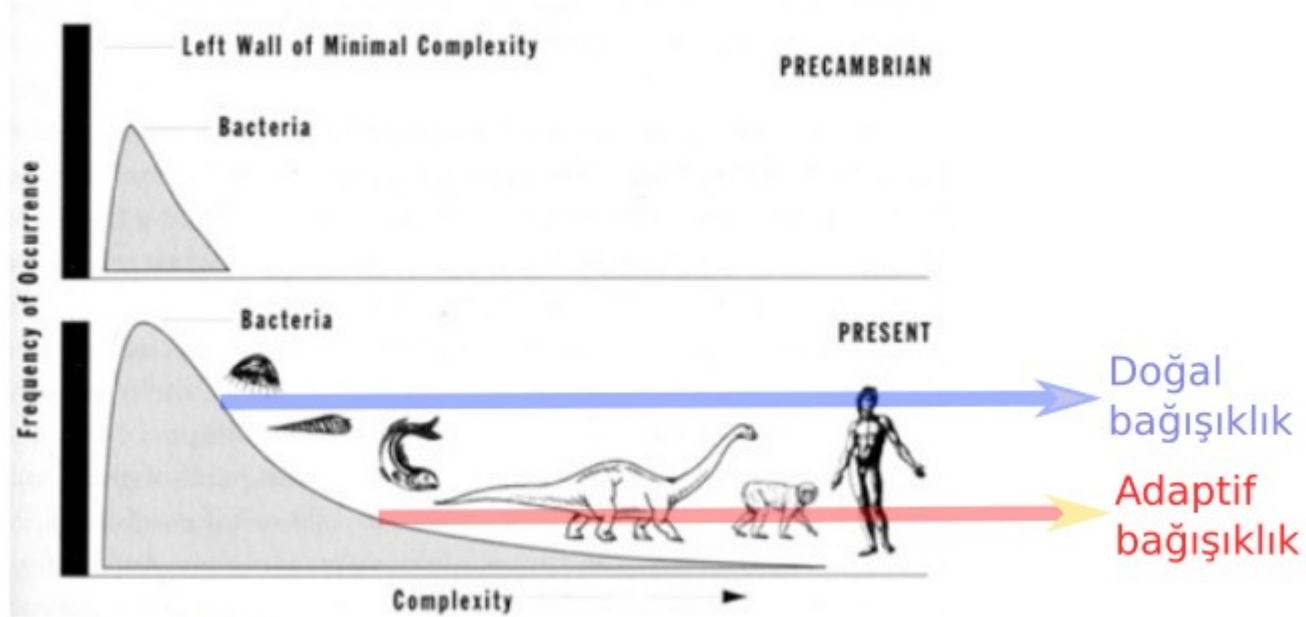
Bağışık yanıt

"Self" - "Non-self" ayrımı önemli

Biyotik etkileşimler

Antagonistik birlikte evrim

Çevresel pertürbasyonlar



Baęışıklık sistemine sahip olmak
ve baęışık yanıt oluřturmak
OK PAHALI

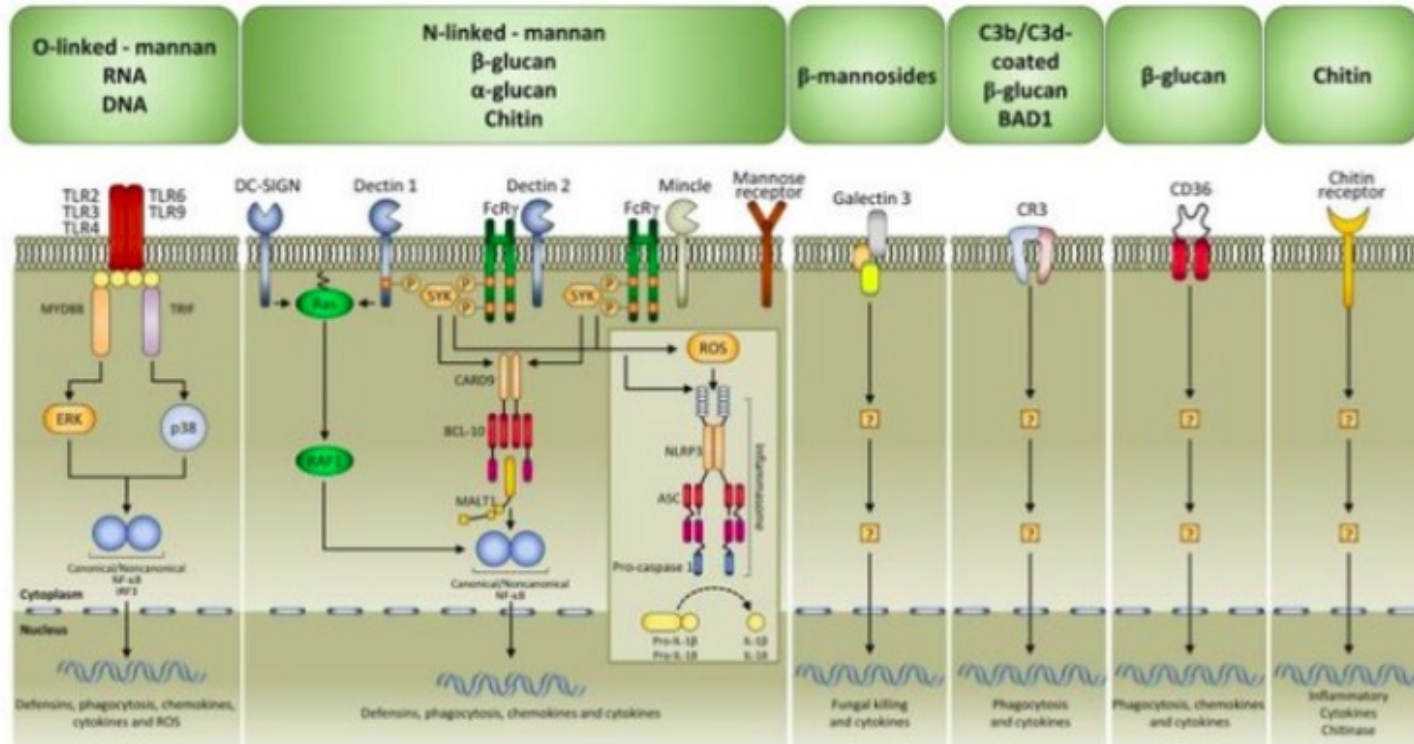


Uygunsuz yanıt maliyetleri yükseltir...

DAMP signaling in fungal infections and diseases

September 2012 *Frontiers in Immunology* 3:286

PAMP's Recognition



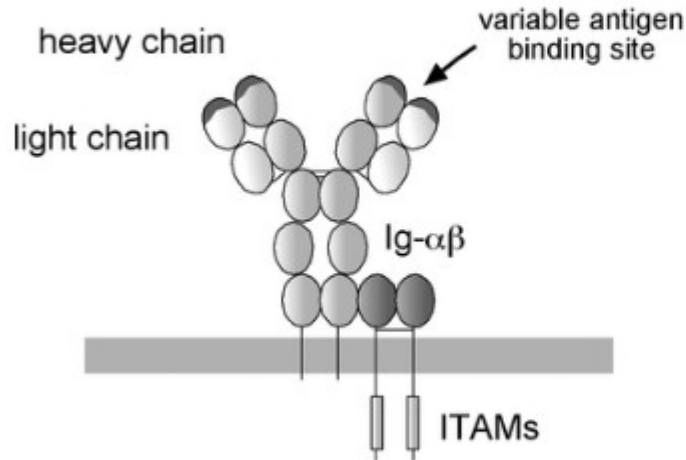
Çok sayıda
patojen geni

vs

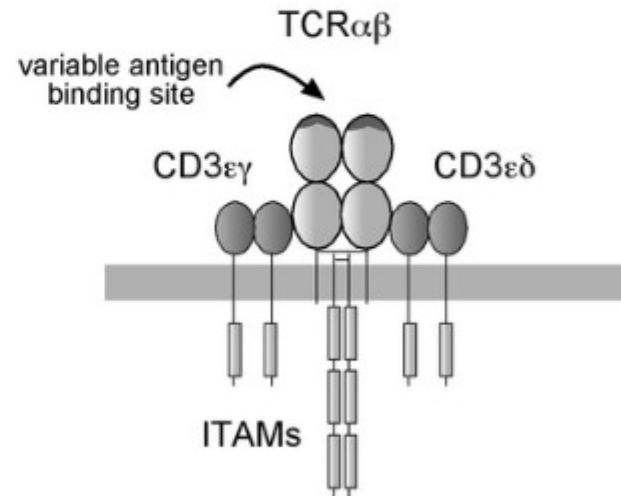
sınırlı sayıda
konak geni

1 patojen geni vs 1 konak geni

B cell antigen receptor



T cell antigen receptor



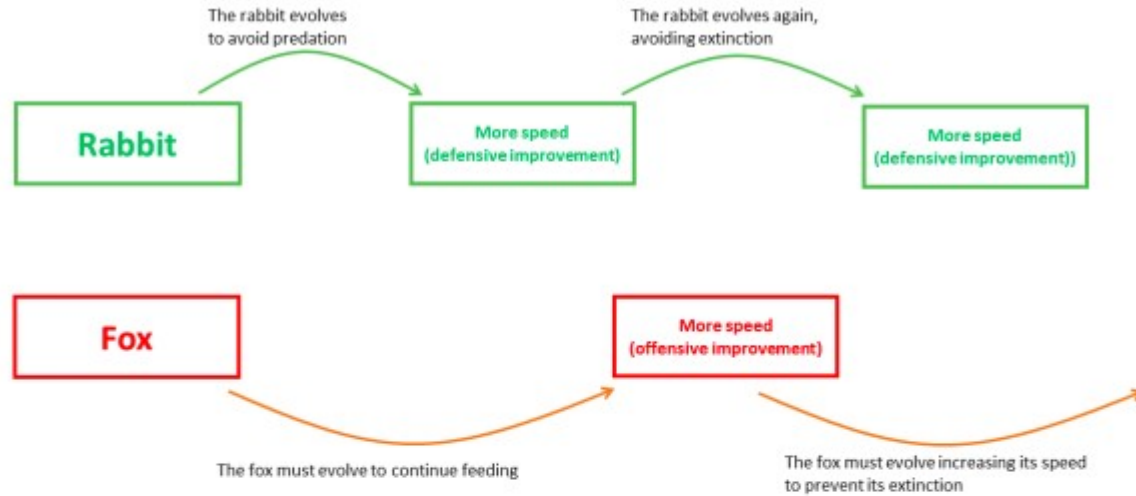
Models of Antigen Receptor Activation in the Design of Vaccines
October 2009 Current pharmaceutical design 15(28):3237-48





Red Queen Hypothesis

https://en.wikipedia.org/wiki/Red_Queen_hypothesis



Red Queen Hypothesis: Predator and prey must be constantly evolving to avoid extinction.

savana'da sıradan bir gün:
ezeli rekabet, ebedi vahşet...



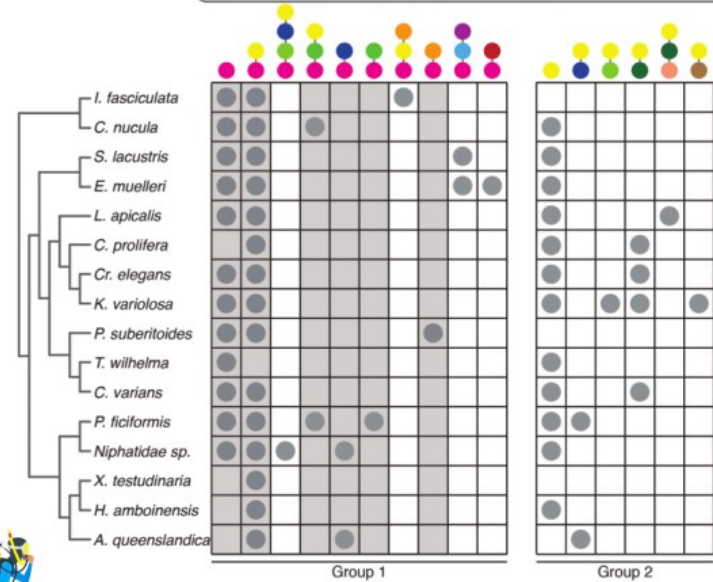
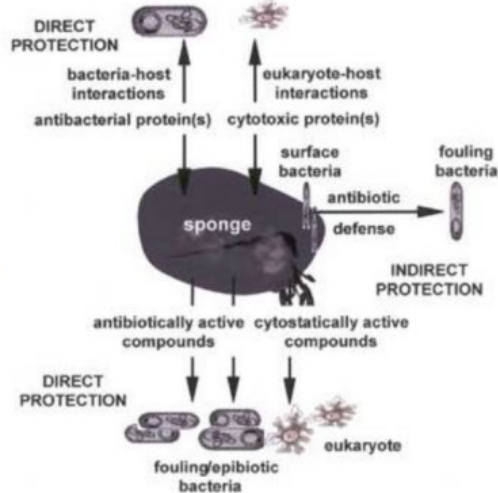
CALYPSO



Jacques-Yves Cousteau

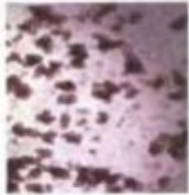


Thakur, N. L., Hentschel, U., Krasko, A., Pabel, C. T., Anil, A. C. and Müller, W. E. G., *Aquat. Microb. Ecol.*, 2003, **31**, 83–87.



Origin and Evolution of the Sponge Aggregation Factor Gene Family.
doi:10.1093/molbev/msx058

Suberites domuncula



Dissociated cells



Cell aggregates



Primmorph



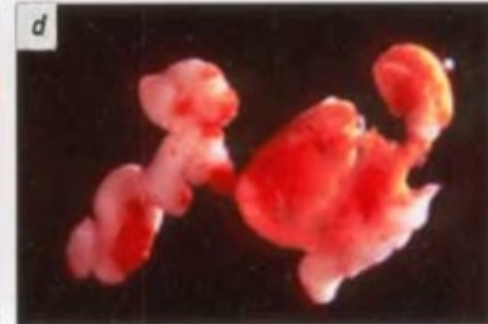
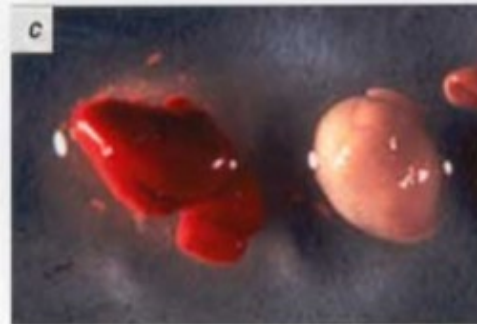
Suberites domuncula



Developed primmorphs

CURRENT SCIENCE, VOL. 86, NO. 11, 10 JUNE 2004

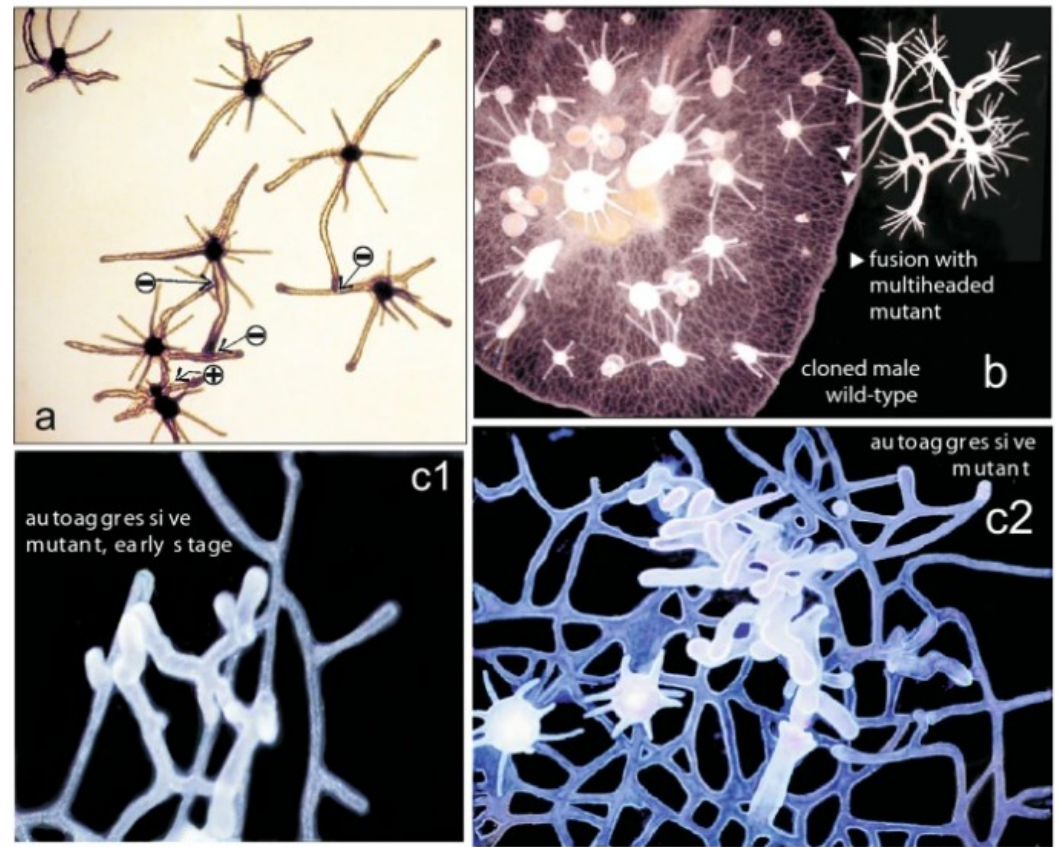
KONTROL



TACROLIMUS



Hydractinia echinata



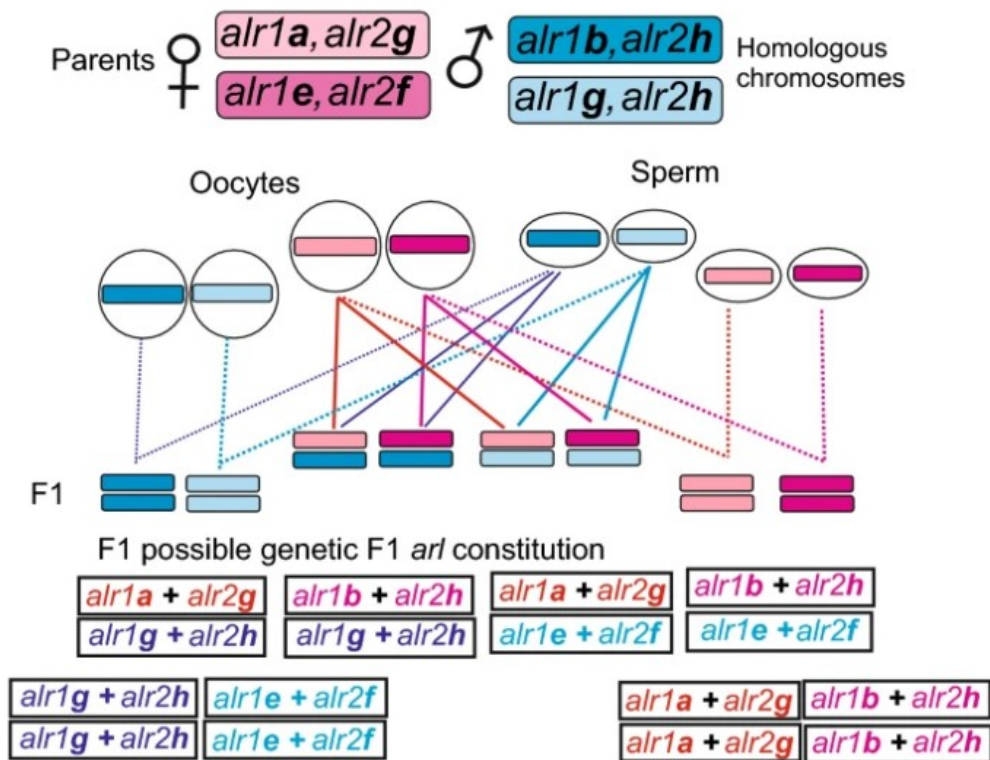
Review | Published: 22 June 2020

Cell Communication-mediated Nonspecific Self-Recognition and -Intolerance in Representative Species of the Animal Kingdom

Werner A. Mueller & Baruch Rinkevich

Journal of Molecular Evolution 88, 482-500(2020) | Cite this article

a Gene loci *alr1* and *alr2* are on both homologous chromosomes but in form of different alleles

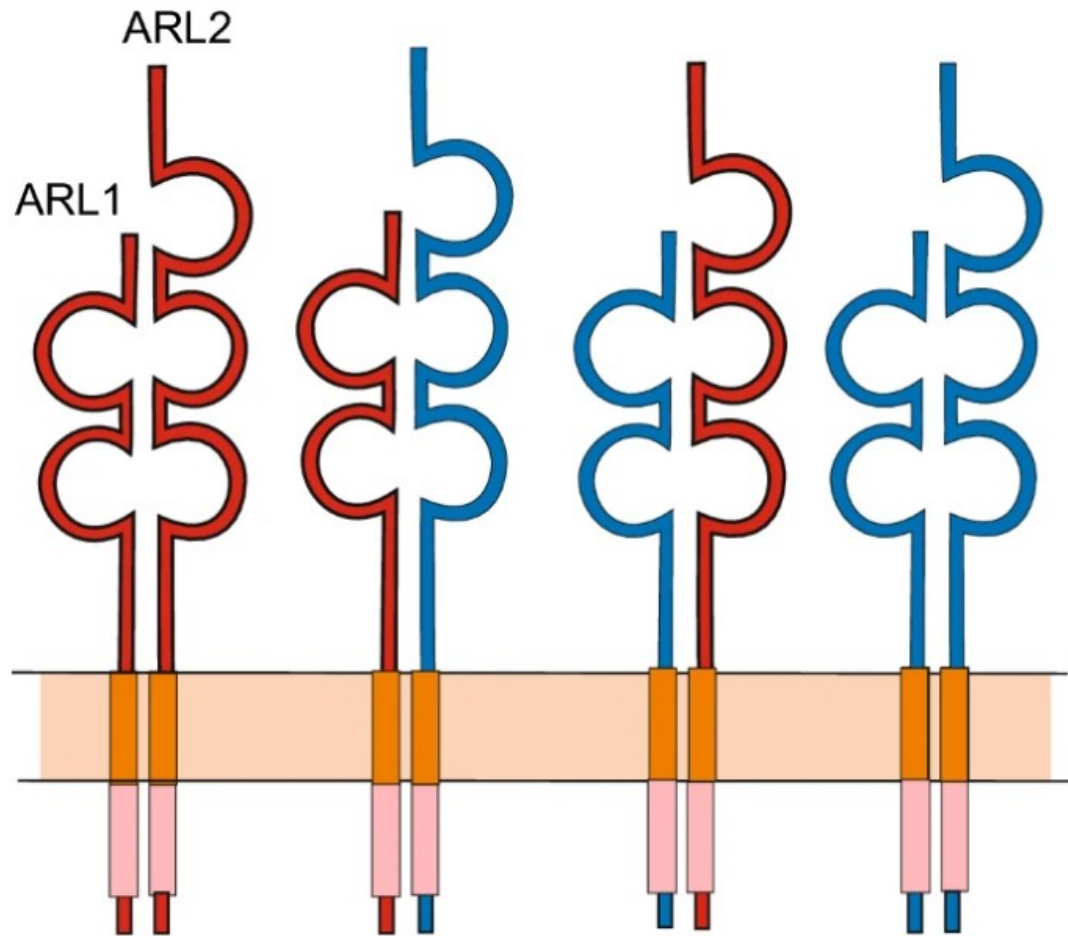


b Array of histocompatibility among F1 siblings

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

Protein Type	Structural Family	Pharmacological Group ¹	
Enzymes	Endonuclease D	Unknown	
	Phospholipase type A ₂ (PLA ₂)	PLA ₂ Type III cytolysins	
	Serine protease S1	Unknown	
Non-enzymatic proteins	Actinoporins	Type II cytolysins	
	CAP	Unknown	
	WSC domain proteins	Unknown	
Peptide neurotoxins	ATX-III	Na _V type 3	
	B-defensin-like	ASIC K _V type 3 Na _V type 1 Na _V type 2 Na _V 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 K _V type 5
	Kunitz-domain	K _V type 2 TRPV1 Protease inhibitor	
		Proline-hinged asymmetric β-hairpin (PHAB)	K _V type 6
		Small cysteine-rich peptides (SCRiPs)	TRPA1
	ShK	K _V type 1	

¹CAP = CRiSP (cysteine-rich proteins), allergen (Ag-5), and pathogenesis related (PR-1); Na_V = voltage-gated sodium channel; TRPA1 = transient receptor potential channel type A1; TRPV1 = transient receptor potential channel type V1.



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

alr1 + alr2

alr1 + alr2

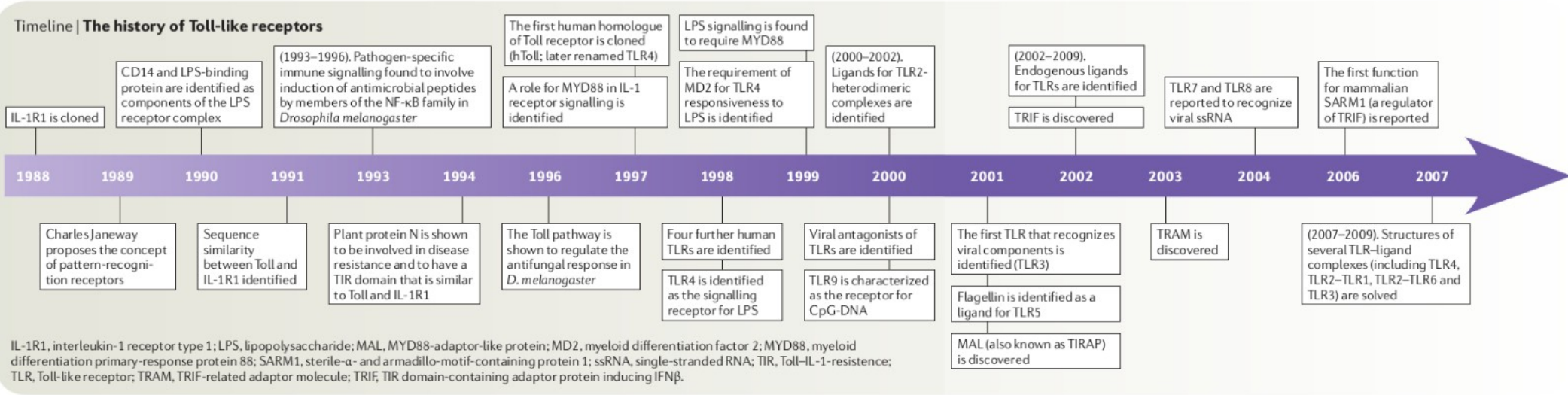
alr1 + alr2

alr1 + alr2

TIMELINE

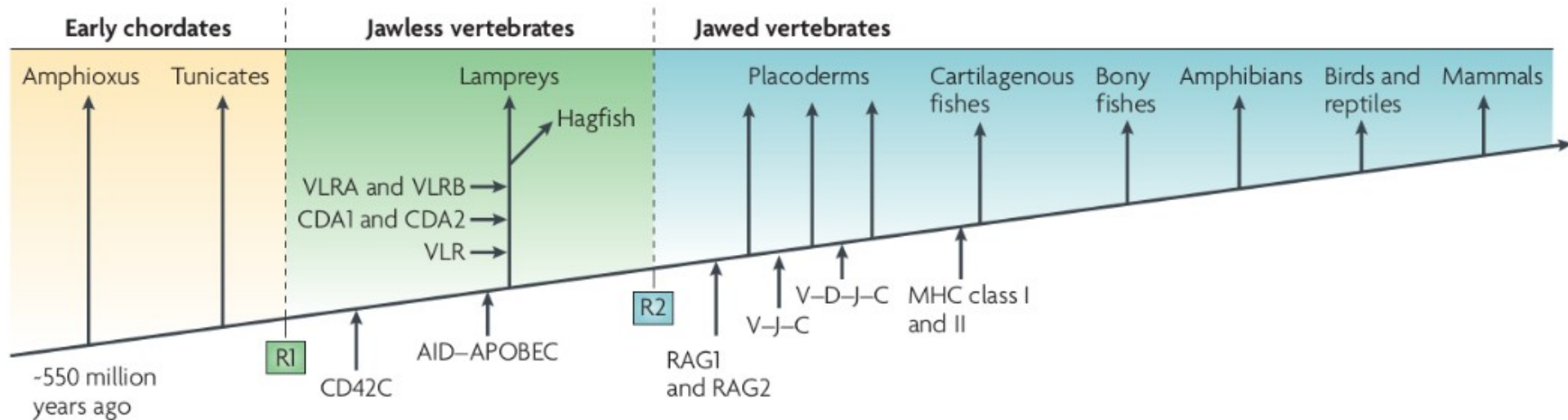
The history of Toll-like receptors — redefining innate immunity

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



DOĞAL BAĞIŞIKLIK VS KAZANILMIŞ BAĞIŞIKLIK

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



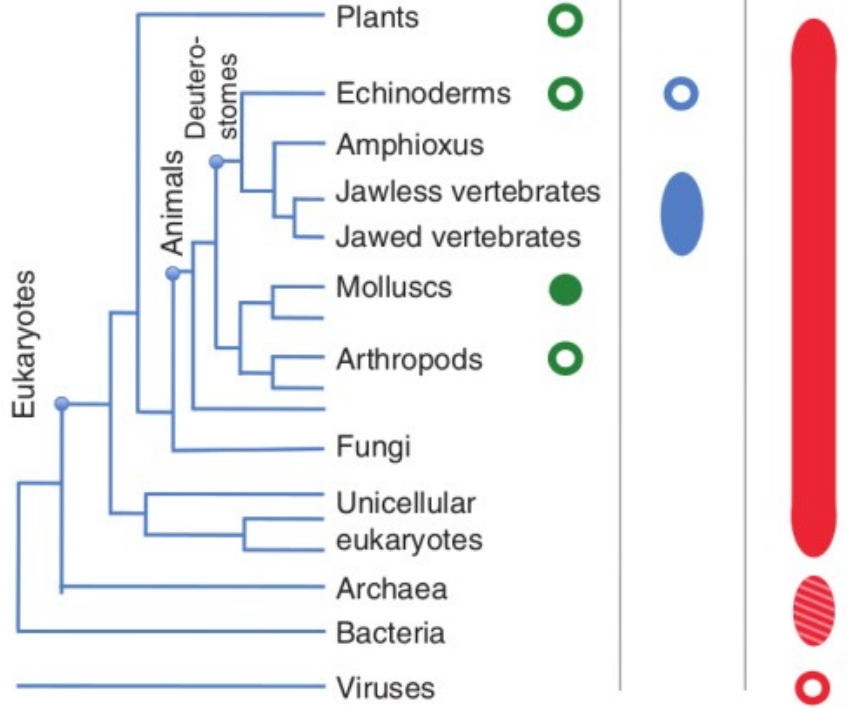
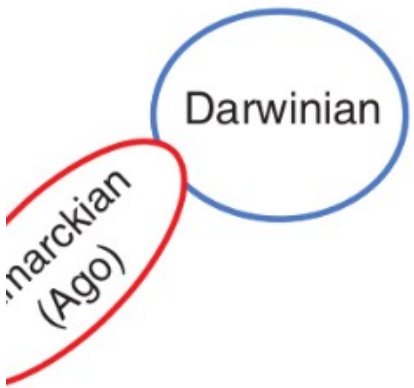
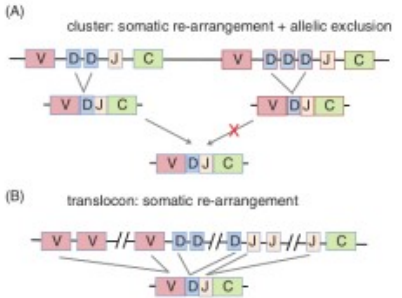
WHOLE GENOME DUPLICATION #1

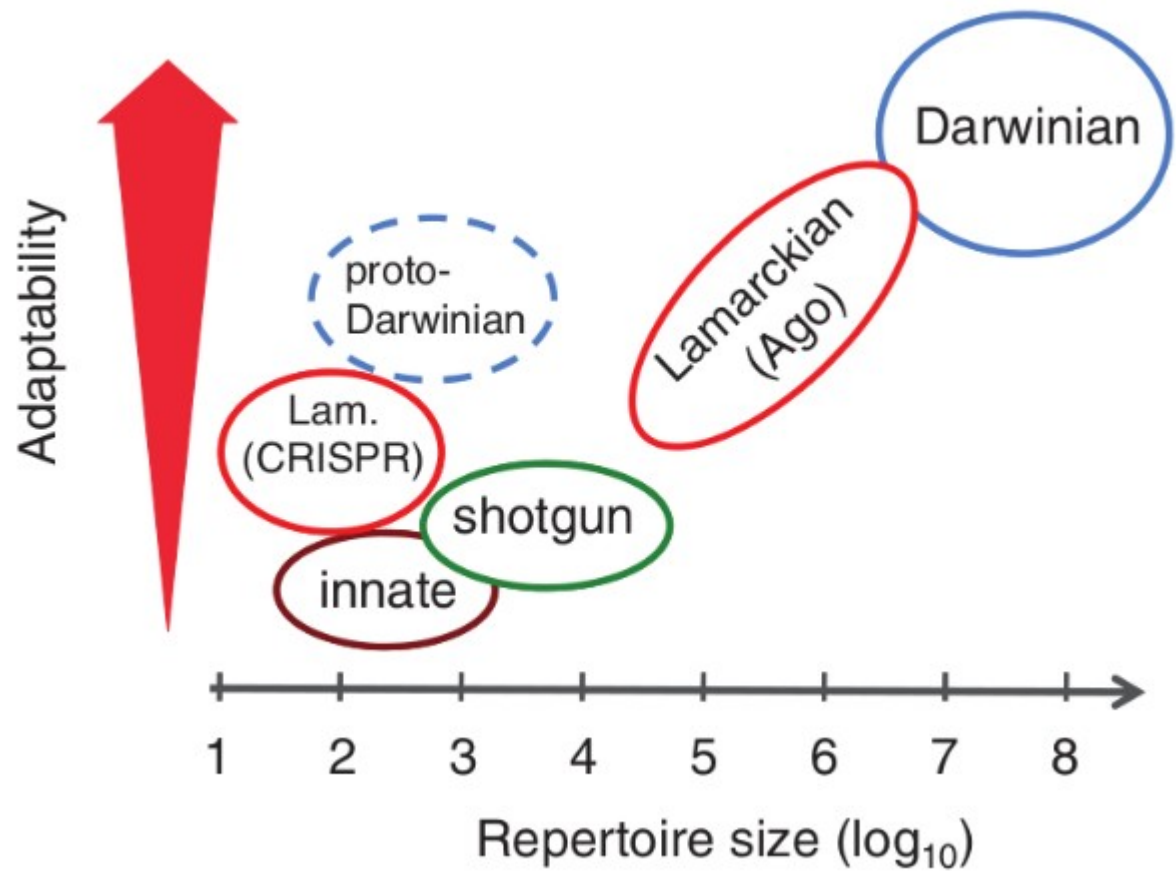
leucine-rich repeat (LRR)-based
receptor for antigen recognition:
variable lymphocyte receptor A & B
(VLRA - VLRB)

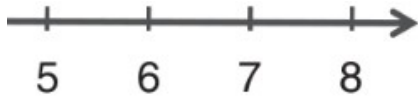
WHOLE GENOME DUPLICATION #2

*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	-	+	+/-	-







ire size (\log_{10})

ÖNEMLİ OLAYLAR:

Daha seçici hedefleme

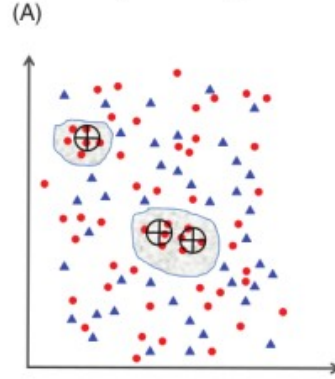
reseptörleri çeşitlendirerek:
Shotgun immünite

Çeşitlendirilmiş reseptörler
arasında seçim:
Proto-Darwinian İmmünite

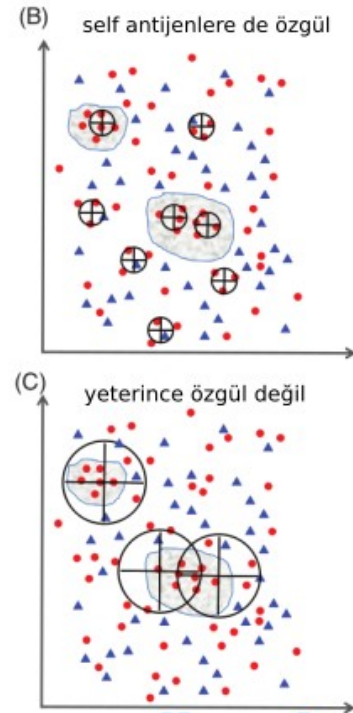
Tüm genom duplikasyonu
İmmün-genlerin regülasyonu

Darwinian İmmünite &
TOLERANS

epitop uzayında...



...bir yanıt



vs OTOİMMÜNİTE



Uygunsuz yanıt maliyetleri yükseltir...