

FESTIVAL DELLA COMPLESSITÀ

X^a Edizione 2019

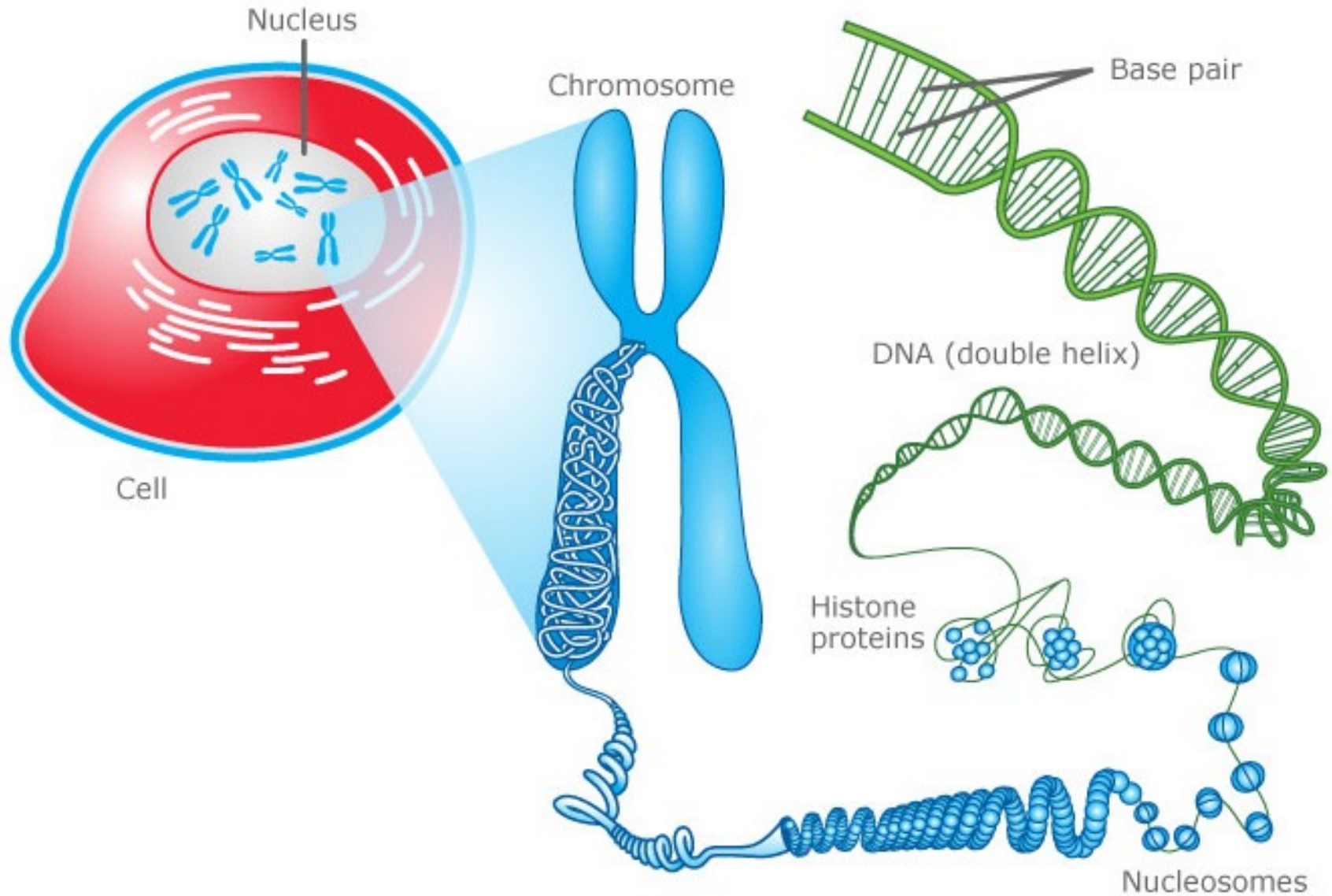
Festival diffuso a Km Zero

DNA, forbici molecolari, mappe concettuali

Antonio Casini

MACRO - Roma, 11 maggio 2019

Il genoma



Il progetto genoma umano

1990-2003

3 miliardi di dollari

20 centri di ricerca



What I cannot create,
I do not understand.

Know how to solve every
problem that has been solved

Why const \times sort .PO

TO LEARN:

Bethe Ansatz Probs.

Kondo \rightarrow

2-D Hall

accel. Temp

Non linear Classical Hydro

$$\textcircled{A} f = u(r, a)$$

$$g = 4(r \cdot z) u(r, z)$$

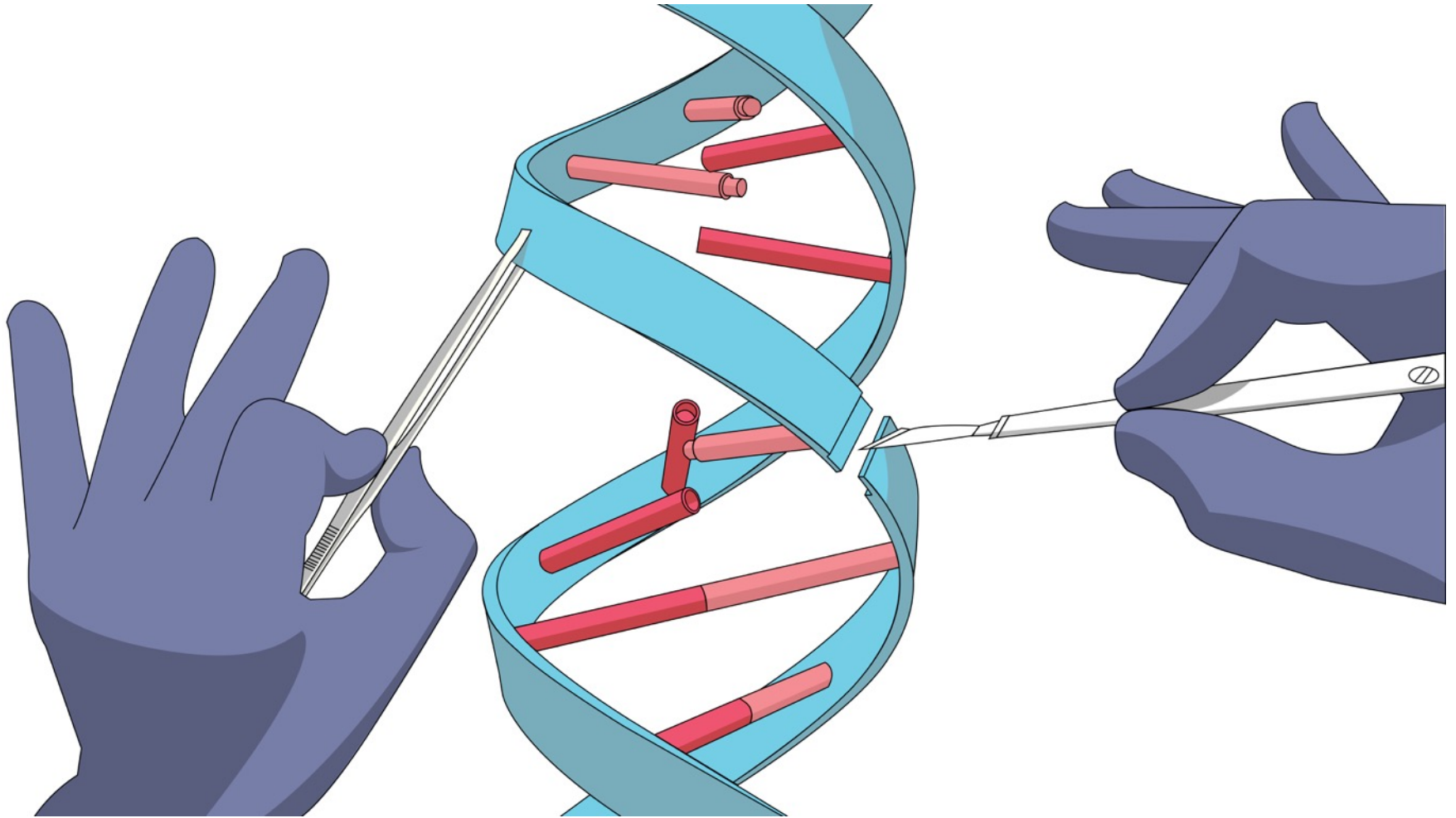
$$\textcircled{B} f = 2|r \cdot a| (u \cdot a)$$

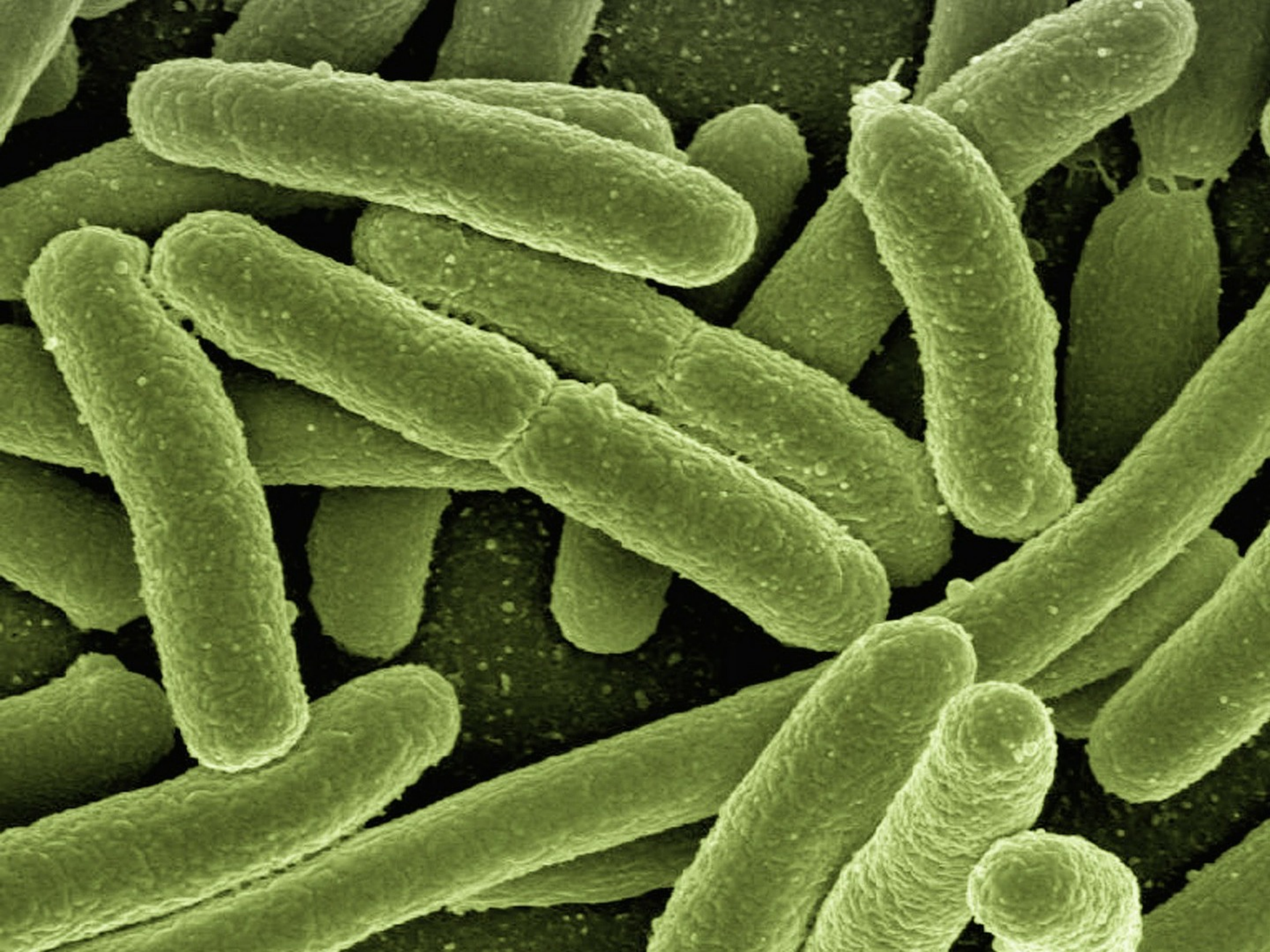


Caltech Archives

Richard Feynman

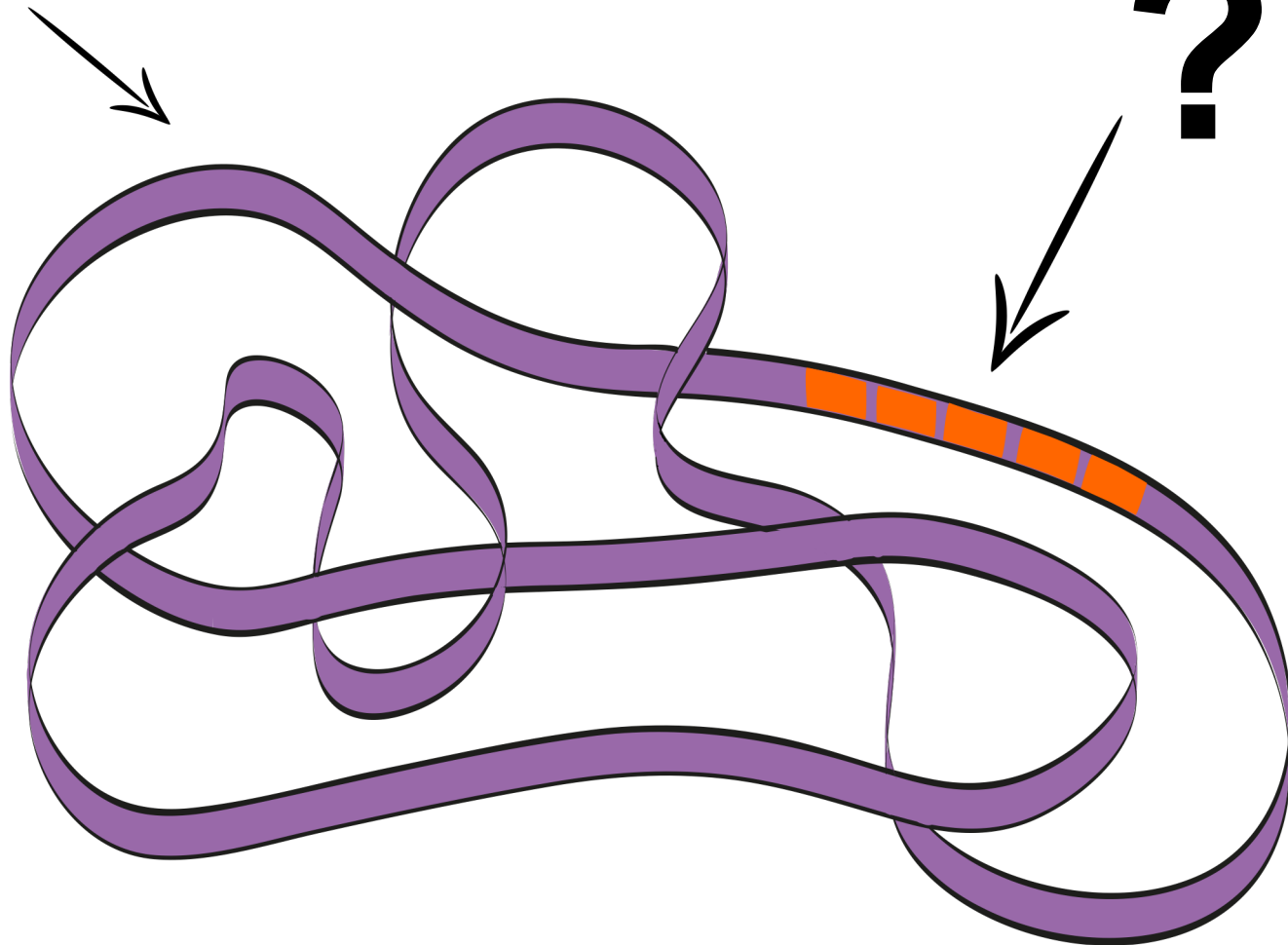
II genome editing





Una scoperta inaspettata

Genoma batterico



Una scoperta inaspettata

Clustered

Regularly

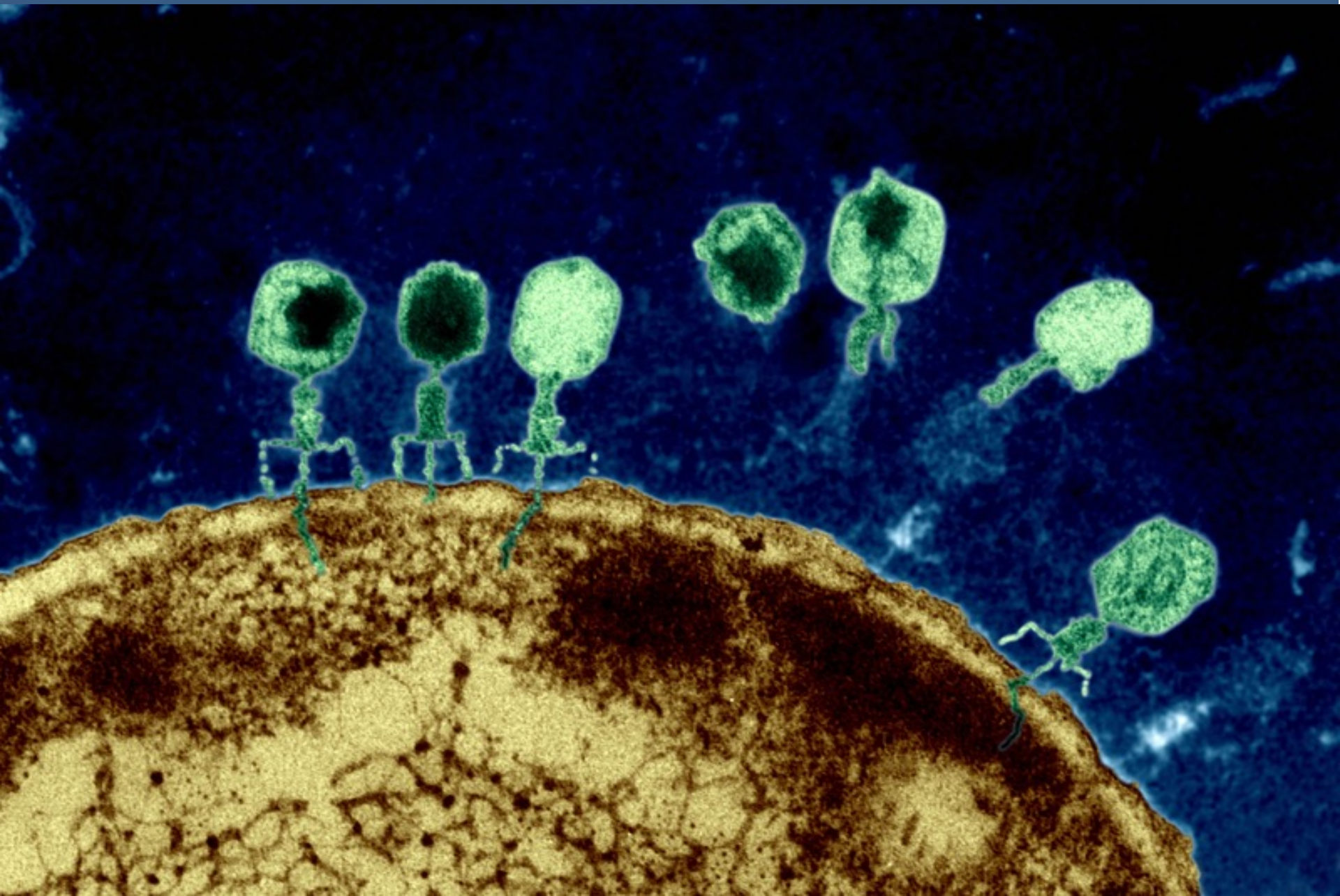
Interspaced

Short

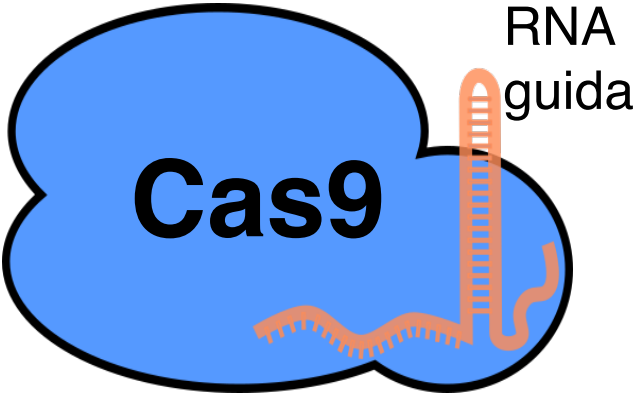
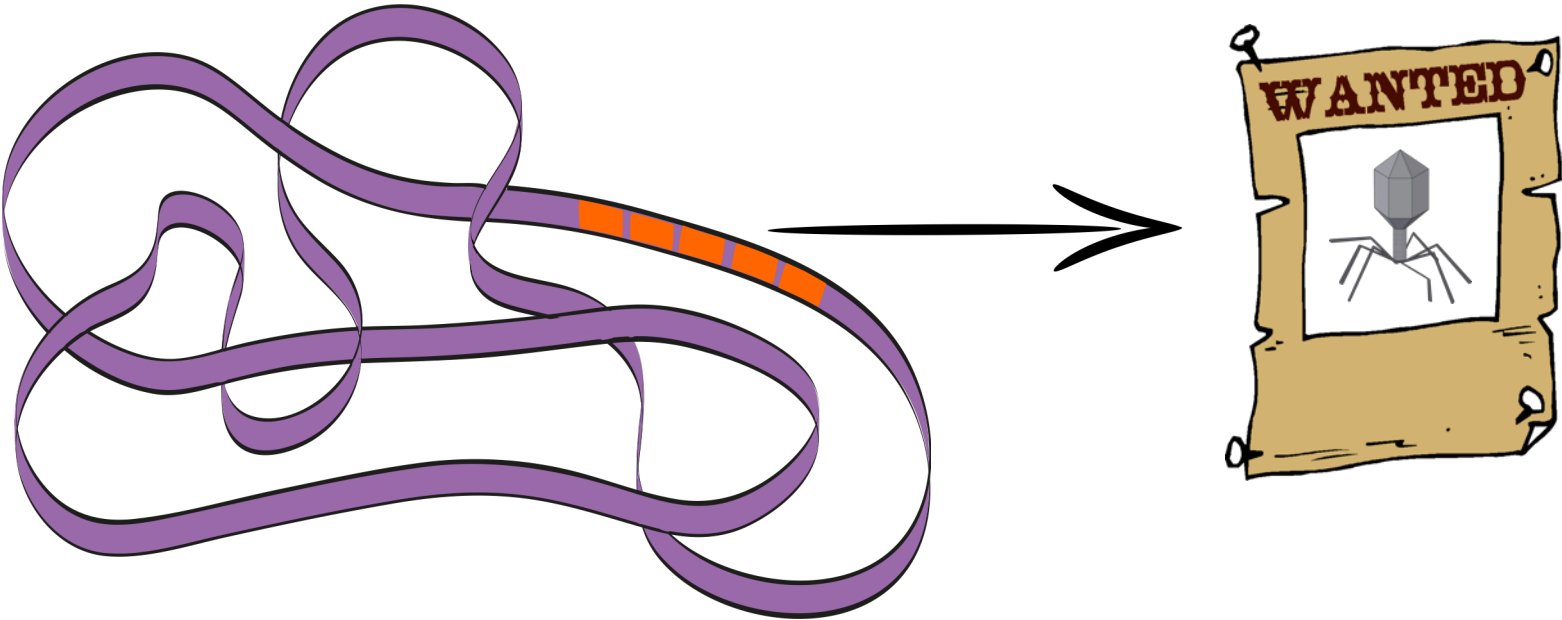
Palindromic

Repeats

Anche i batteri si possono ammalare



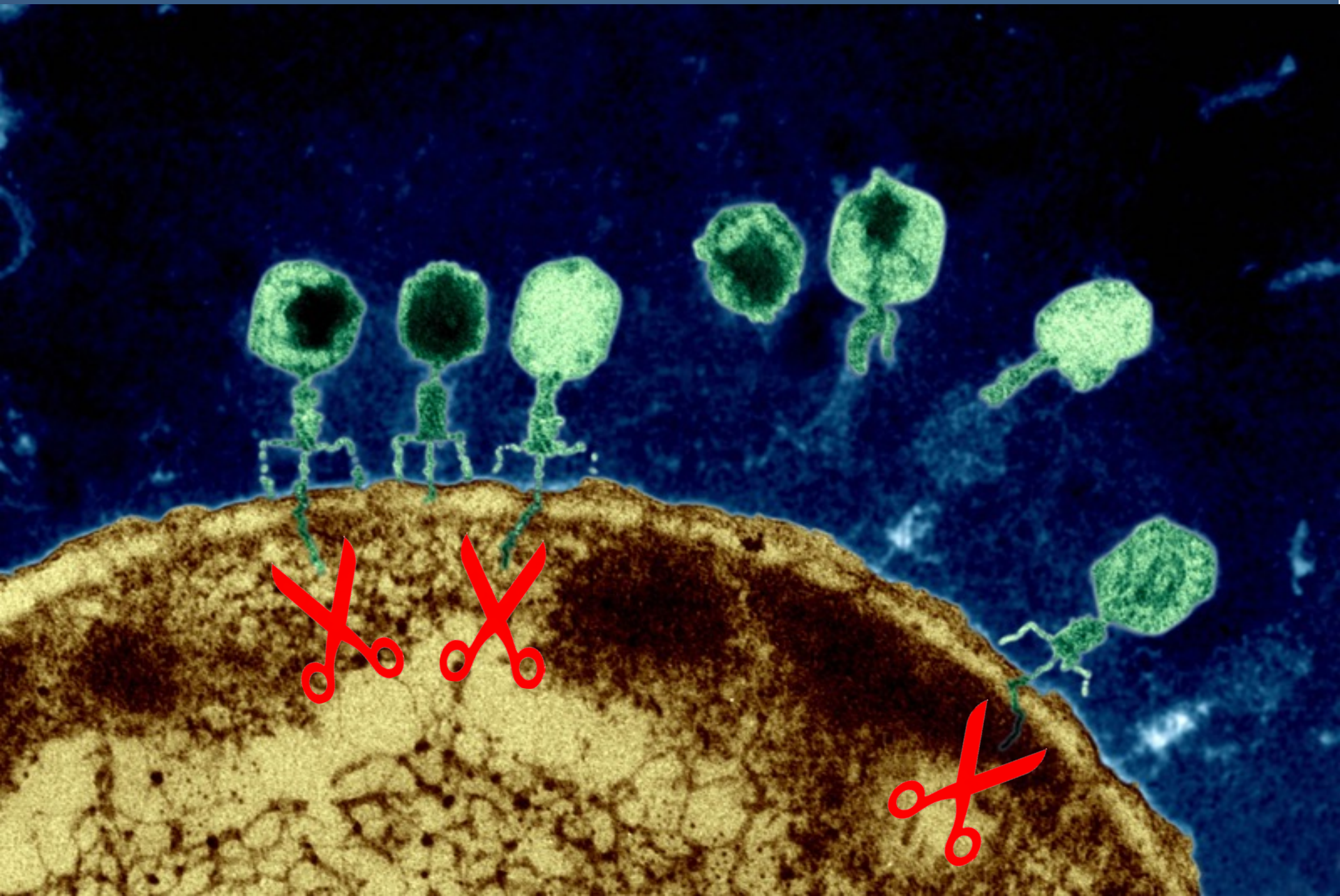
CRISPR-Cas9: un sistema immunitario dei batteri



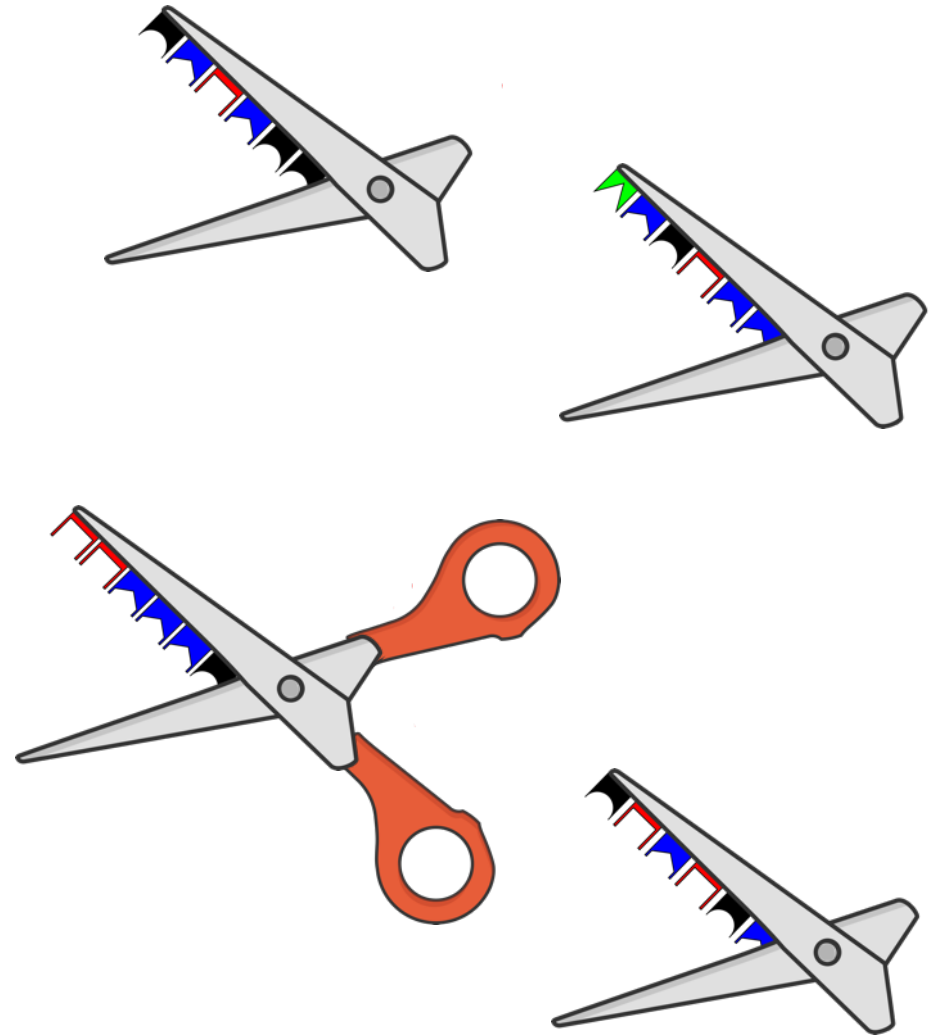
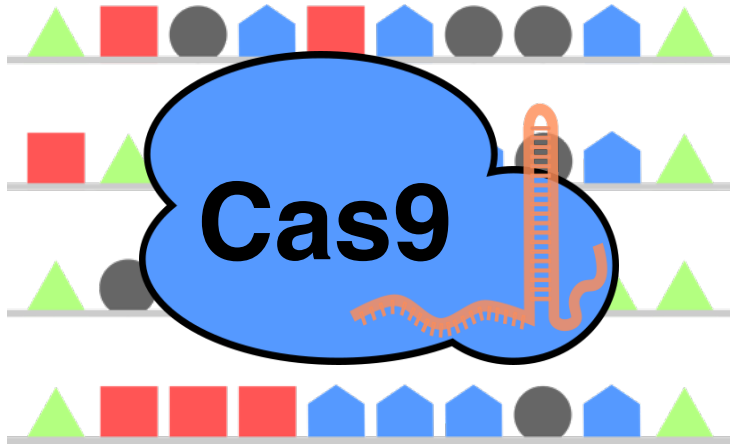
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CRISPR-Cas9: un sistema immunitario dei batteri



CRISPR-Cas9: forbici molecolari per il DNA



**No hunger.
No pollution.
No disease.**

Editing DNA is now
as easy as cut and paste.
Welcome to the
post-natural world.

WIRED

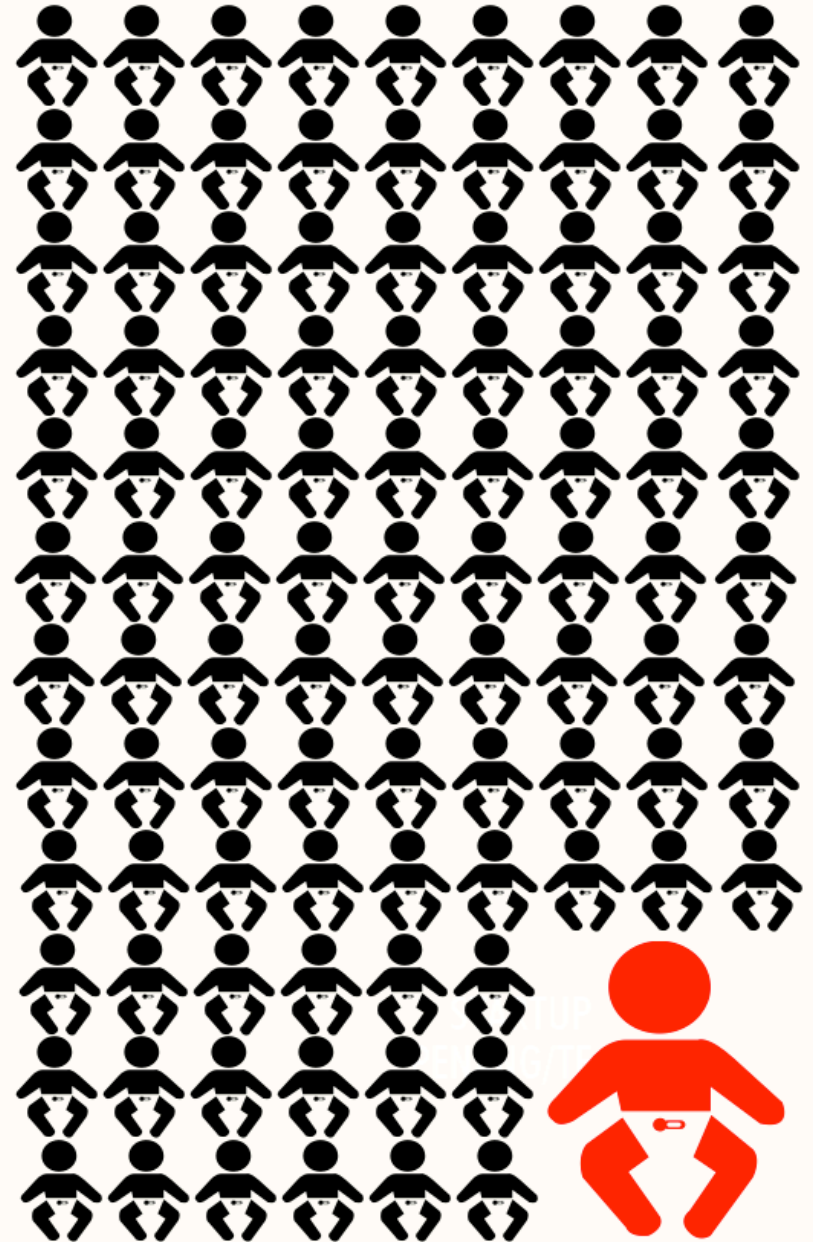
AUG 2015 | PLAY GOD

**And the end
of life as
we know it.
The Genesis
Engine.**



MALATTIE GENETICHE

1 ogni
100 nati



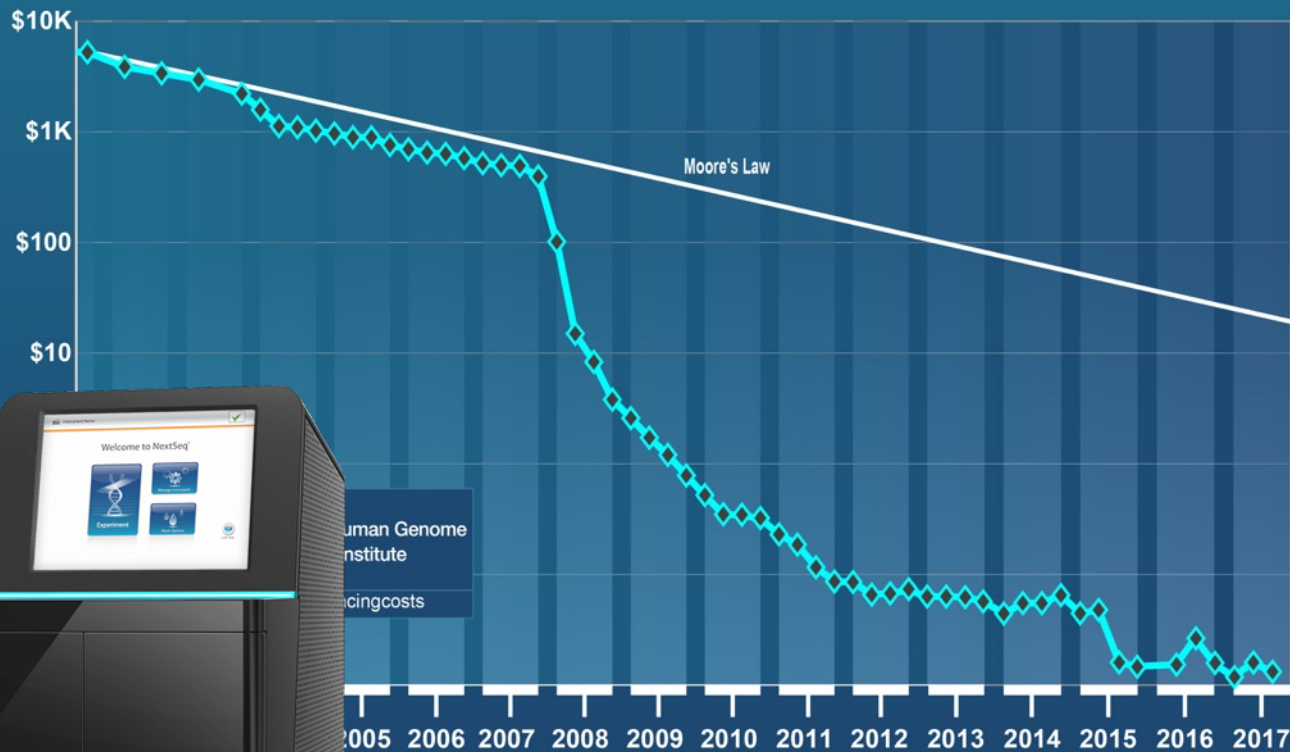
Una nuova arma contro le malattie genetiche



1 gene = 1 malattia

Genomi 2.0

Cost per Raw Megabase of DNA Sequence



Human Genome
Institute
sequencing costs



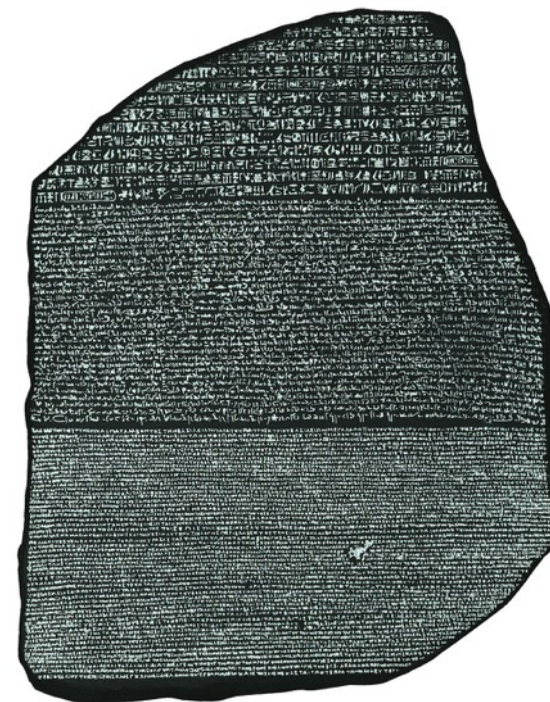
**WHOLE GENOMES SEQUENCED
AT BROAD INSTITUTE**

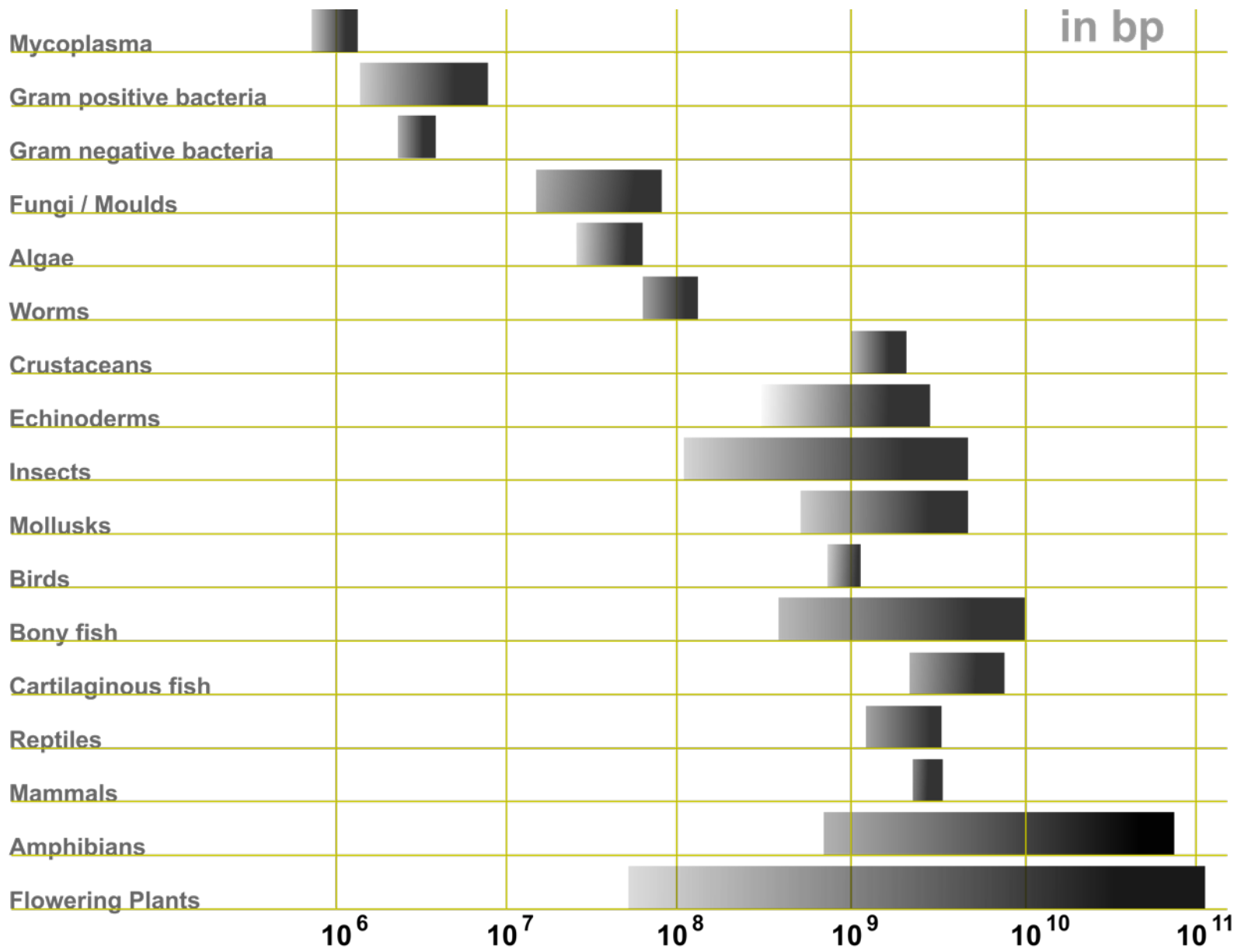
APRIL 25, 2018

A complex network diagram with a central focus. The text "BIG DATA" is written in large, bold, white capital letters in the center. Surrounding the text is a dense web of thin, curved lines in shades of orange, red, and blue. These lines radiate outwards from a central point, creating a fan-like or starburst pattern. At the end of many of these lines are small, glowing dots in the same color palette. The background is a dark, deep blue, which makes the vibrant lines and dots stand out prominently. The overall effect is one of a vast, interconnected digital network.

BIG DATA

Quanto conosciamo il nostro genoma?





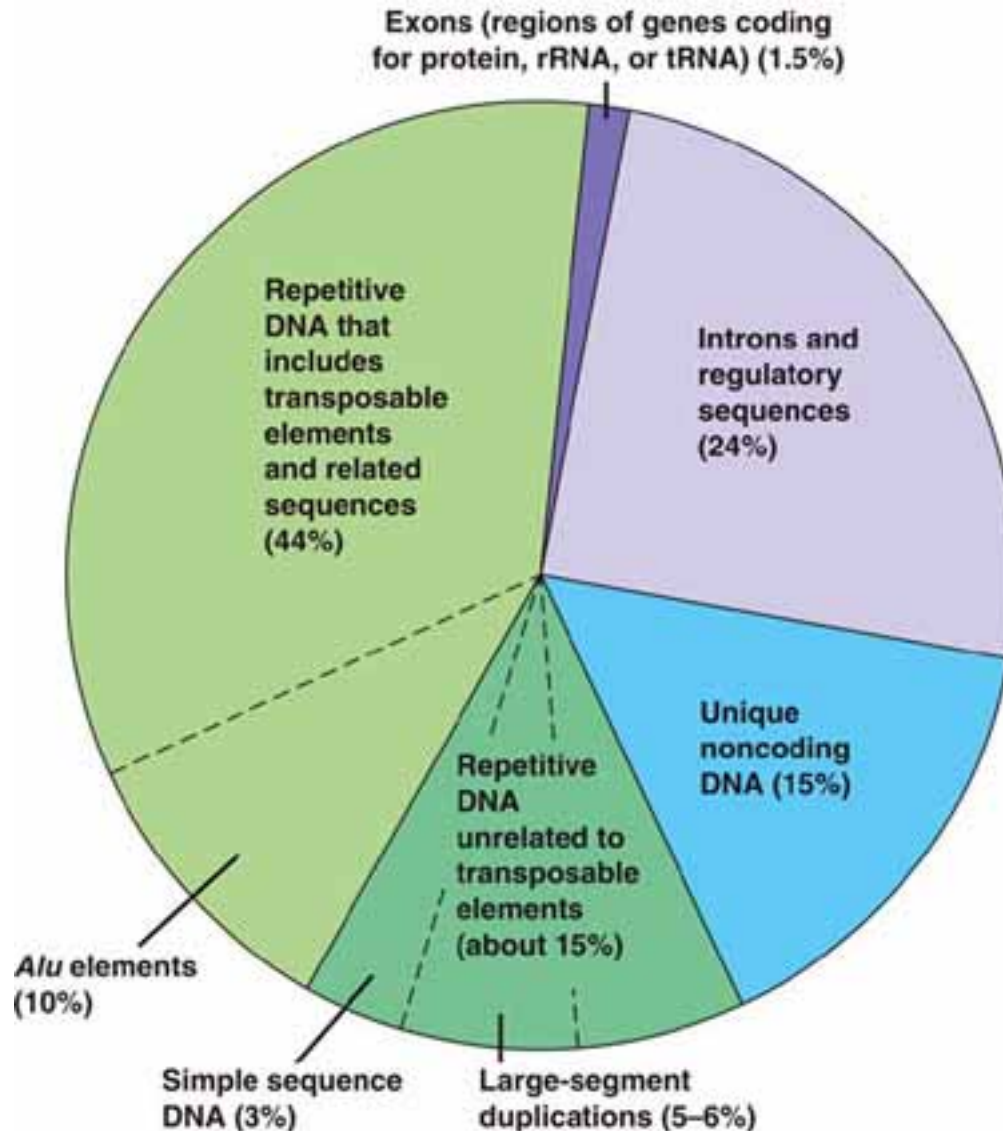


1,2% su tratti comuni

4-5% complessiva



Quanto conosciamo il nostro genoma?



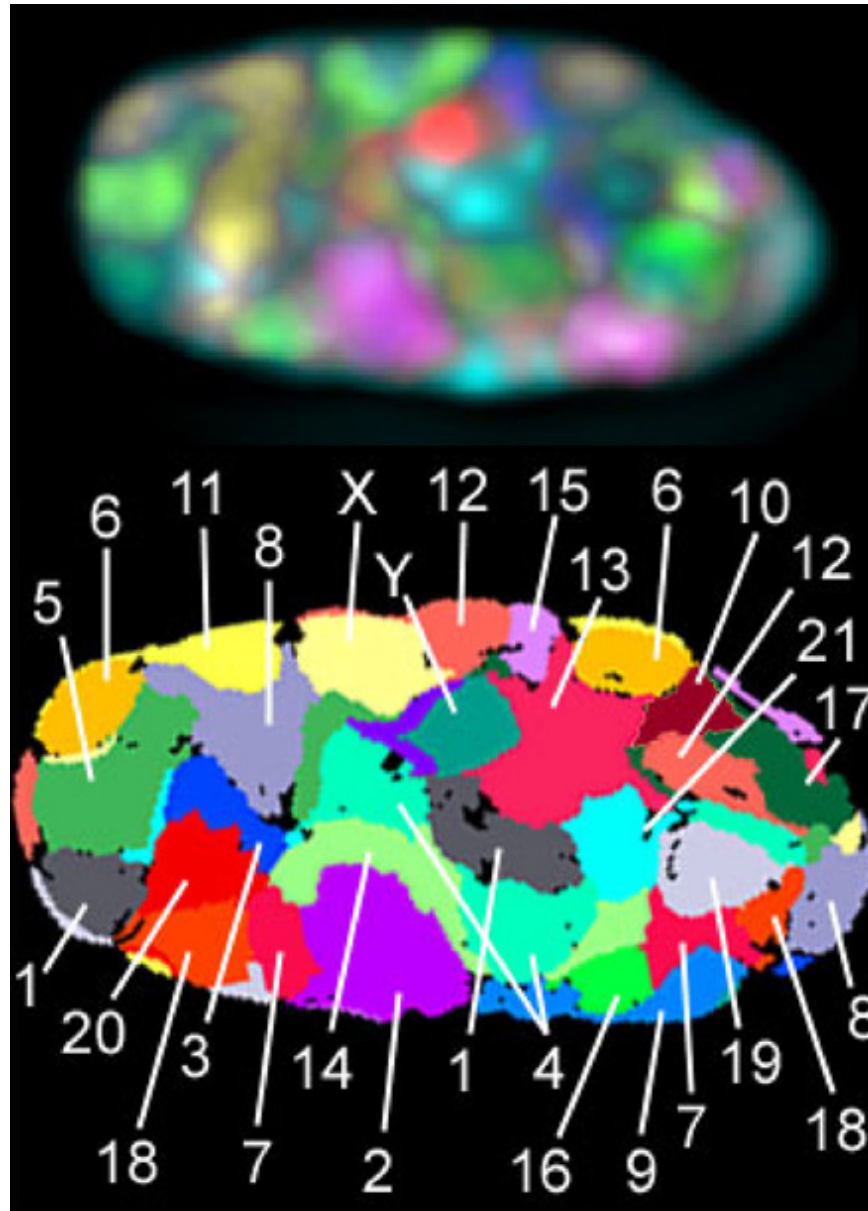
The image features a central black circle containing the word "ENCODE" in a bold, sans-serif font. Each letter of "ENCODE" is filled with a vertical rainbow gradient from purple on the left to yellow on the right. The background is a circular genomic map, or Cytoscape, consisting of numerous concentric rings. Each ring is divided into segments by black lines, and each segment contains a thin, horizontal line of color. The colors of these lines vary across the rings and segments, creating a complex, multi-colored pattern that represents genomic data. The overall composition is circular and symmetrical.

ENCODE

Ripensare al genoma



Ripensare al genoma



Medicina di precisione



VS.



Trattamento di malattie multifattoriali



How Russians cope with recession

No-go for NGOs in China

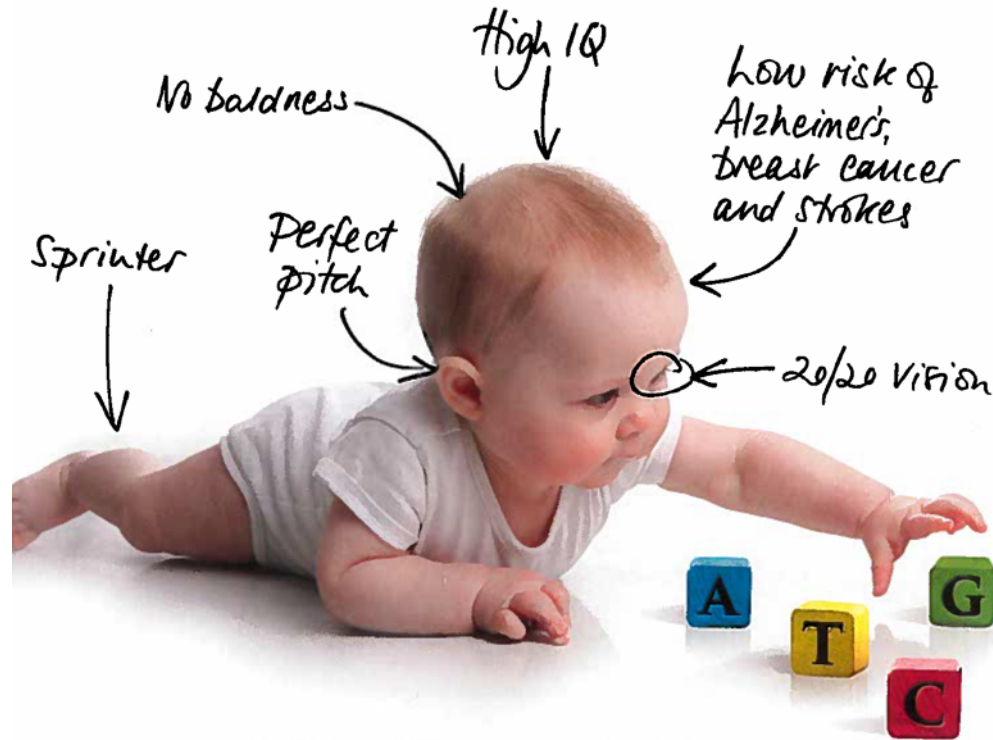
Islamic State's taste for slavery

Commodities: the binge, the hangover

India's poet-politicians

Editing humanity

The prospect of genetic enhancement



Albania	AL900	Croatia	HRK18	France	€6.50	Ireland	€6.50	Latvia	€6.50	Netherlands	€6.50	Romania	RON20	Spain	€6.50		
Austria	€6.50	Egypt	€6.50	Germany	€6.50	Israel	NIS 43.00	Lebanon	LC13,000	Nigeria	Naira 1,100	Saudi Arabia	Saudi 45	Sweden	SKR66		
Bahrain	Dinar 6.50	Czech Rep.	CZK119	Cyprus	€6.50	Denmark	DKK17	Italy	€6.50	Kenya	Kenya 110	Qatar	QAR 24	Switzerland	CHF11		
Belgium	€6.50	Greece	€6.50	Hong Kong	HK\$12.50	India	₹100	Japan	¥100	Malaysia	RM1.50	Poland	PLN7	Slovakia	€6.50	Turkey	TL15
Bosnia	BAM16	Estonia	€6.50	Hungary	HUF2,170	Korea	₩1,000	Malta	€6.50	Portugal	€6.50	Slovenia	€6.50	UAE	Dirham 45		
Bulgaria	BGN13	Finland	€6.50	Indonesia	€6.50	Iran	€6.50	Kenya	€6.50	Qatar	€6.50	South Africa	€6.50	UK	£5.00		

GP-write

A Grand Challenge Project
to Build and Test New
Genomes



“What I cannot create,
I do not understand ,”

Richard Feynman

While the sequence of the human genome has been known for nearly 20 years, many mysteries in life's recipe book remain to be solved. That's why one group of researchers as well as ethicists and communicators is proposing to move **from passively reading genomes to actively writing them.**



CENTER *of* EXCELLENCE
for ENGINEERING BIOLOGY