



Молекулярная биология

(за 45 минут)

Николай Вяххи
JetPoint, 6 марта 2013



**Институт
Биоинформатики**

Розалинда

The screenshot shows a web browser window with the URL `rosalind.info/problems/prot/`. The page title is "Protein Translation solved by 1958". The content includes a section titled "The Genetic Code" with a "click to expand" link. Below this, the "Problem" section explains that 20 amino acids are abbreviated by 20 letters from the English alphabet (excluding B, J, O, U, X, and Z). It defines "protein strings" and "genetic strings". The "RNA codon table" is mentioned as dictating the encoding of codons into the amino acid alphabet. The "Given" section states: "An RNA string s corresponding to a strand of mRNA (of length at most 10 kbp)." The "Return" section states: "The protein string encoded by s ." The "Sample Dataset" section contains the RNA string: `AUGGCCAUGGCGCCCAGAACUGAGAUCAAUAGUACCCGUAUUAACGGGUGA`. The "Sample Output" section is empty. A "Feedback" button is visible on the right side of the page.

<http://rosalind.info>

Агенда

ДНК

РНК

Белки

Геномика

Протеомика



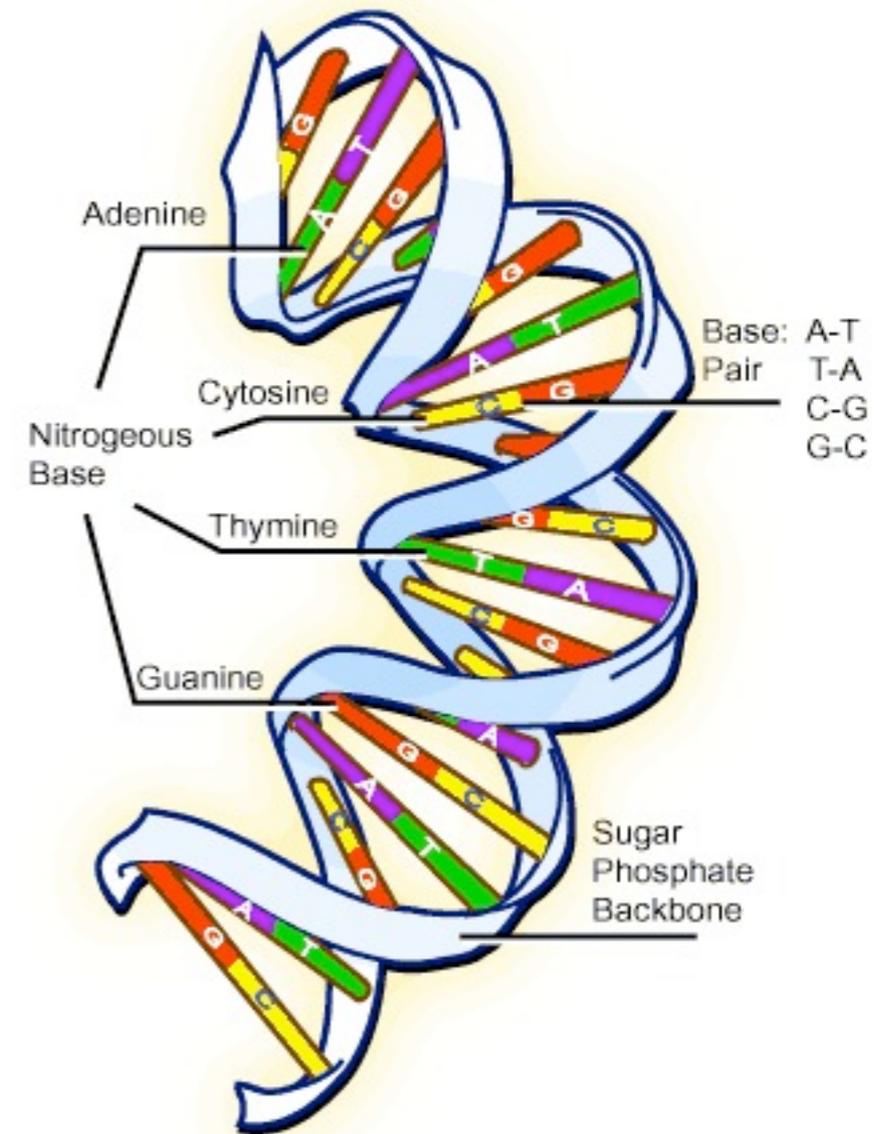
ДНК

Двойная спираль

Нуклеотиды:

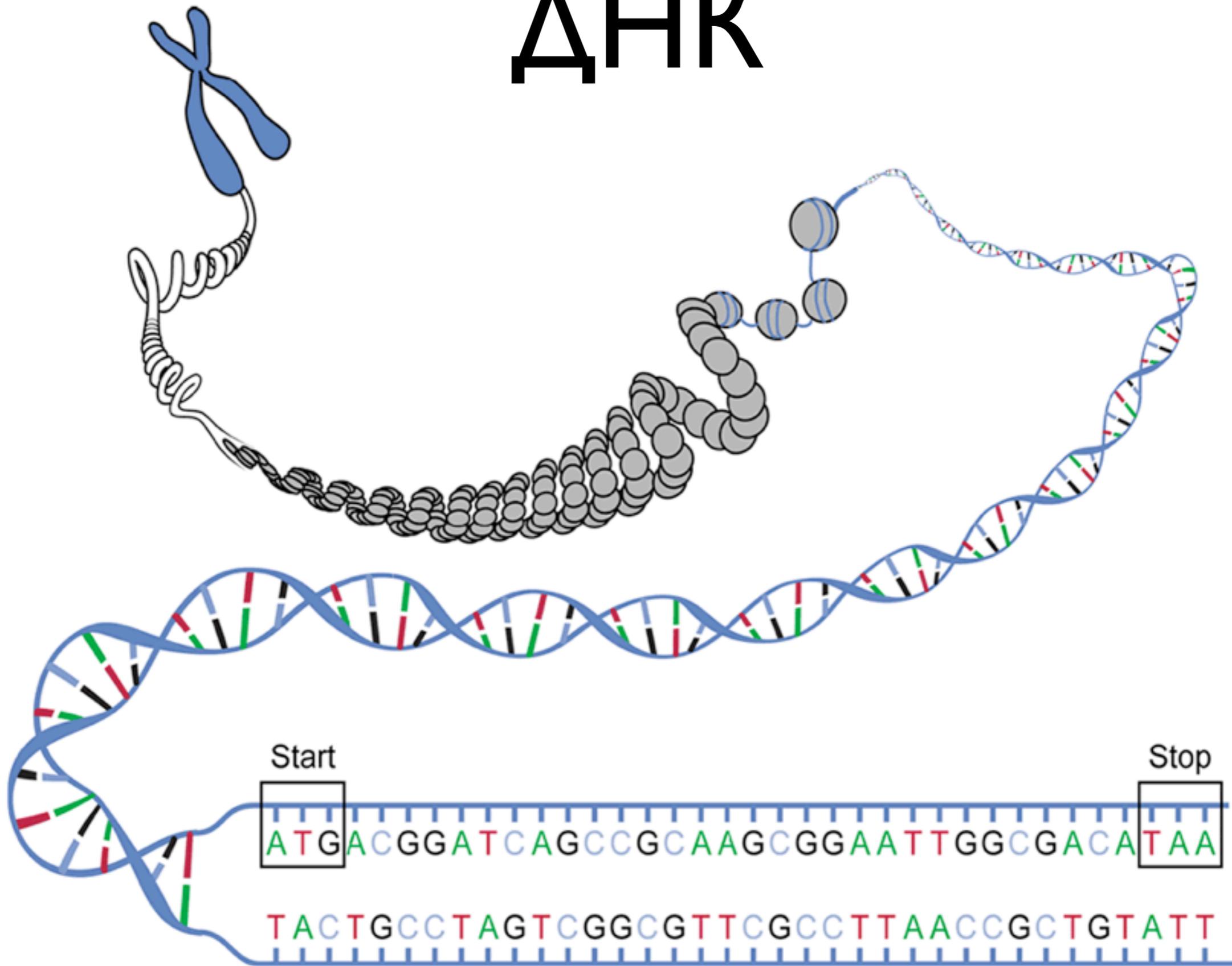
A = **T**

C ≡ **G**



Мера длины: bp (base pair)

ДНК



Направление ДНК

→ **CCCAAGAACTGAGATCAAT** →

Репликация



ДНК → 2 x ДНК

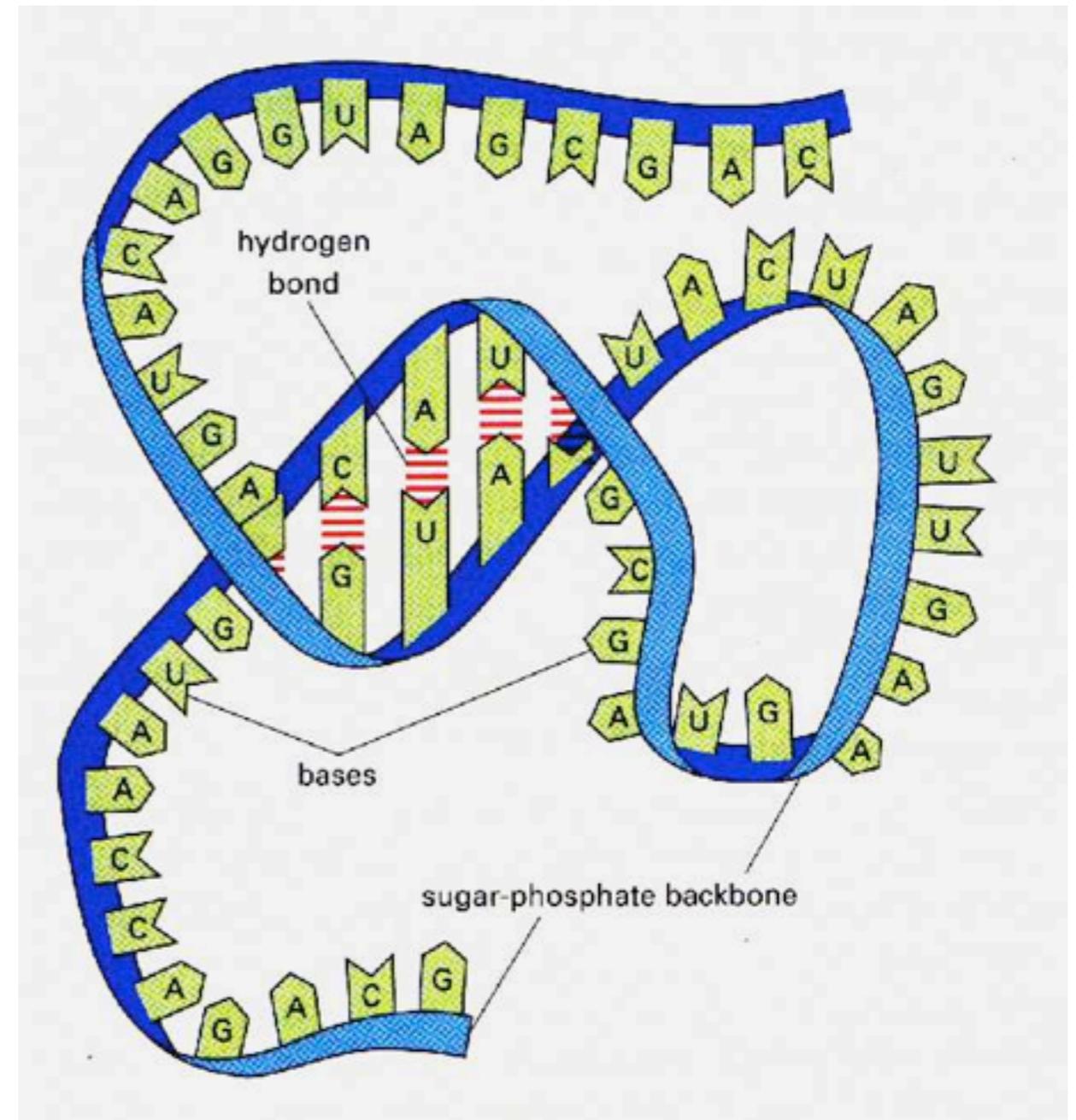
РНК

Одна цепь

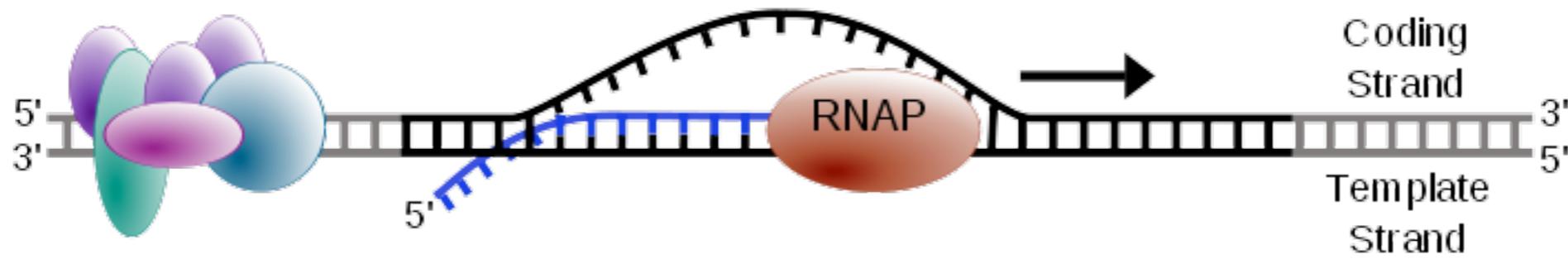
Рибонуклеотиды:

A = **U**

C ≡ **G**



Транскрипция



ДНК → РНК

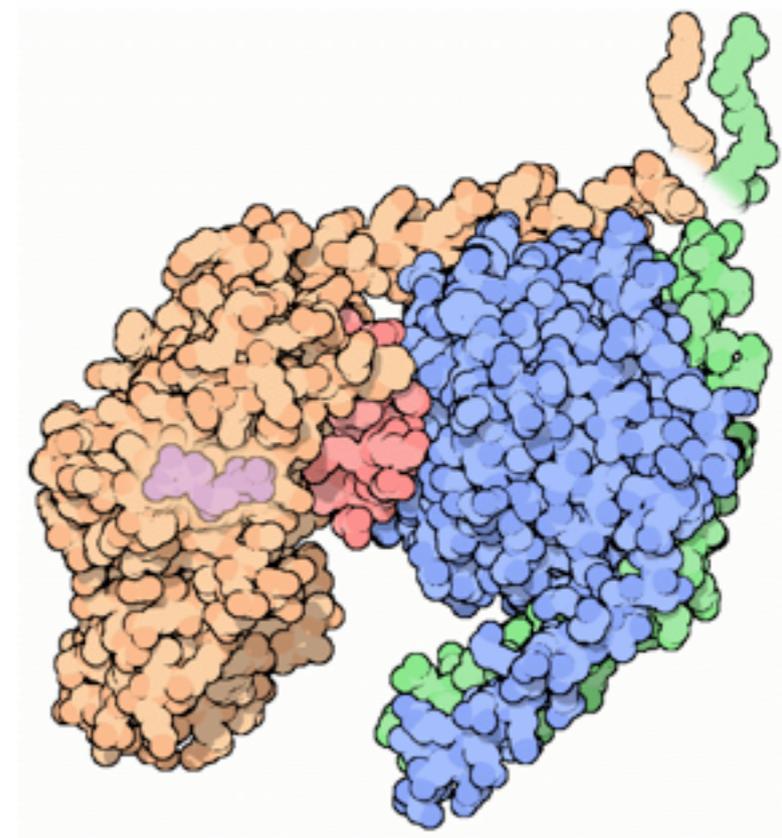
T → **U**

Белки / Протеины

Аминокислоты (20):

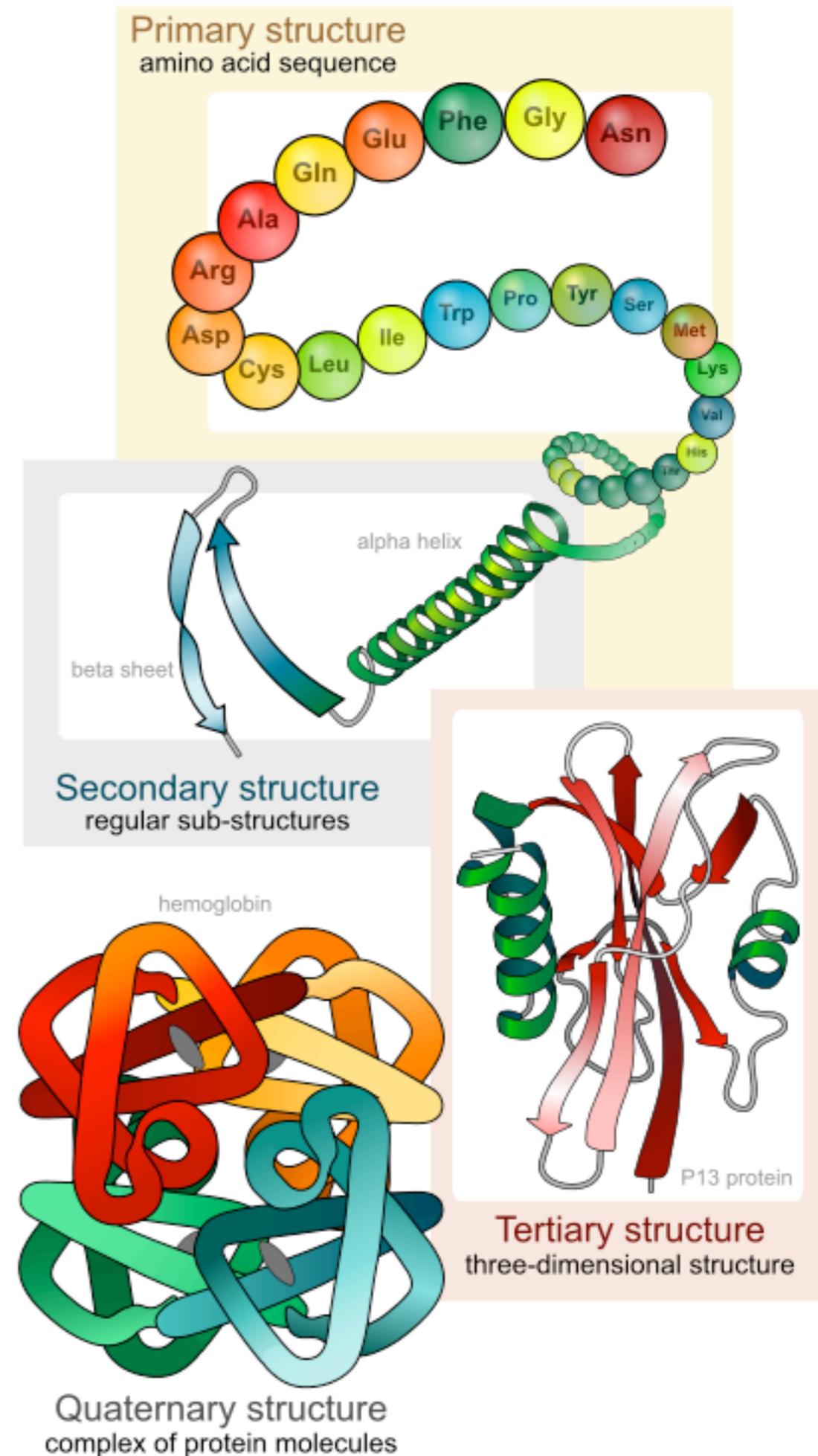
ACDEFGHIKLMNPQRSTVWY

Функции: структурная,
ферментативная, рецепторная,
гормональная, транспортная,
сократительная, защитная.



Структура белка

1. Последовательность
2. α -спираль / β -лист
3. Трёхмерная структура
4. Комплекс



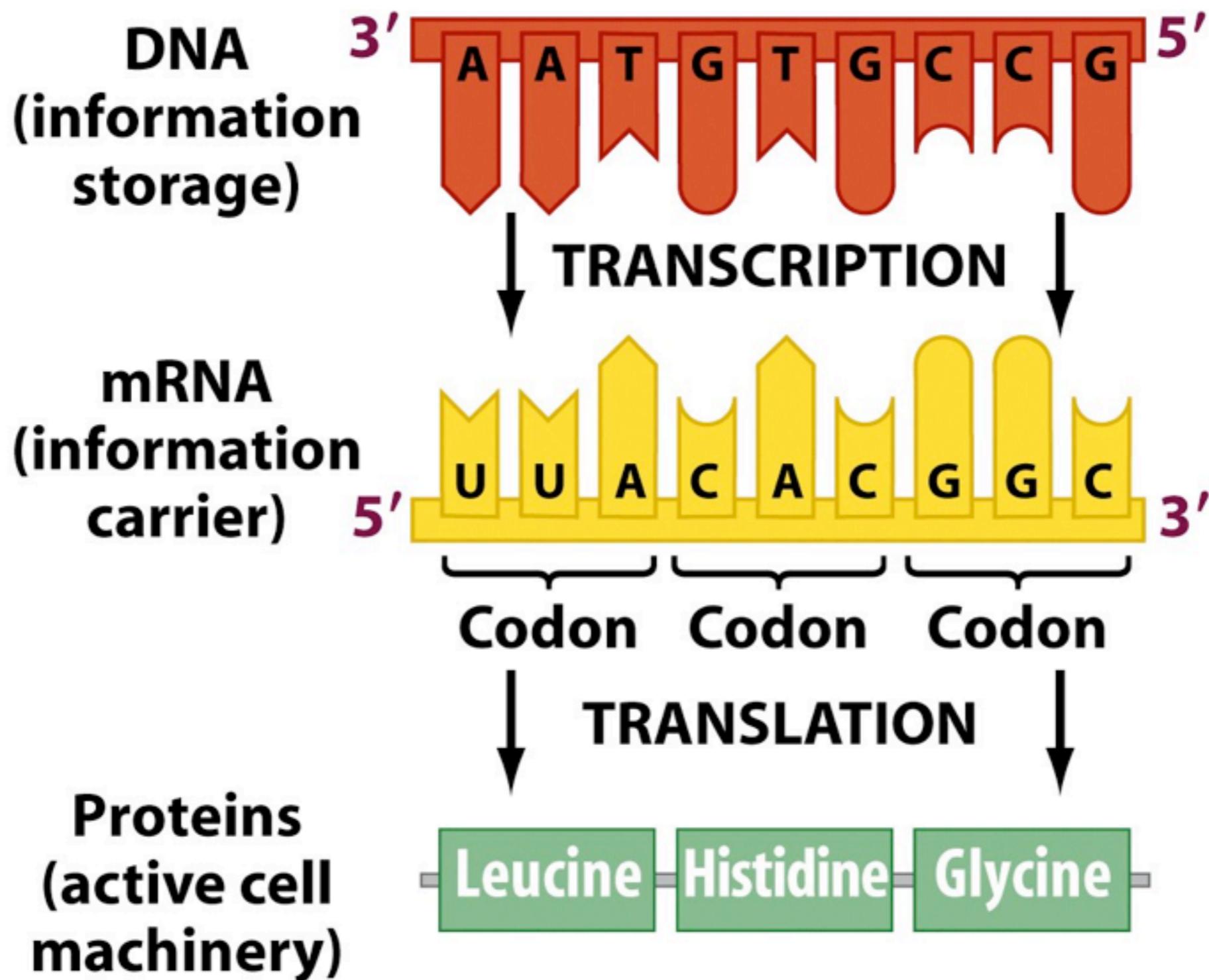
Трансляция

		Second base					
		U	C	A	G		
First base	U	UUU } Phenyl- UUC } alanine F UUA } Leucine L UUG }	UCU } UCC } Serine S UCA } UCG }	UAU } Tyrosine Y UAC } UAA } Stop codon UAG } Stop codon	UGU } Cysteine C UGC } UGA } Stop codon UGG } Tryptophan W	U	C
	C	CUU } CUC } Leucine L CUA } CUG }	CCU } CCC } Proline P CCA } CCG }	CAU } Histidine H CAC } CAA } Glutamine Q CAG }	CGU } CGC } Arginine R CGA } CGG }	U	C
	A	AUU } Isoleucine I AUC } AUA } AUG } Methionine M start codon	ACU } ACC } Threonine T ACA } ACG }	AAU } Asparagine N AAC } AAA } Lysine K AAG }	AGU } Serine S AGC } AGA } Arginine R AGG }	U	C
	G	GUU } GUC } Valine V GUA } GUG }	GCU } GCC } Alanine A GCA } GCG }	GAU } Aspartic GAC } acid D GAA } Glutamic GAG } acid E	GGU } GGC } Glycine G GGA } GGG }	U	C
						A	G

РНК → Белок

3 нуклеотида (кодон) → 1 аминокислота (aa)

Центральная Догма

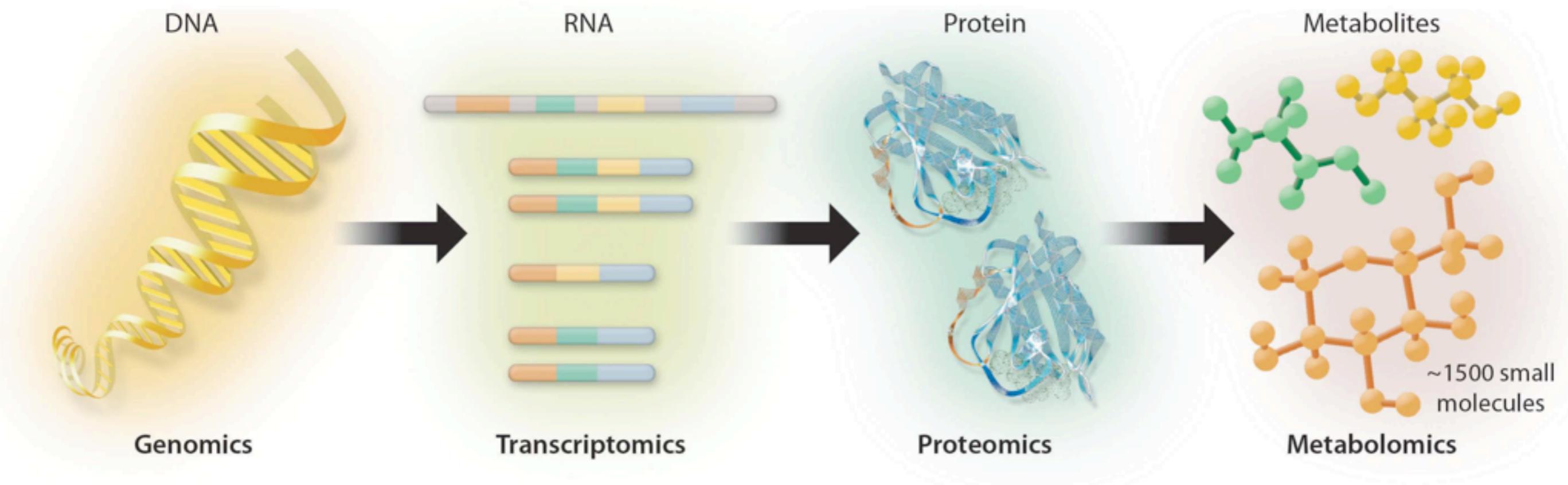


ОМИКИ

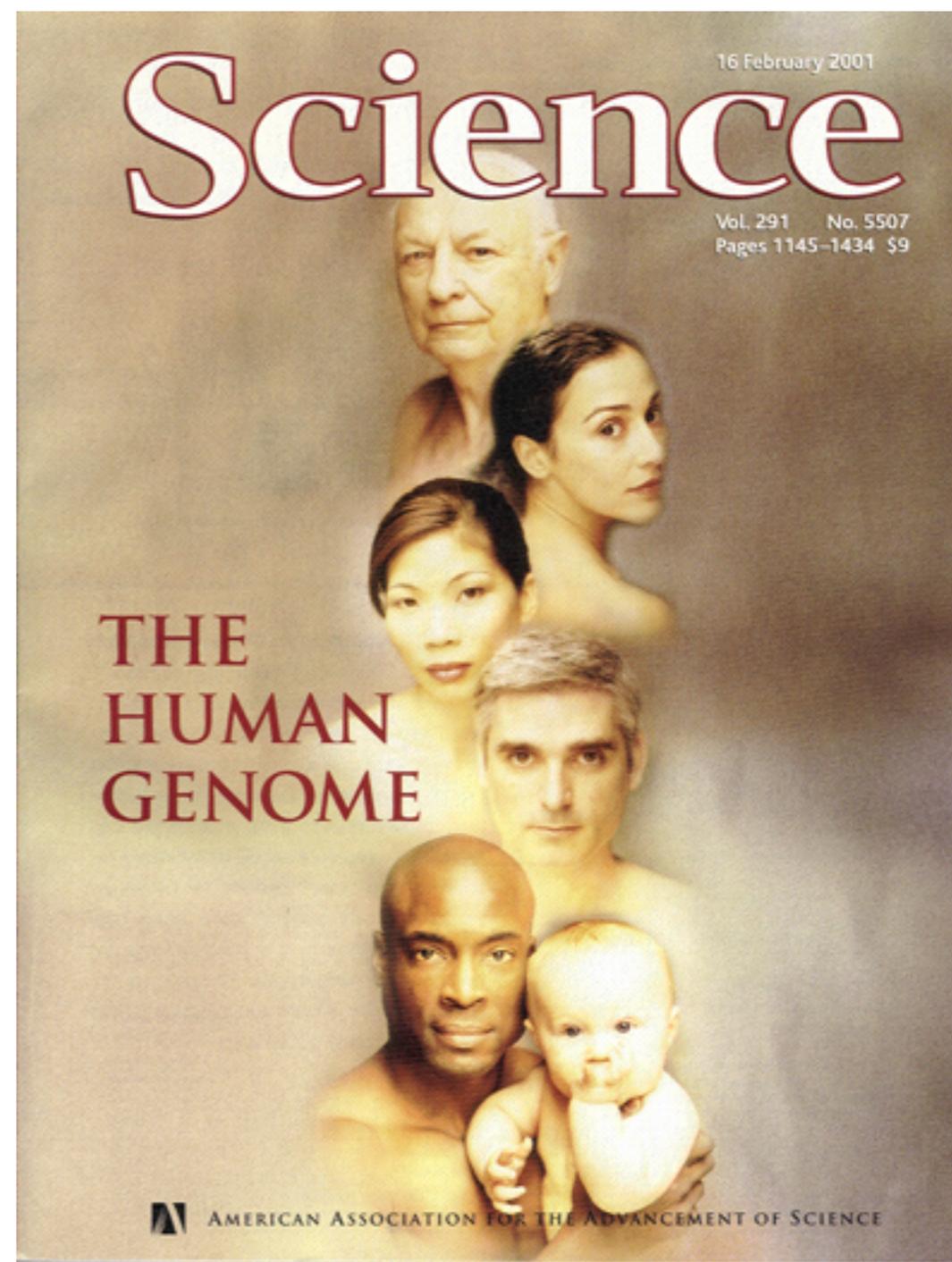
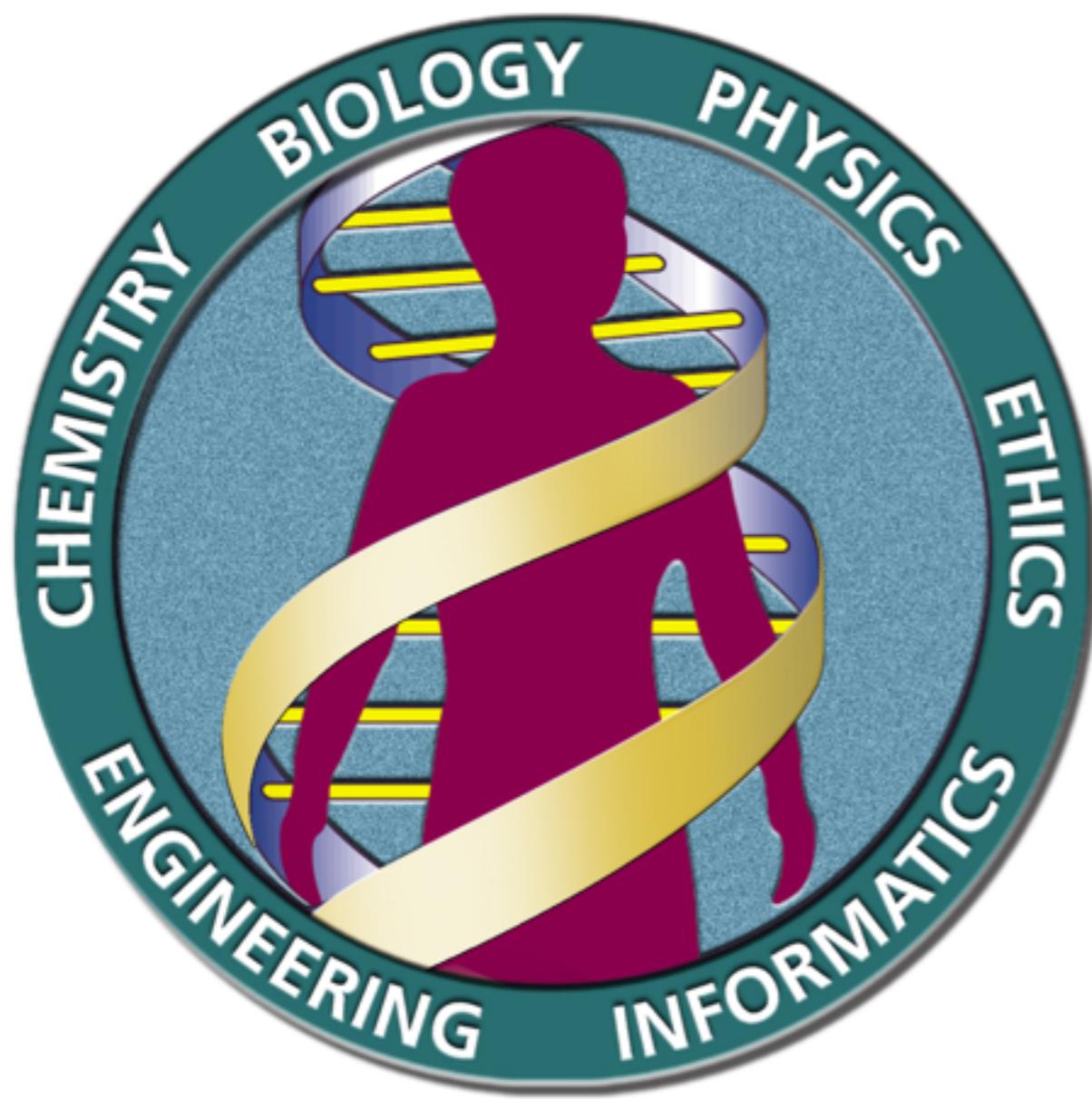
Геном — все ДНК организма.

Транскриптом — все РНК организма.

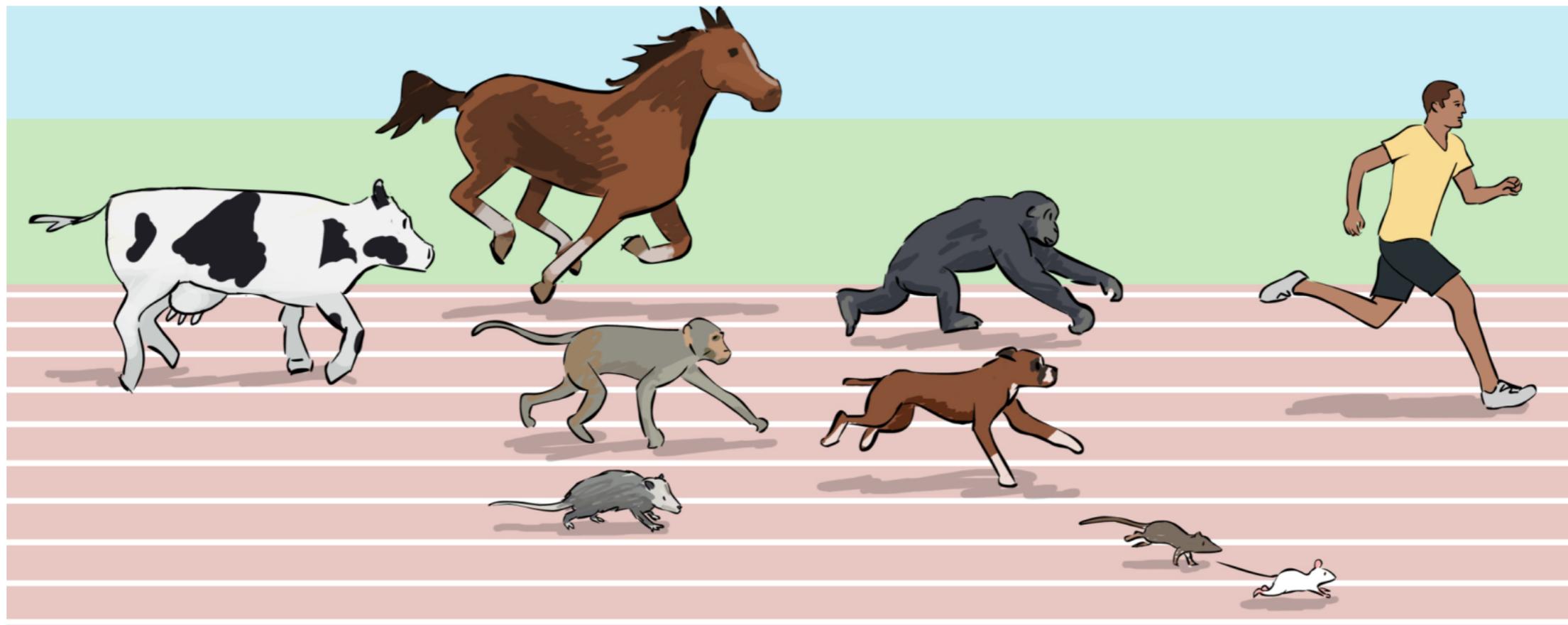
Протеом — все белки организма.



Геном человека



Геномы



cow
2009

horse
2007

opossum
2007

macaque
2006

dog
2005

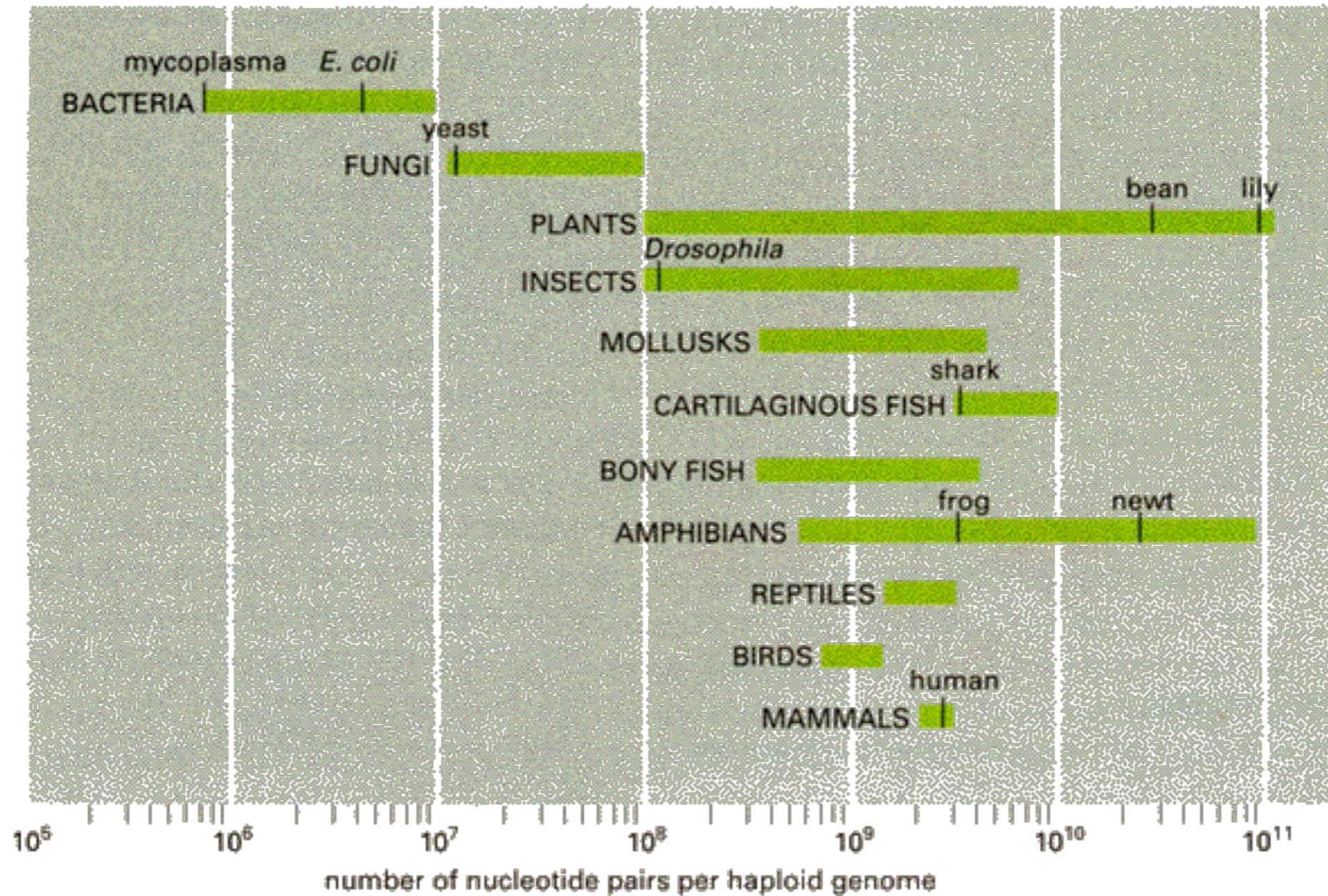
chimpanzee
2005

rat
2004

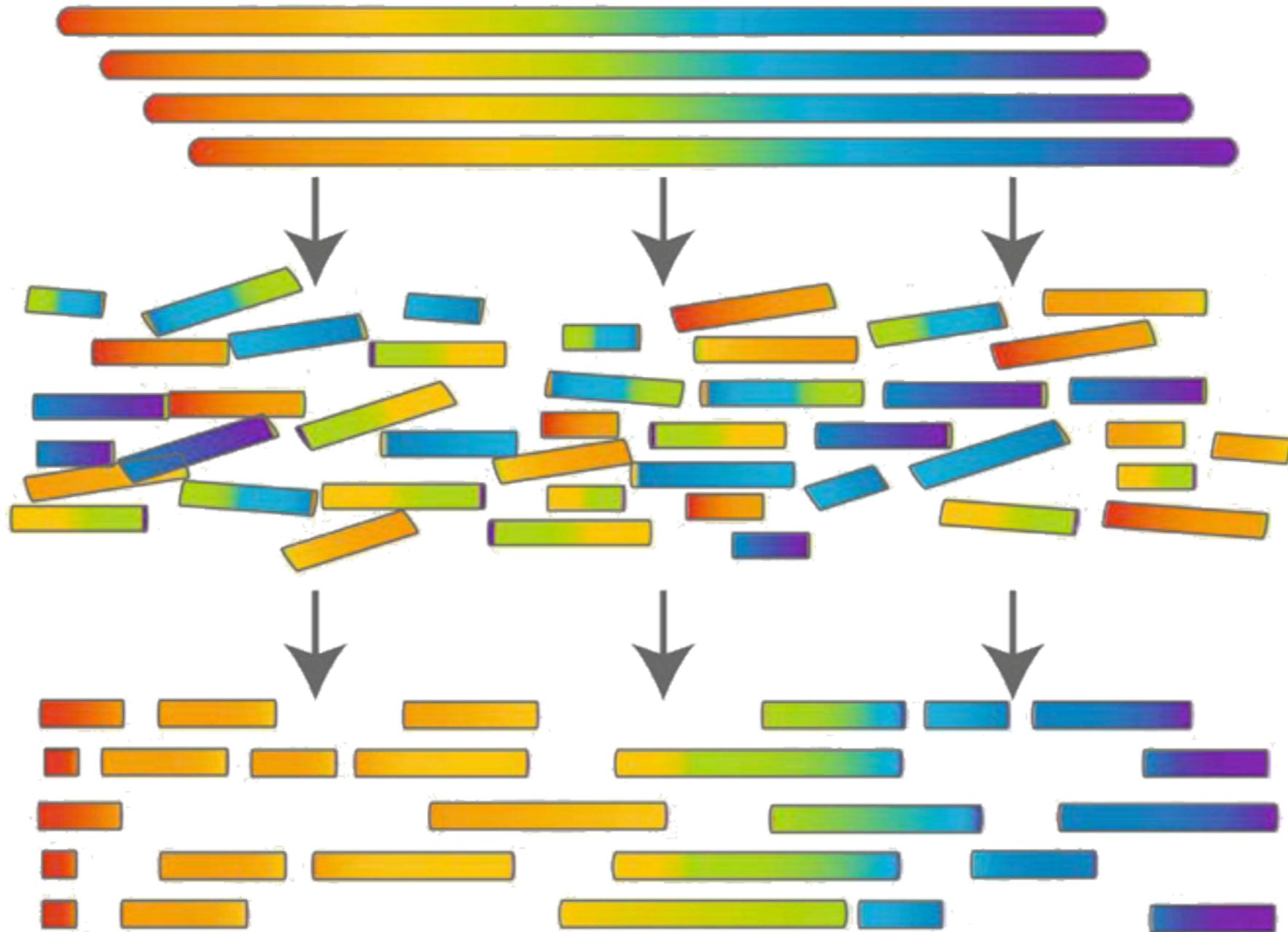
mouse
2002

human
2001

Длины геномов



Чтение геномов

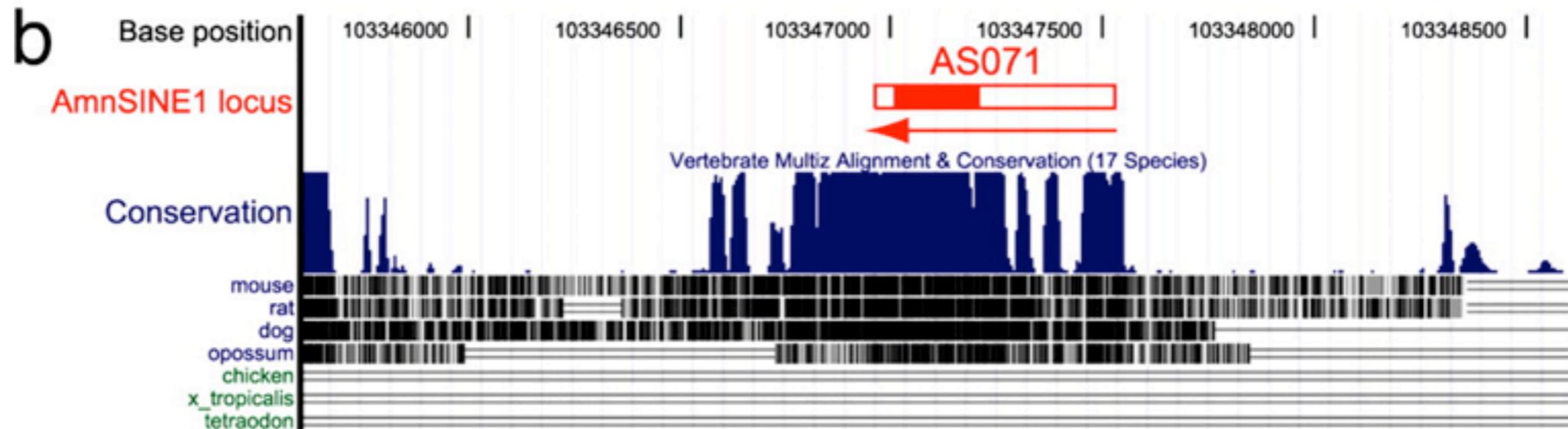
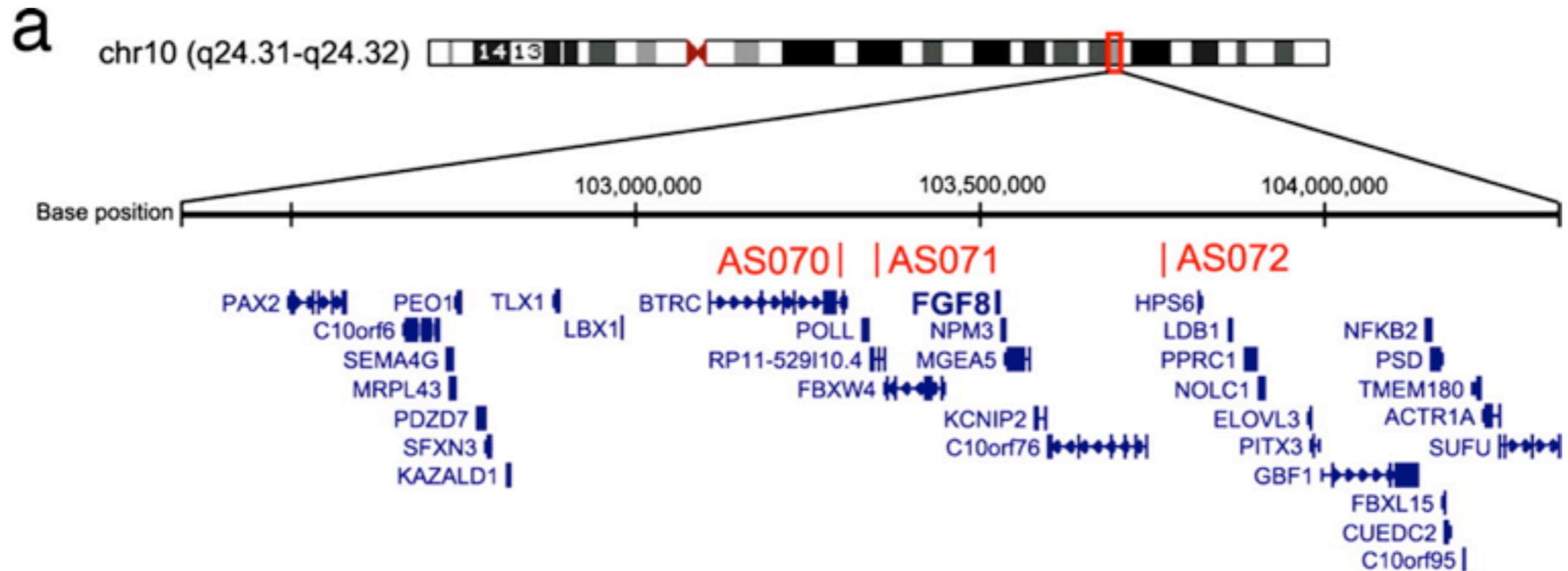


ATGTTCCGATTAGGAAACCTATCTGTAAGTTCATTTCAGTAAAAGGAGGAAATATAA

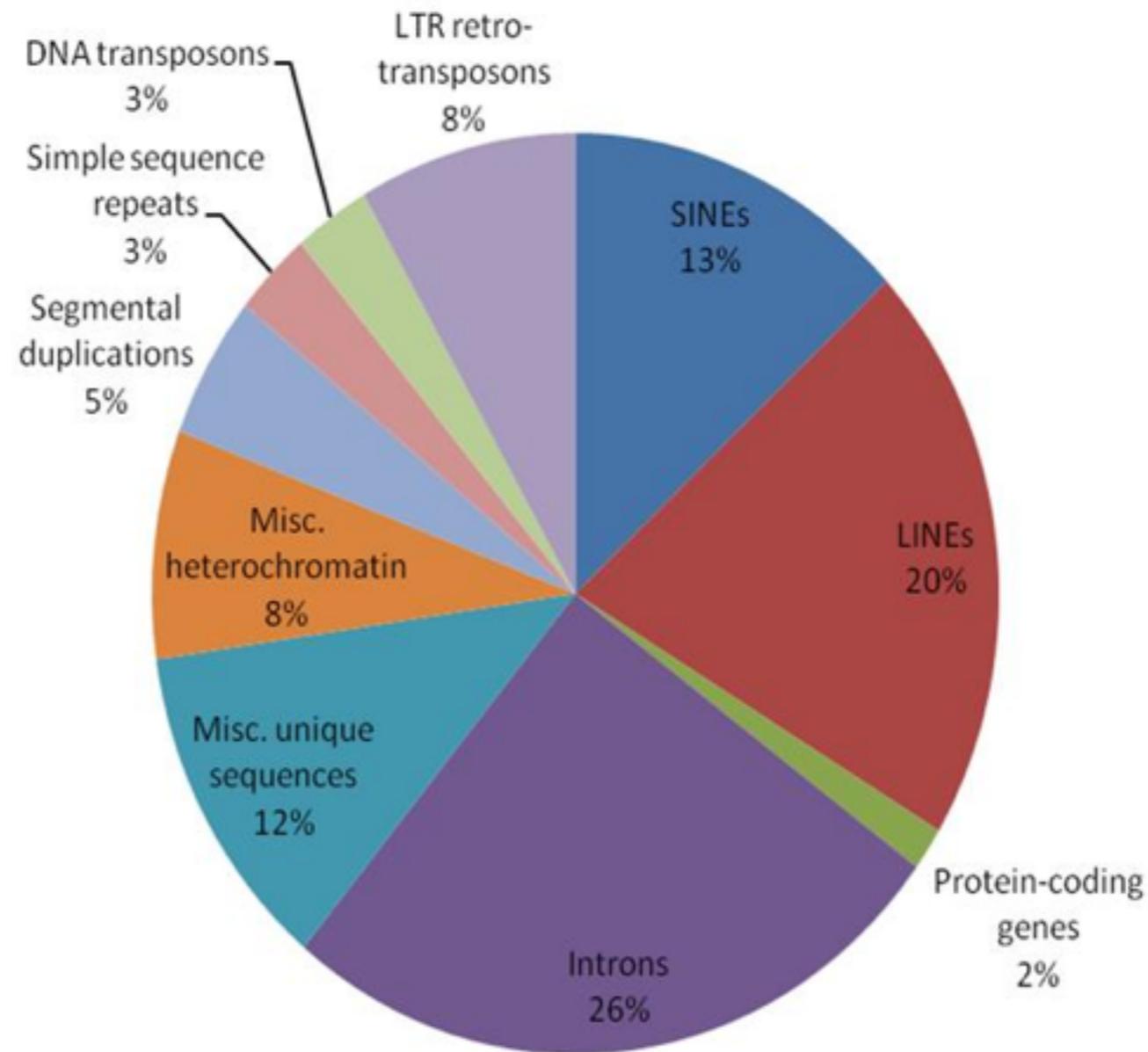
Геномика

AGCTTTTCATTCTGACTGCAACGGGCAATATGTCTCTGTGTGGATTAAAAAAGAGTGTCTGATAGC
AGCTTCTGAACTGGTTACCTGCCGTGAGTAAATTTAATTTGACTTAGGTCACTAAATACTTT
AACCAATATAGGCATAGCGCACAGACAGATAAAAATTACAGAGTACACAACATCCATGAAACGCATT
AGCACACCATTACCACCACCATCACCATTACCACAGGTAACGGTGCGGGCTGACGCGTACAGGAAA
CACAGAAAAAAGCCCGCACCTGACAGTGCGGGCTTTTTTTTTTCGACCAAAGGTAACGAGGTAACAAC
CATGCGAGTGTTGAAGTTCGGCGGTACATCAGTGGCAAATGCAGAACGTTTTCTGCGTGTTGCCGAT
ATTCTGGAAAGCAATGCCAGGCAGGGGCAGGTGGCCACCGTCCTCTCTGCCCCGCCAAAATCACCA
ACCACCTGGTGGCGATGATTGAAAAAACCATTAGCGGCCAGGATGCTTTACCCAATATCAGCGATGC
CGAACGTATTTTTGCCGAACTTTTGACGGGACTCGCCGCCGCCAGCCGGGGTTCCCGCTGGCGCAA
TTGAAAACTTTCGTCGATCAGGAATTTGCCCAAATAAAACATGTCCTGCATGGCATTAGTTTGTTGG
GGCAGTGCCCGGATAGCATCAACGCTGCGCTGATTTGCCGTGGCGAGAAAATGTCGATCGCCATTAT
GGCCGGCGTATTAGAAGCGCGCGGTCAACAACGTTACTGTTATCGATCCGGTCGAAAAACTGCTGGCA
GTGGGGCATTACCTCGAATCTACCGTCGATATTGCTGAGTCCACCCGCCGTATTGCGGCAAGCCGCA
TTCCGGCTGATCACATGGTGCTGATGGCAGGTTTCACCGCCGGTAATGAAAAAGGCGAACTGGTGGT
GCTTGGACGCAACGGTTCCGACTACTCTGCTGCGGTGCTGGCTGCCTGTTTACGCGCCGATTGTTGC
GAGATTTGGACGGACGTTGACGGGGTCTATACCTGCGACCCGCGTCAGGTGCCCGATGCGAGGTTGT
TGAAGTCGATGTCCTACCAGGAAGCGATGGAGCTTTCCTACTTCGGCGCTAAAGTTCCTCACCCCCG
CACCATTACCCCATCGCCCAGTTCCAGATCCCTTGCCTGATTAAAAATACCGGAAATCCTCAAGCA
CCAGGTACGCTCATTGGTGCCAGCCGTGATGAAGACGAATTACCGGTCAAGGGCCGGGACTCGCCCCG

Аннотации

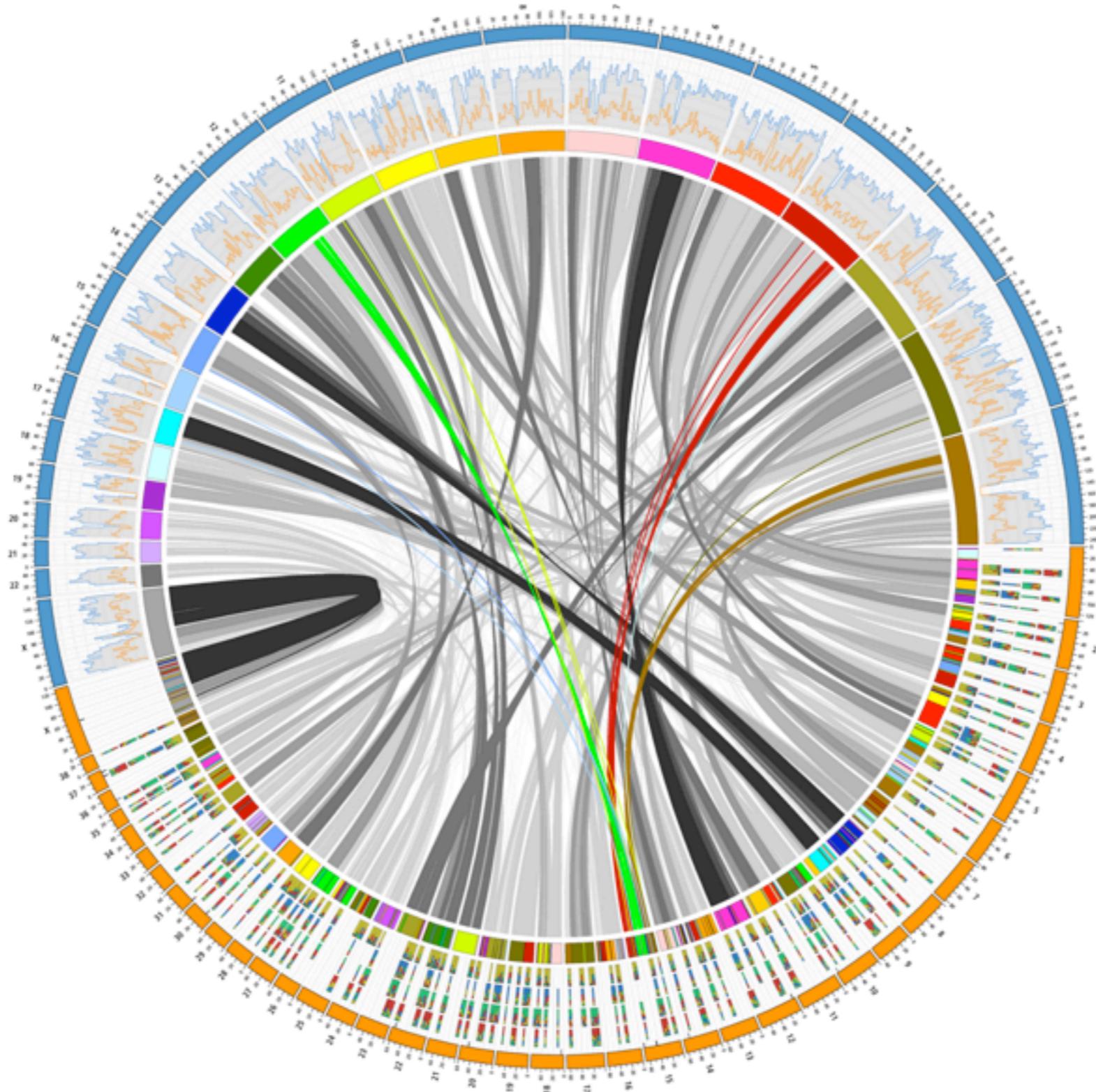


Геном человека

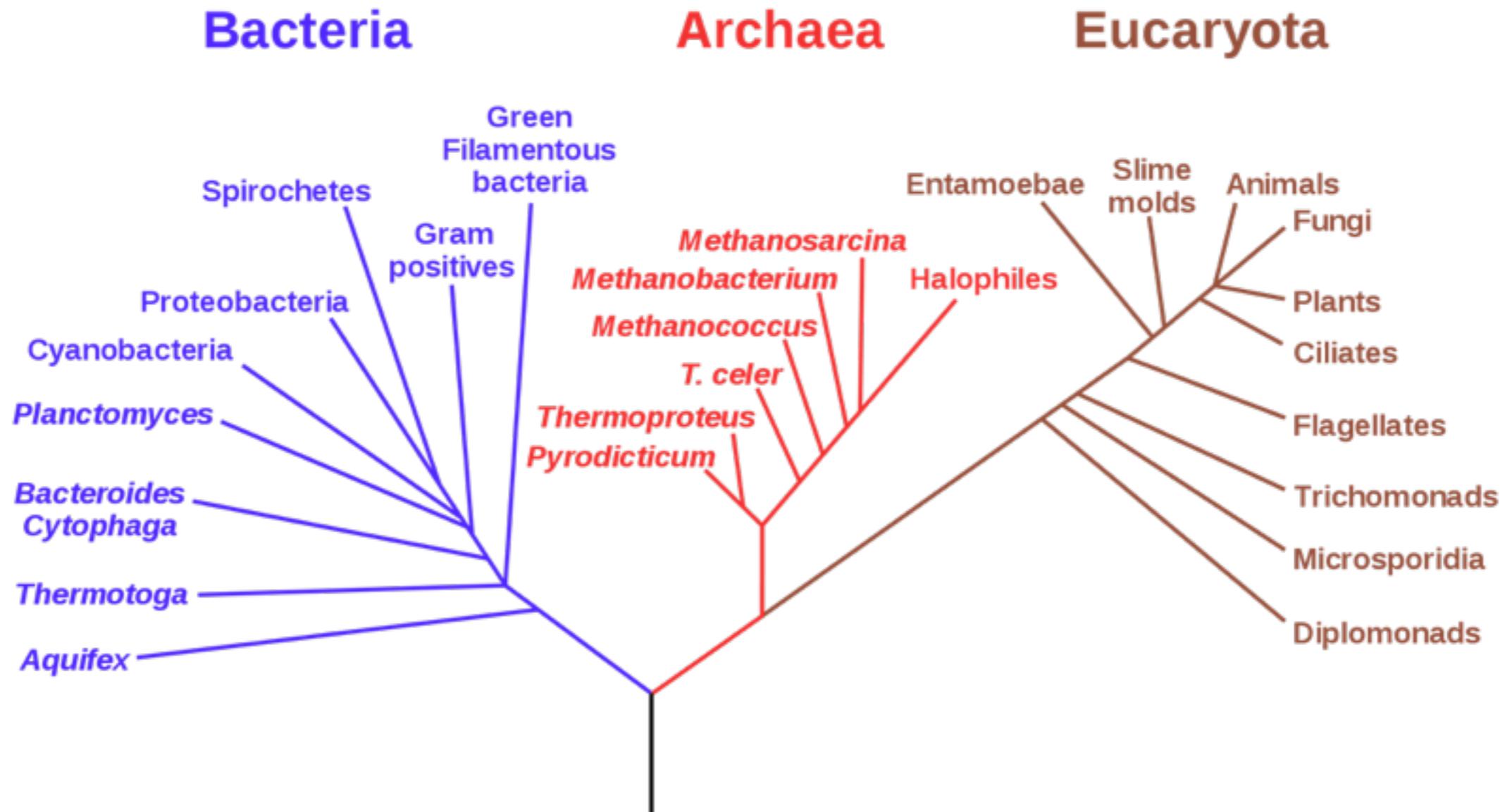


Components of the Human Genome

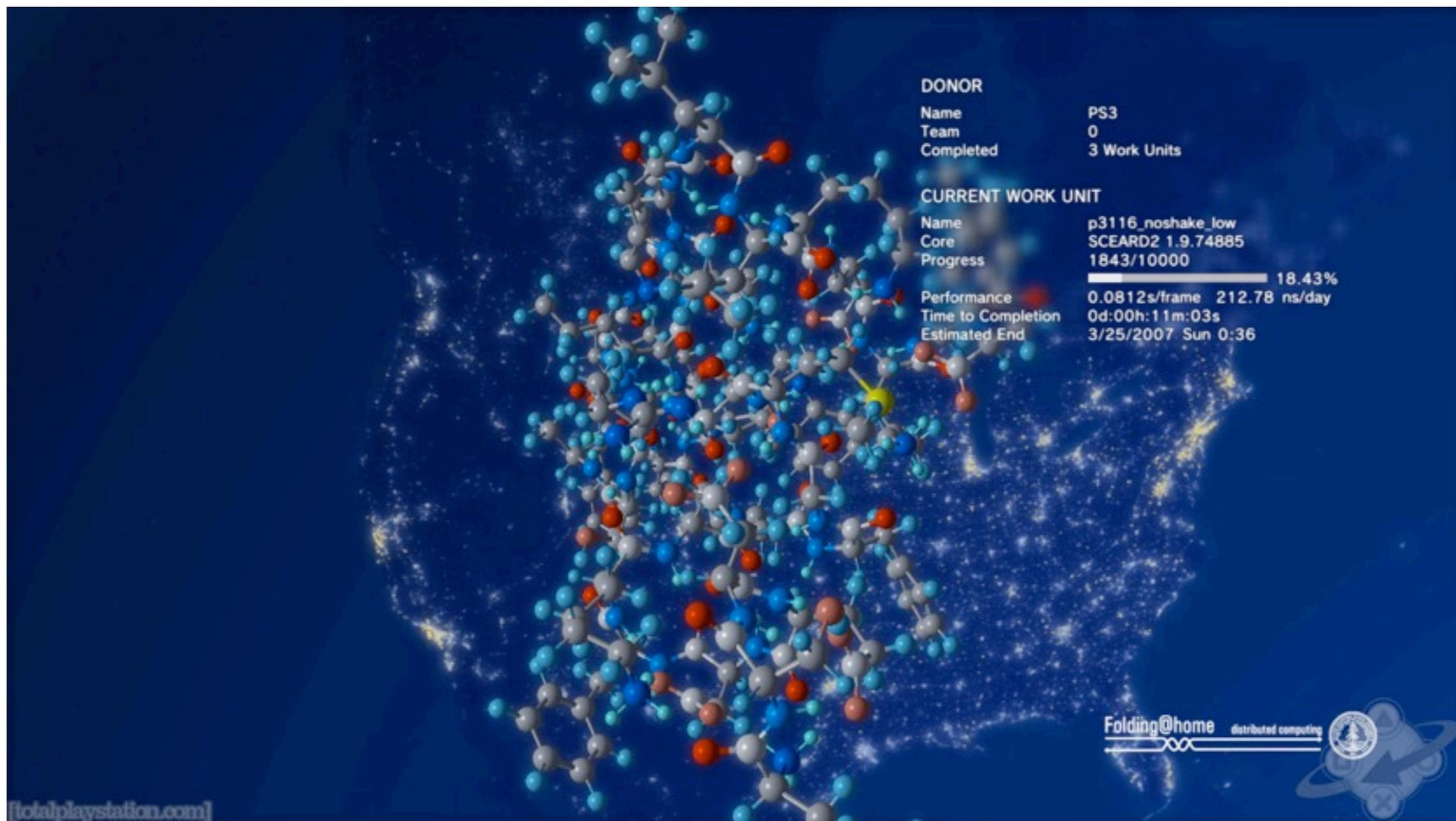
Сравнительная геномика



Филогения



Протеомика



The image shows a screenshot of the Folding@home software interface. The background features a 3D ball-and-stick model of a protein structure, primarily composed of blue, white, and red spheres, set against a dark blue space background with a faint map of Earth. On the right side, there is a text-based status panel. At the bottom right, the Folding@home logo is visible, along with a small circular icon containing a tree and a globe. In the bottom left corner, the URL [totalplaystation.com] is displayed.

DONOR

Name	PS3
Team	0
Completed	3 Work Units

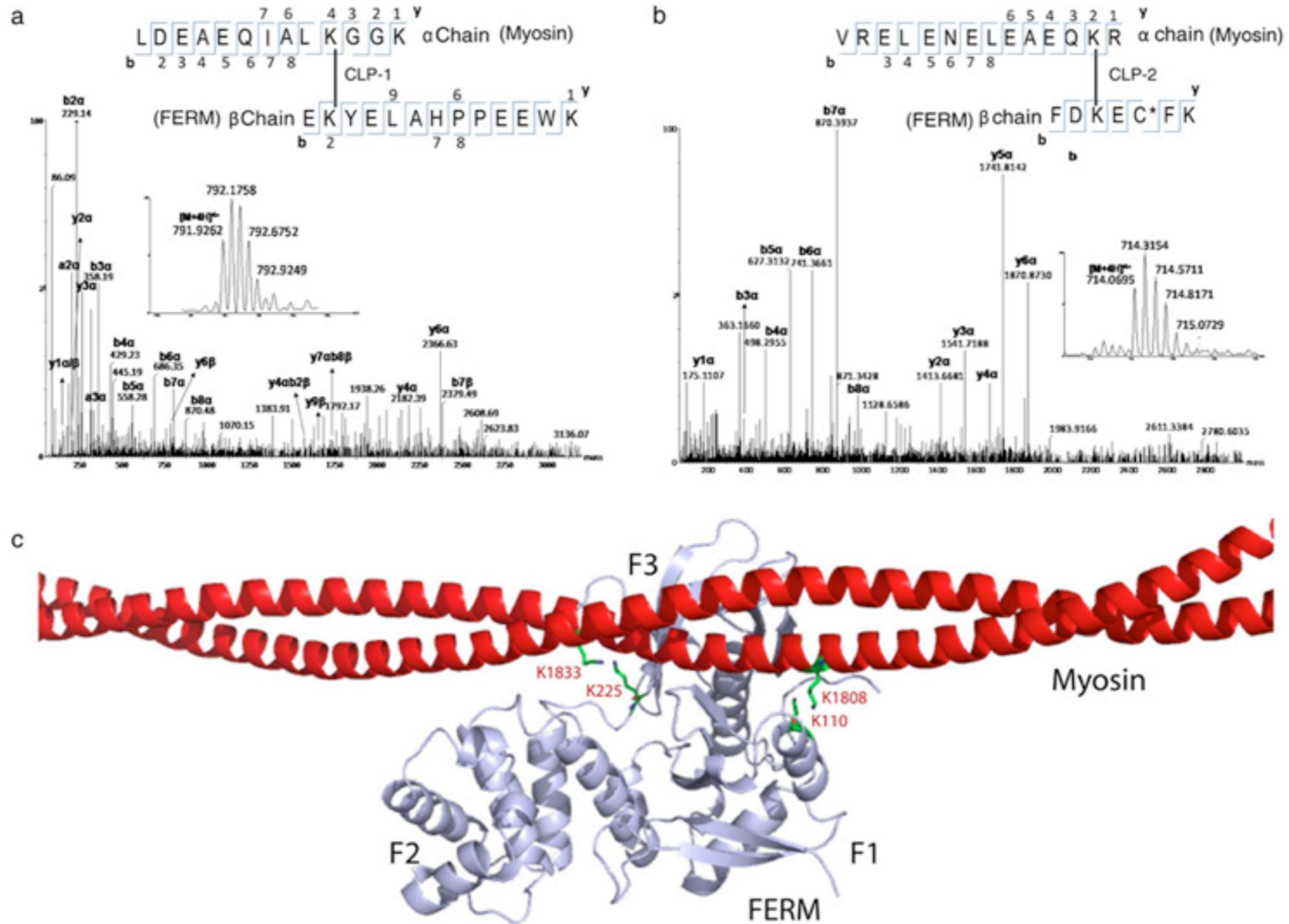
CURRENT WORK UNIT

Name	p3116_noshake_low
Core	SCEARD2 1.9.74885
Progress	1843/10000
	<div style="width: 18.43%;"></div> 18.43%
Performance	0.0812s/frame 212.78 ns/day
Time to Completion	0d:00h:11m:03s
Estimated End	3/25/2007 Sun 0:36

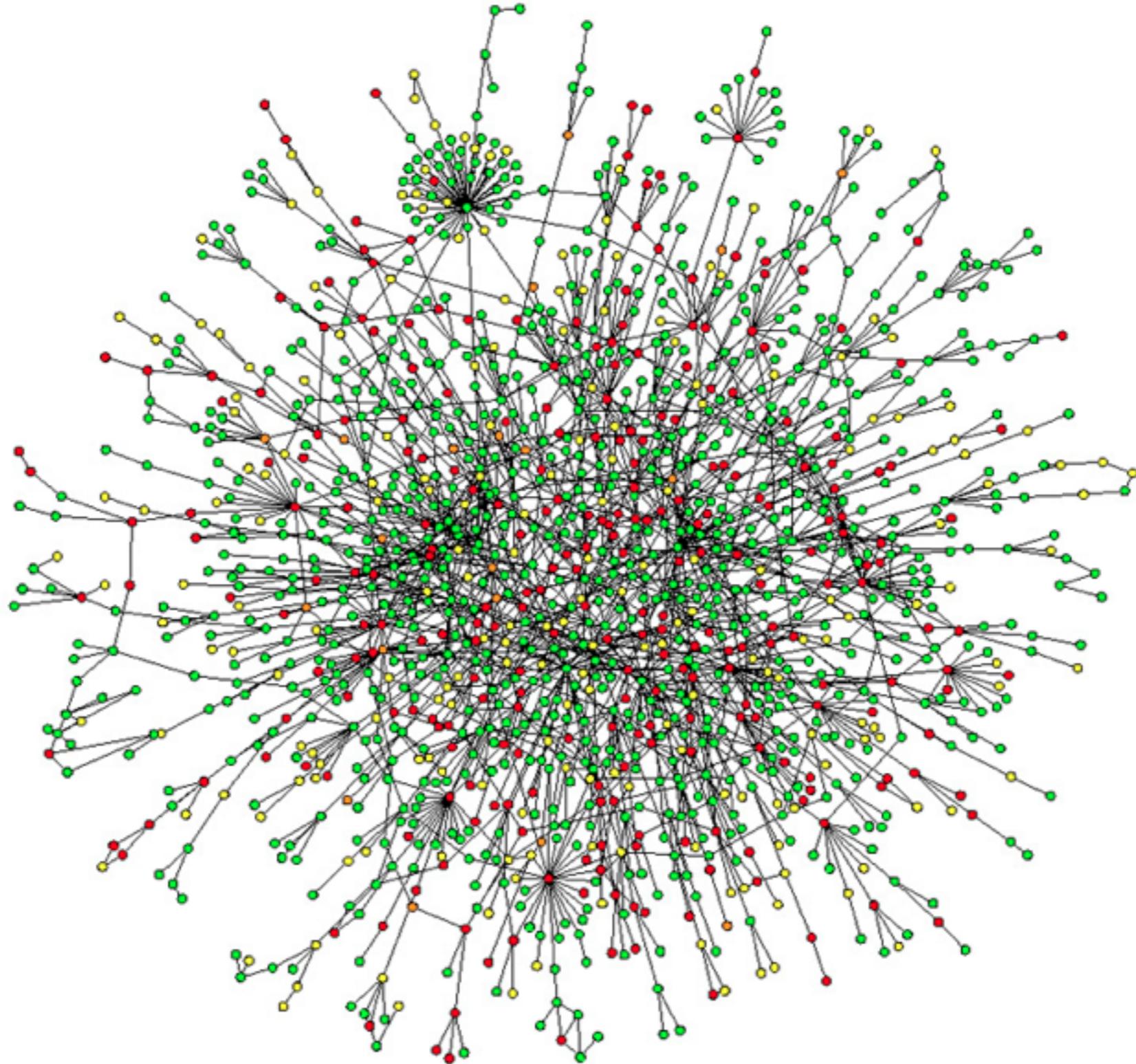
[totalplaystation.com]

Folding@home distributed computing

Масс-спектрометрия



Pathways



Только что было

ДНК

РНК

Белки

Геномика

Протеомика

