

As causas da diversidade

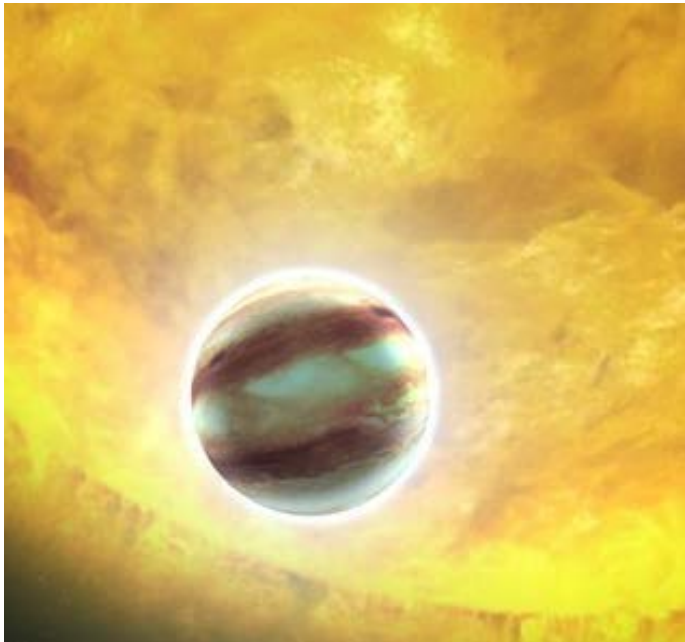
Angel Carracedo



Fundación Galega de Medicina Xenómica-Servicio Galego de Saúde

Instituto de Ciencias Forenses e Centro Nacional de Xenotipado-Universidade de Santiago de Compostela

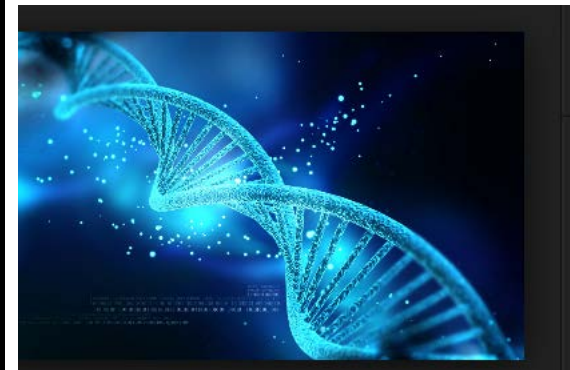


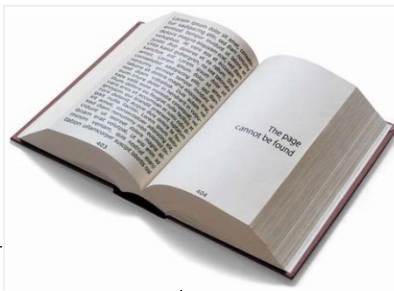


4500 millones de años



4000 millones de anos

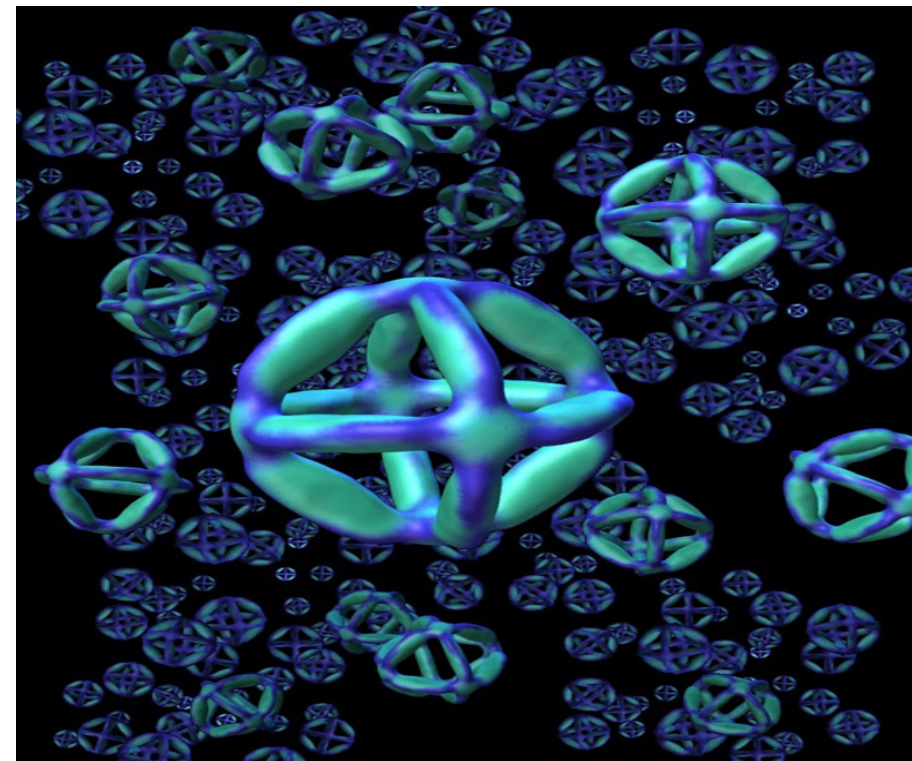
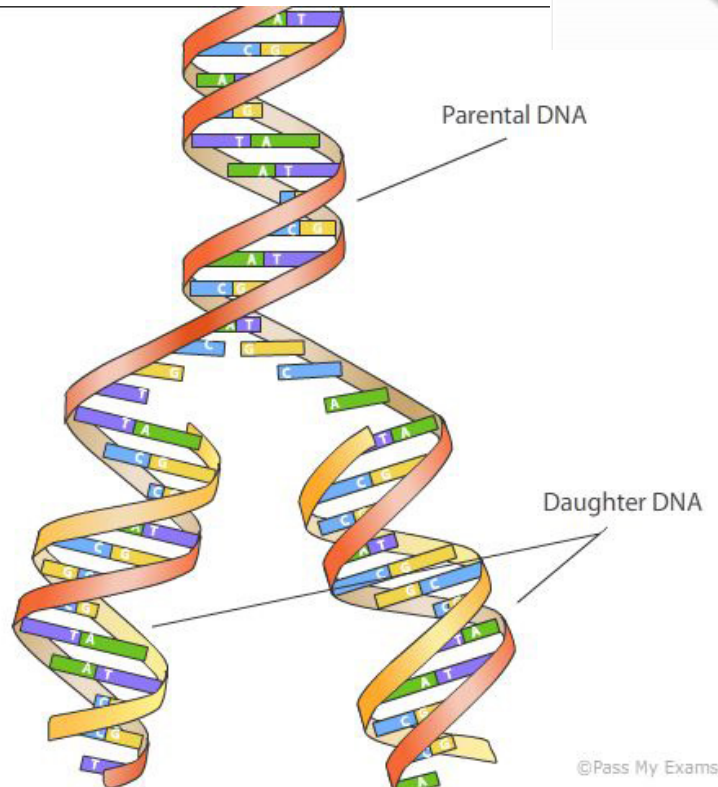




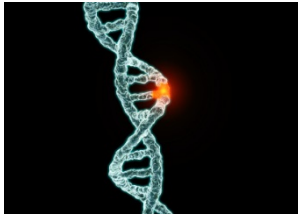
ATCG

TAT ATC CCG ATC TGG ...

3,300 millones de pares de bases



TAT ACT GCG TCG GAT GCT GCG ATT GCT GAC CAA CAT CGT GAC AGT TAG ACA AAC
GAT TGA CTG TTA GGA TTG ACCA CCA ATT ACG ATG ACG TTG GAC ... $3,3 \times 10^9$



MUTACIONES

AGC CAA TGG CAG TGA TGG
ATG GTA GCT GAG TGC TGG....

Silent mutation

Missense mutation

Nonsense mutation

TGT → TGC

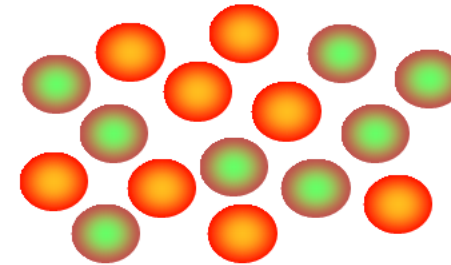
TGT → TGG

TGT → TGA

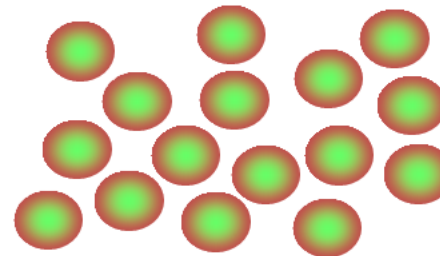
Cys → Cys

Cys → Trp

Cys → Stop

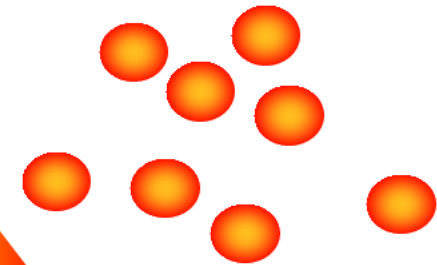


Variación



Sin variación

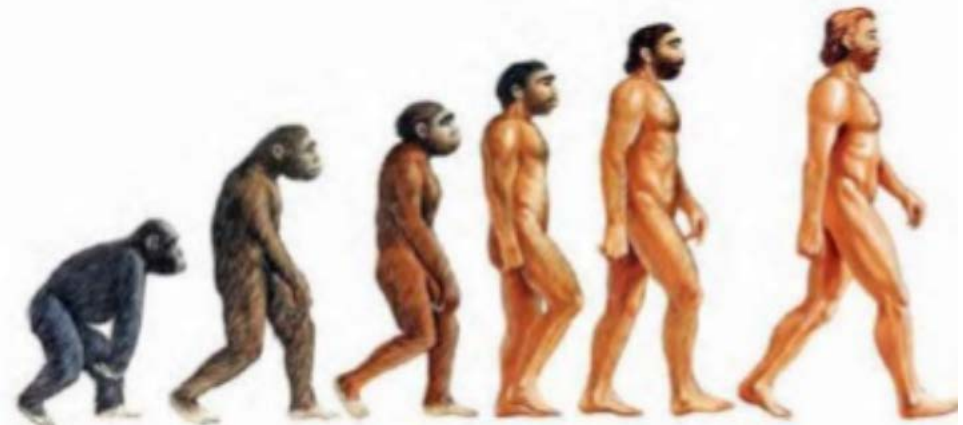
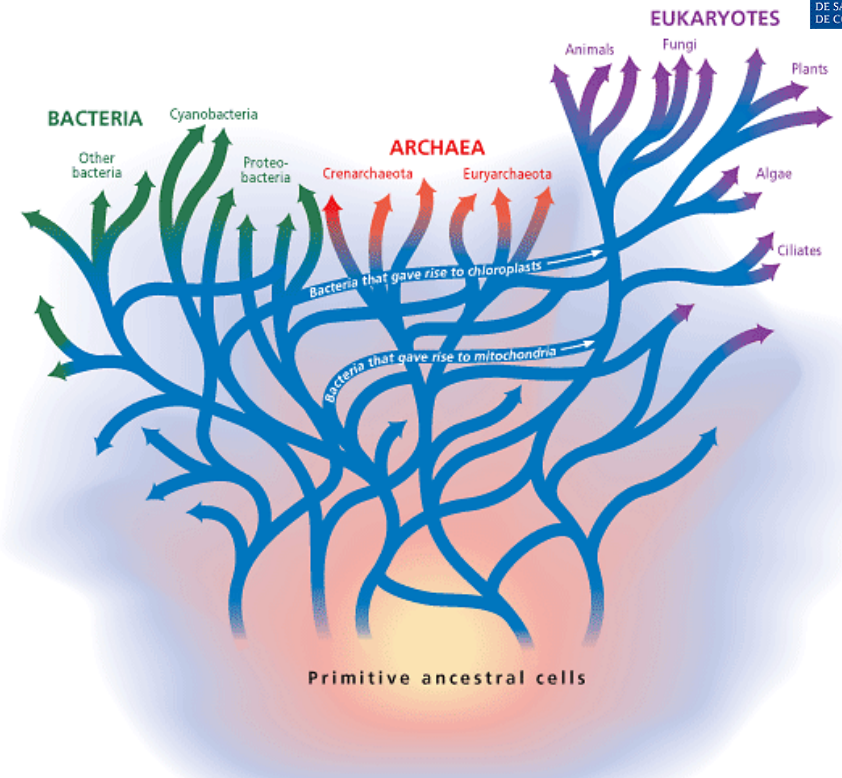
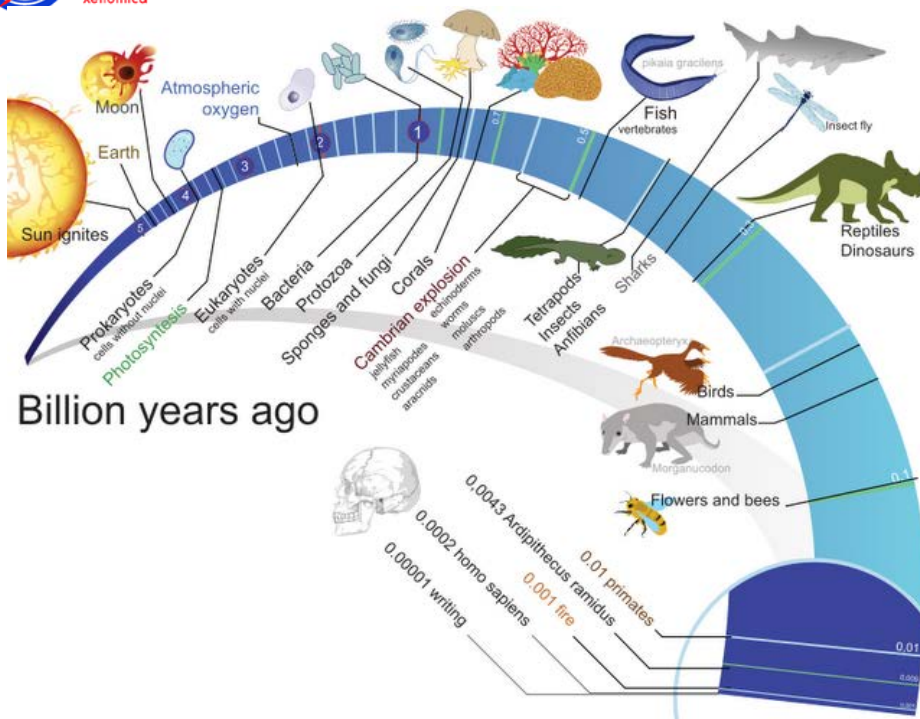
Virus, Bacterias
Cambio climático
Tóxicos



SOBREVIVE

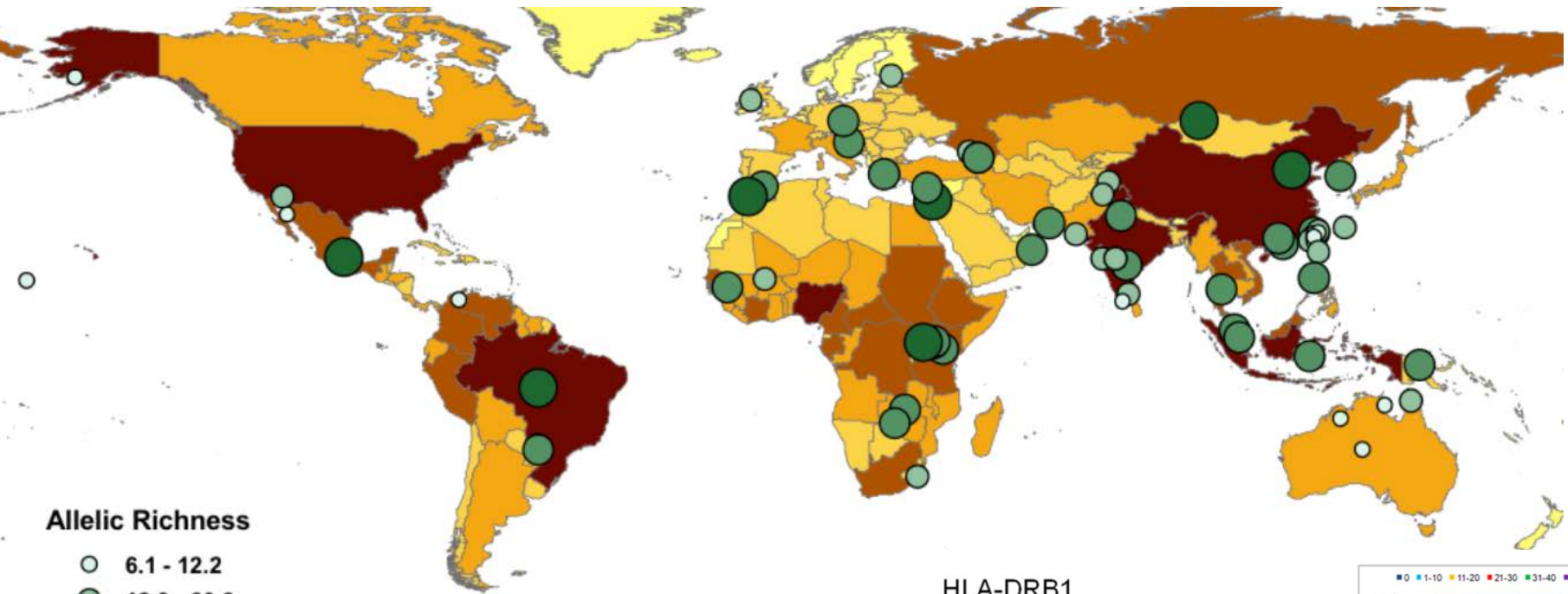
SE EXTINGUE

CON ESE SOL HAY MAS LUZ
CON ESA SAL HAY MAS LUZ
ONE SES OLH AYM ASL UZ

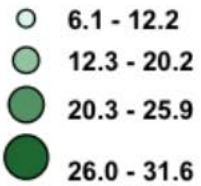




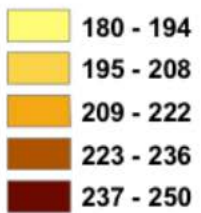
Diversidad de HLA y riqueza de patógenos



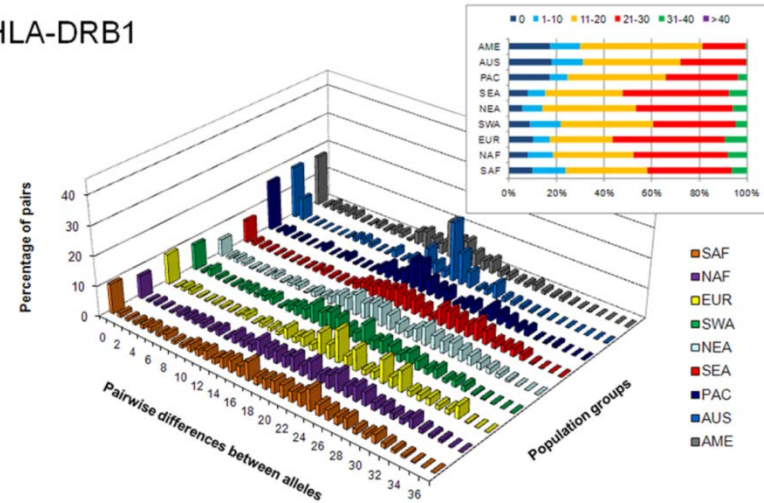
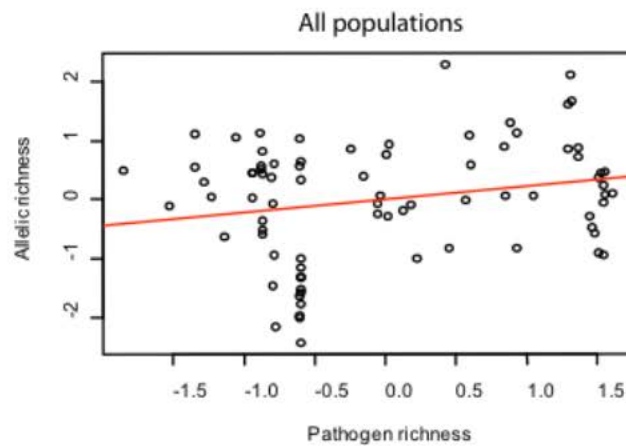
Allelic Richness

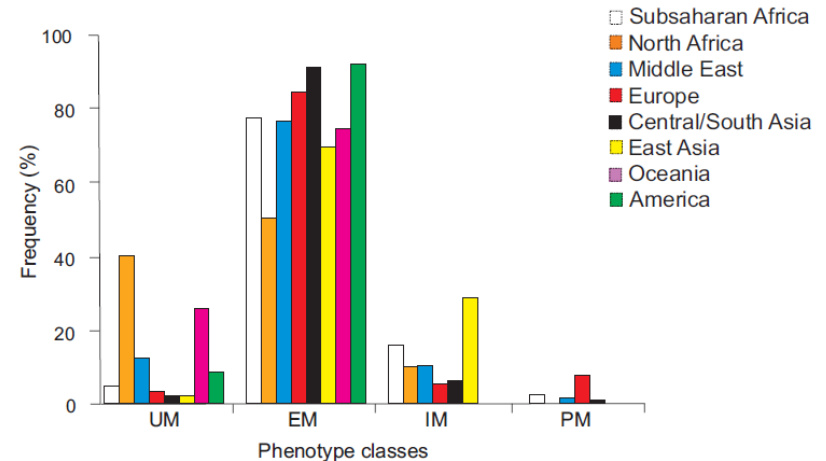
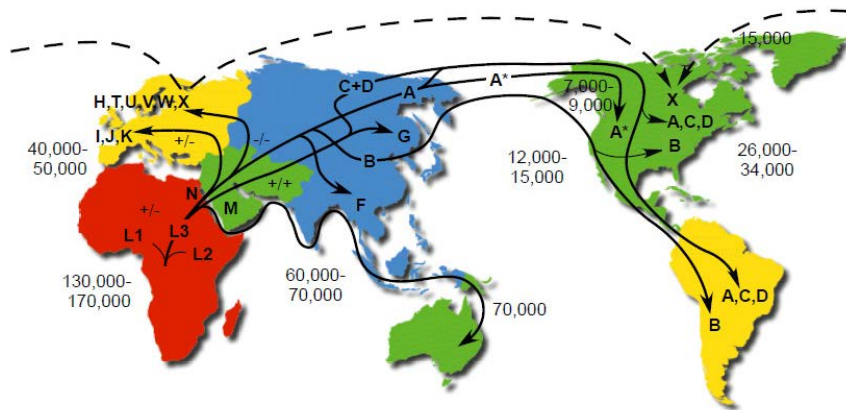


Pathogen Richness



HLA-DRB1





UM High freq North Africa/Saudi Arabia/ Medium East

40% UM

Mozabites 40% UM CYP2D6

Decreased-function variants *CYP2D6*10*, *CYP2D6*17*, and *CYP2D6*41* are common in Asian, African, and Western Asian populations
Null function variant *CYP2D6*4* is common in European populations.



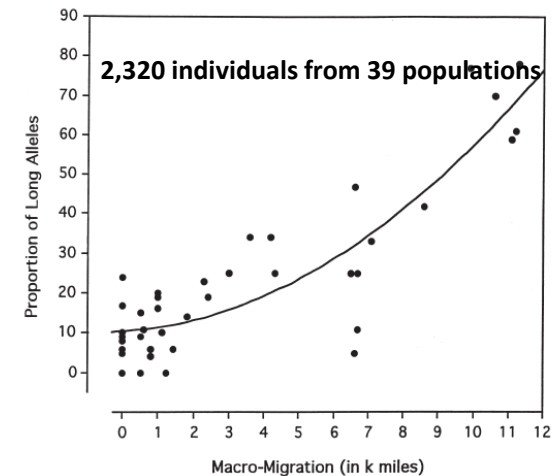
Receptores dopaminérgicos

Sedentary populations, migratory populations showed a higher proportion of long alleles for DRD4 (p .001).

Adaptive value of long alleles of in migratory societies and the possibility of natural selection for a migration gene??.

DRD4 variants— has been linked to Attention Deficit Hyperactivity Disorder (ADHD) treatment

Pharmacogenomic consequences in non-response to ADHD



Population Migration and the Variation of Dopamine D4 Receptor (DRD4) Allele Frequencies Around the Globe, Chen et al. Evolution and Human Behavior 20: 309–324 (1999)



Somos genes y ambiente. El ambiente y las circunstancias también condicionan lo que somos

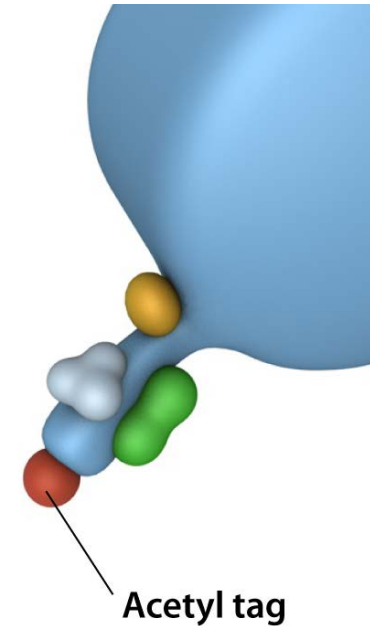
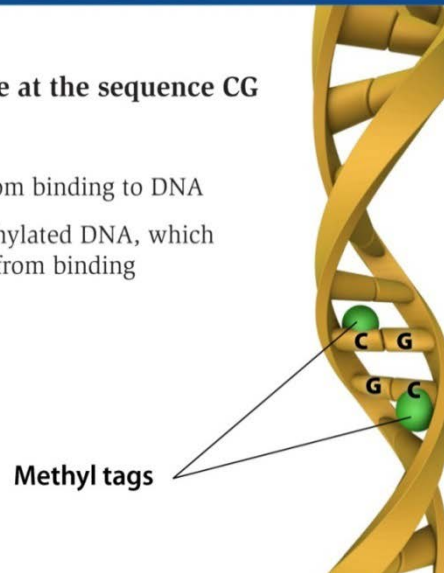
Gene and environment: Epigenetics

Methyl tags usually turn genes off

Methyl tags are added to a cytosine at the sequence CG

They silence genes by:

- Blocking transcription machinery from binding to DNA
- Recruiting proteins that bind to methylated DNA, which then block transcription machinery from binding



CON ESE SAL. HAY MÁS LUZ

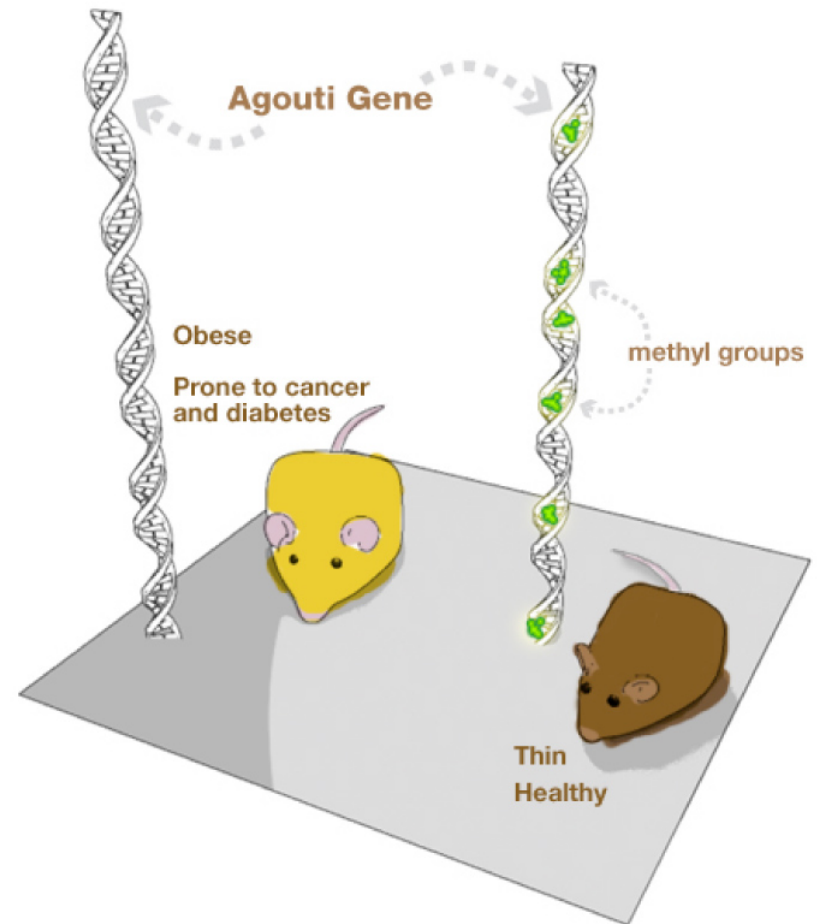
Diet affects the epigenome

These two mice are genetically identical.

During pregnancy, the mother of the brown mouse ate a diet rich in methyl groups.

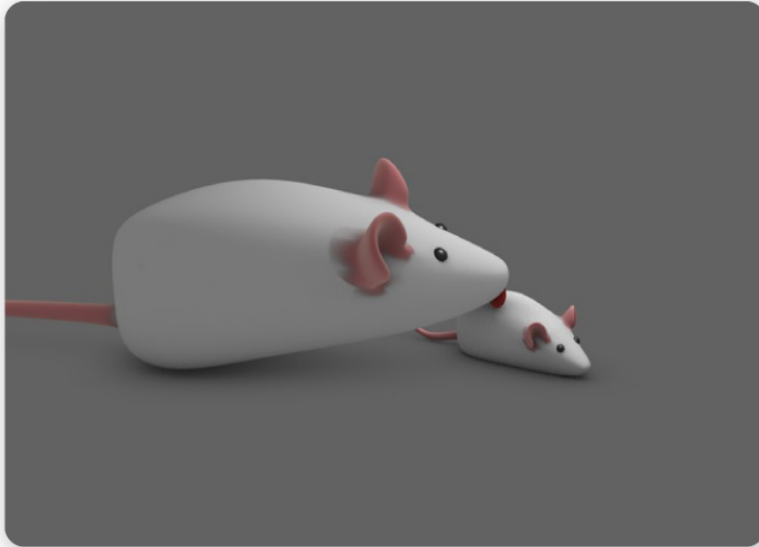
The mother of the yellow mouse ate regular mouse food.

The high methyl diet affected the developing mouse's epigenome, causing it to be born brown, thin and healthy.

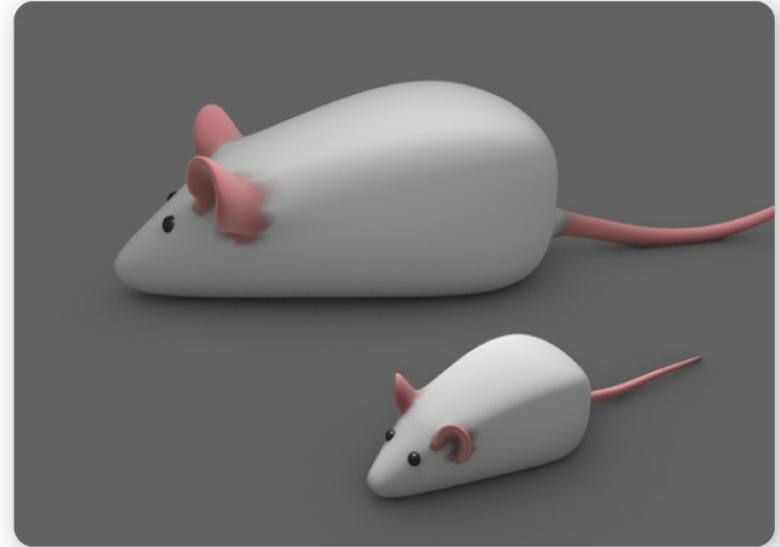


Waterland and Jirtle, 2003. Mol. Cell Biol 23(15): 5293-300.

Maternal care affects the epigenome



Highly nurtured rat pups tend to grow up to be calm adults.

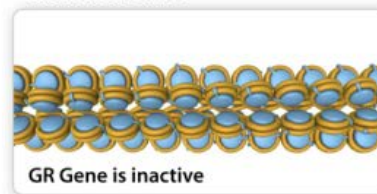


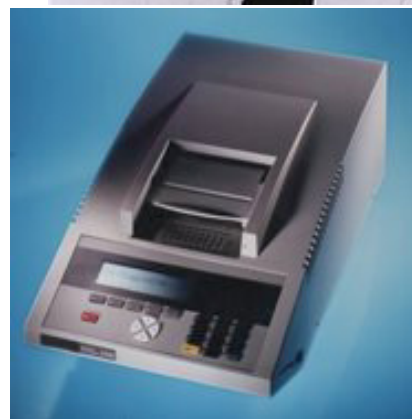
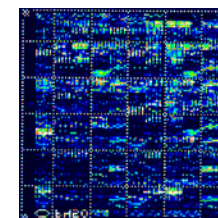
Rat pups who receive little nurturing tend to grow up to be anxious adults.

High Nurtured



Low Nurtured



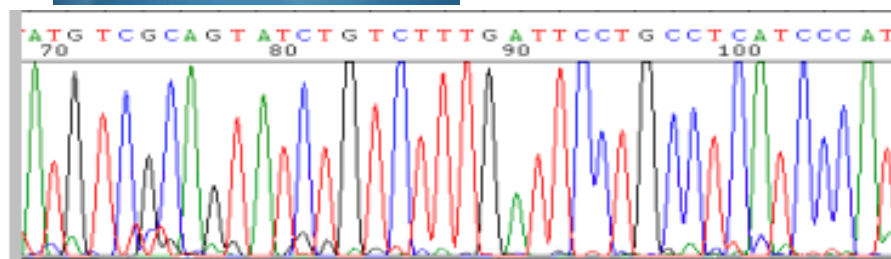


Science

THE
HUMAN
GENOME

nature

the
human
genome



Technology	Sequencing method	Amplification method	Read length (bp)	Throughput (Mb/run)
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Sequencing Chip

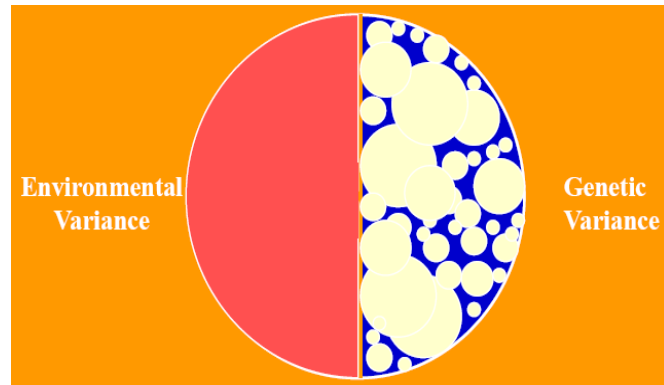
100 nm

DNA Polymerase

Detector

Single DNA Molecule Technologies





La genómica nos da herramientas para buscar el componente genético de la enfermedad que se conoce cada vez mejor:

Heritability: Genetic variance/Total variance

Colorrectal cancer: 35%

Breast cancer: 28%

Lung cancer: 3%

Schizophrenia: 82%

Autism: 90%

ADHD: 75%

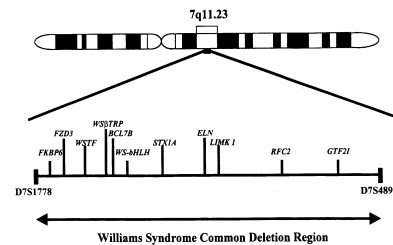
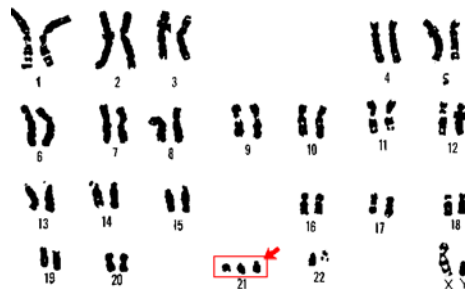
TOC: 65%

-Predicción de riesgo

-Diagnóstico

-Estratificación

-Dianas para fármacos



Ventajas de la integración



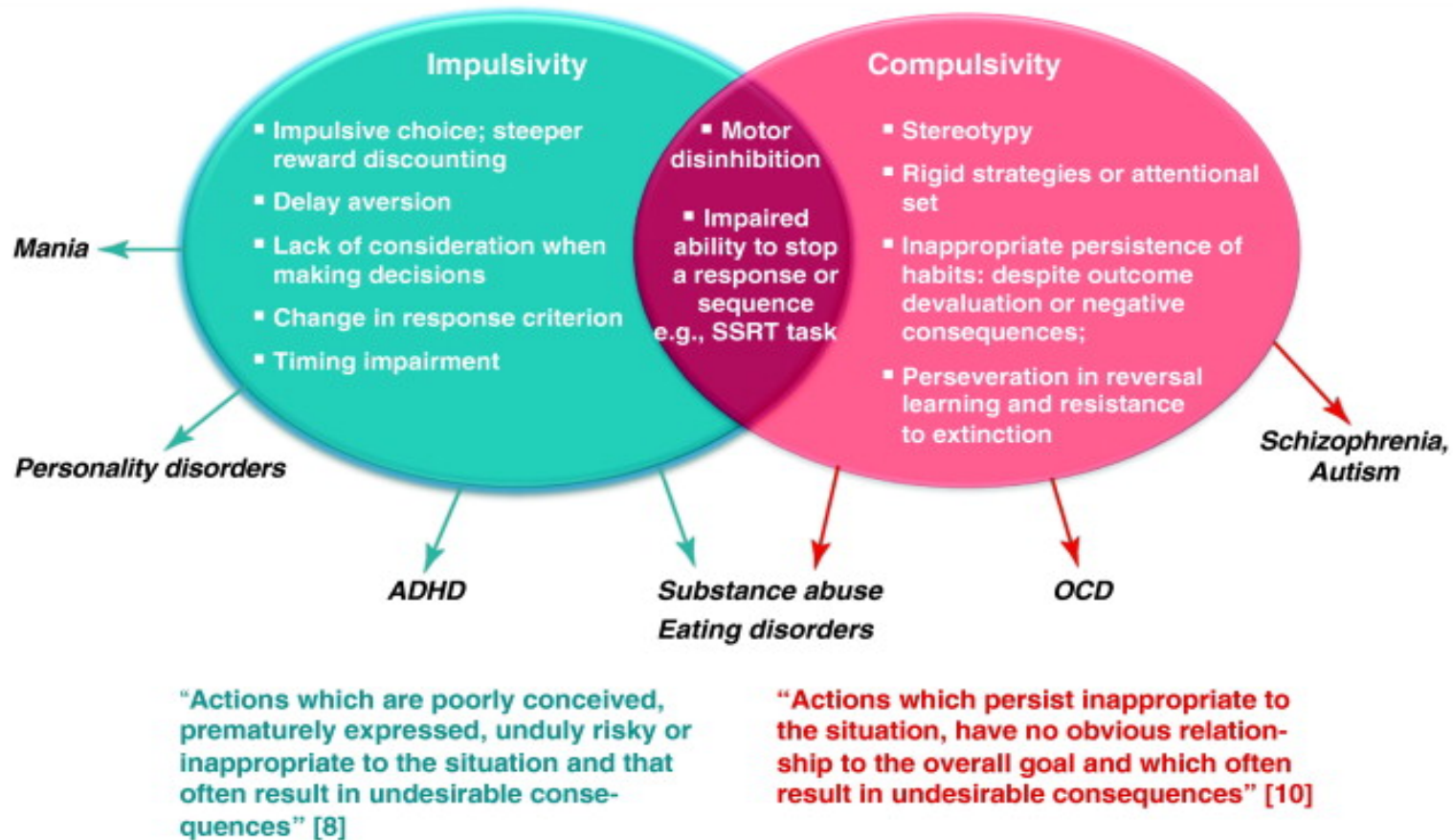


**10 % población
infanto-juvenil
tiene problemas**



Awareness

TDAH 2-7%
TOC 1-2%
Depresión 1-2%
Anorexia 1-2%
Trastornos personalidad 1%
Autismo 0.5-1%
Esquizofrenia 0,5-1%
Otros 2-3%



TRENDS in Cognitive Sciences

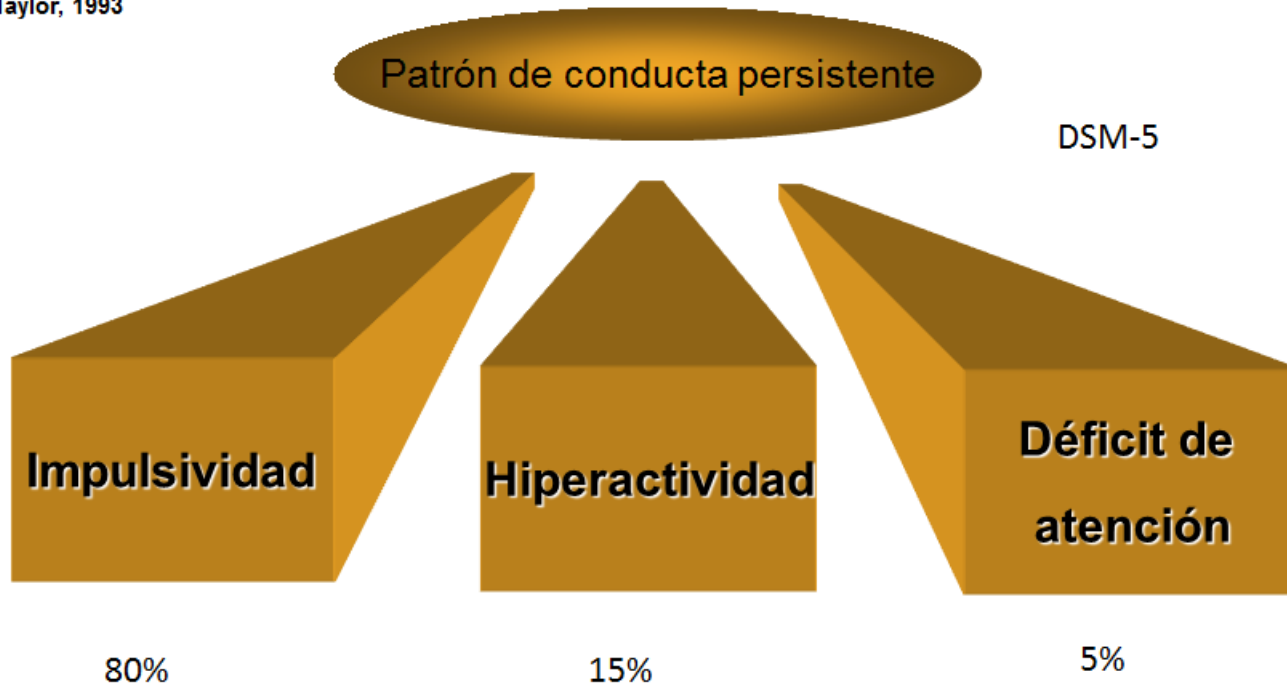
[Trends Cogn Sci.](#) 2012 Jan;16(1):81-91. Epub 2011 Dec 10.

Neurocognitive endophenotypes of impulsivity and compulsivity: towards dimensional psychiatry.

[Robbins TW](#), [Gillan CM](#), [Smith DG](#), [de Wit S](#), [Ersche KD](#)

TDAH

Taylor, 1993



Tratamiento:

Terapia cognitivo-conductual

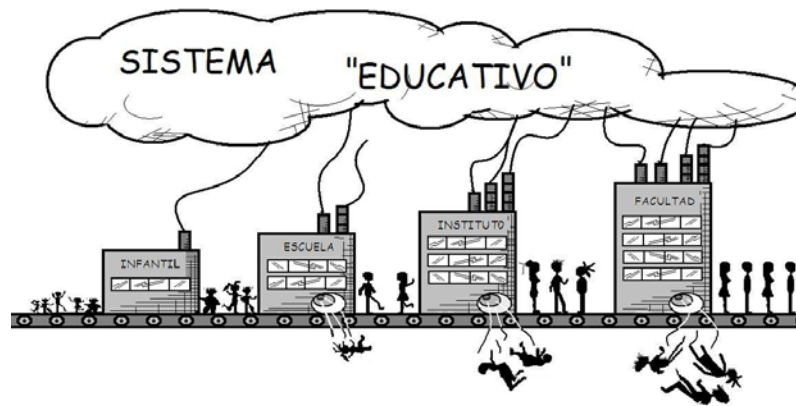
Terapia farmacológica

Apoyo psico-pedagógico

Educación del entorno (profesores – padres)

Educación de la sociedad en general





Los tiempos pasan, los valores sociales cambian, las necesidades de la sociedad cambian, los sistemas educativos permanecen.

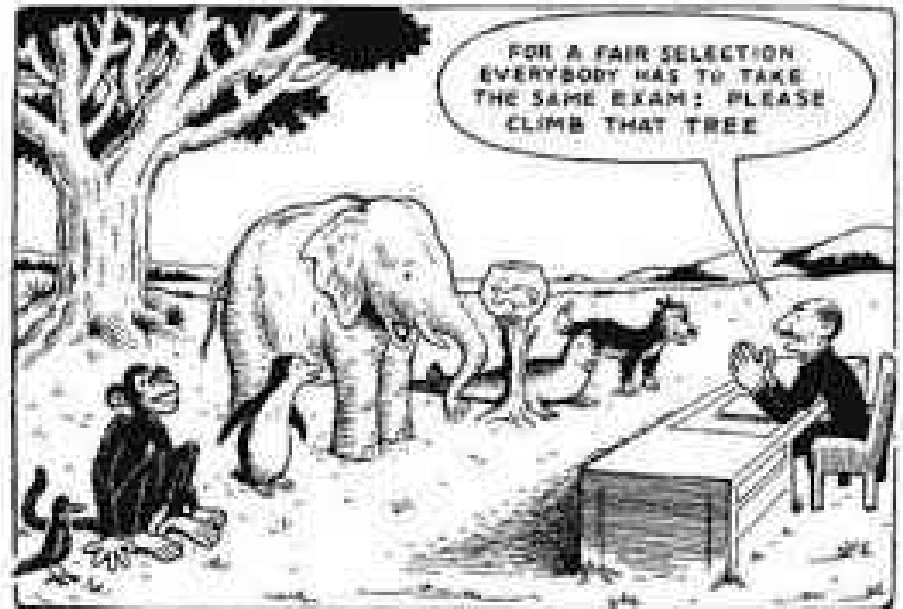
Educación en la diversidad:

Respeto a la diversidad
Atención individualizada

Educación en valores humanos

Educación en el entendimiento del mundo que te rodea

Respetar ritmos
madurativos = Aceptar
las diferencias



Trabajar la motivación

la autoconfianza

la necesidad del esfuerzo

el equilibrio

la comprensión intrapersonal

la relación interpersonal (que incluye el respeto)

los valores

la creatividad y el pensamiento divergente

la curiosidad



El gran problema:

La evaluación:

El examen de selectividad

El examen MIR

Las oposiciones para el acceso a la función pública
en algunos países como España

La no correlación entre las habilidades exigidas y las
necesarias para hacer una función

Esto tiene consecuencias importantes más allá de lo
individual: Falta de competitividad del sector público

LA FIESTA CON QUE SE CELEBRA
LA LLEGADA DE NUESTROS AMI-
GOS, ES MAGNIFICA... Y SI ASURAN-
DETURIX NO HUBIERA SUFRIDO UN
ACCIDENTE, HABRIA AL ENIZADO
LA VELADA CON SUS CANCIONES...

