

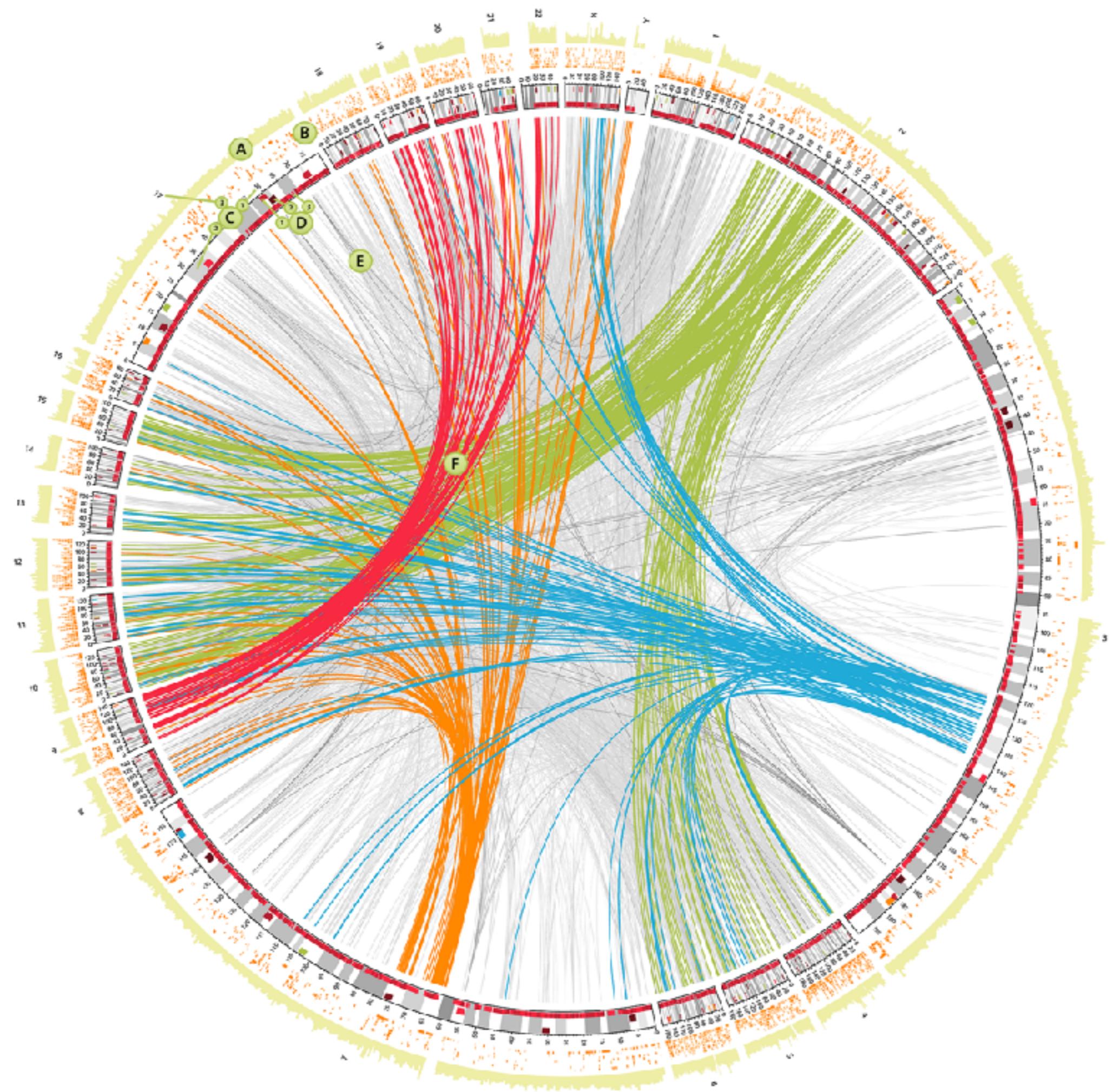
Ben Elçin :)

Twitter: @AmaEksi

Bir gün kendi klonunuzla
karşılaşırsanız?...



5 μ m



SHARE**RESEARCH ARTICLE**

0

**Sarah M. Richardson**^{1,2,*}, **Leslie A. Mitchell**^{2,3,||}, **Giovanni Stracquadanio**^{1,2,4,||}, **Kun Yang**^{1,2,||}, **Jessica S. Dymond**^{2,†}, Ja...[+ See all authors and affiliations](#)

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Science 10 Mar 2017:
Vol. 355, Issue 6329, pp. 1040-1044
DOI: 10.1126/science.aaf4557

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SHARE**RESEARCH ARTICLE**

Design of a synthetic yeast genome

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Abstract

We describe complete design of a synthetic eukaryotic genome, Sc2.0, a highly modified *Saccharomyces cerevisiae* genome reduced in size by nearly 8%, with 1.1 megabases of the synthetic genome deleted, inserted, or altered. Sc2.0 chromosome design was implemented with BioStudio, an open-source framework developed for eukaryotic genome design, which coordinates design modifications from nucleotide to genome scales and enforces version control to systematically track edits. To achieve complete Sc2.0 genome

Yapay insan genomu ne
zaman sentezlenebilir?

-om



-ome & -omics

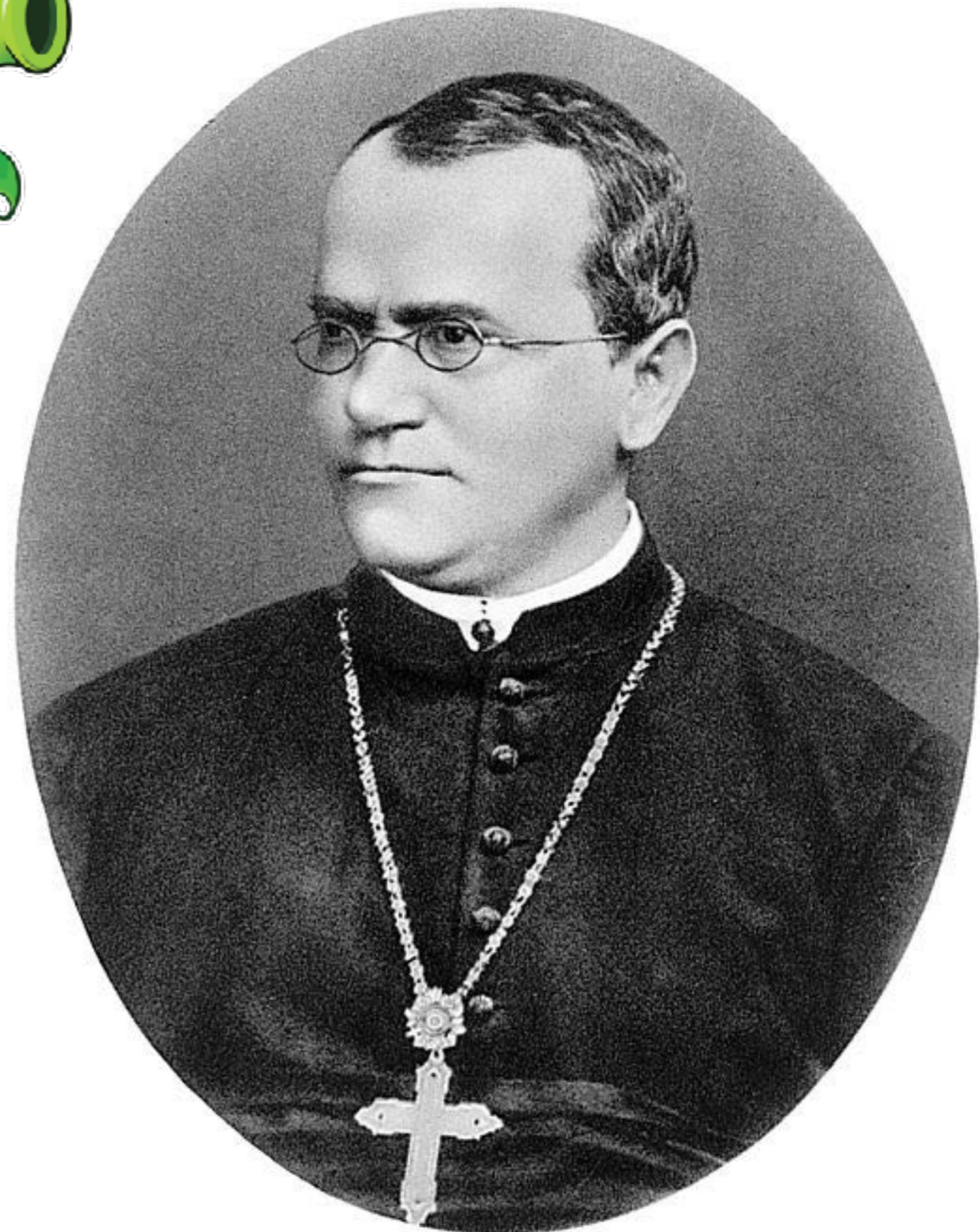
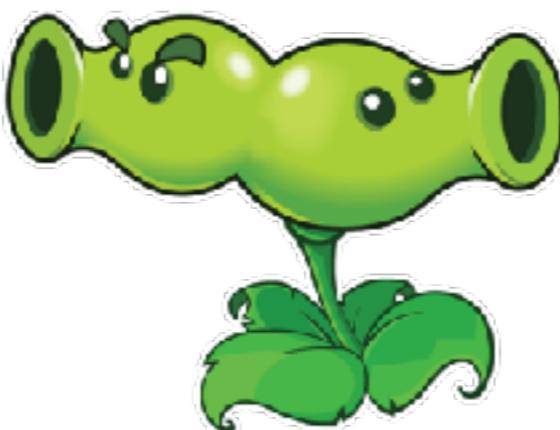
gen-> genom -> genomik

protein -> proteom -> proteomik

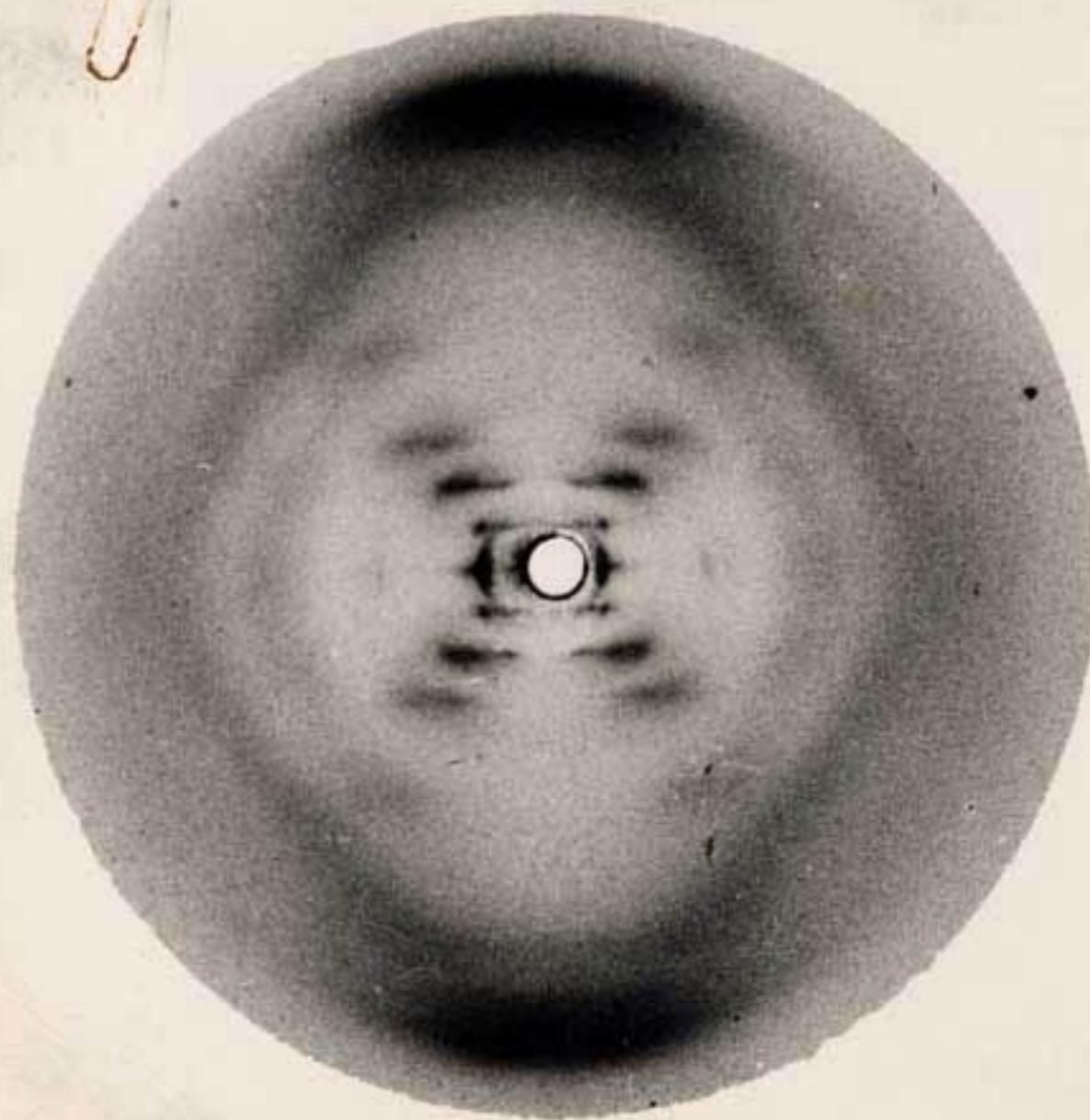
lipit -> lipidom -> lipidomik

transkript -> transkriptom -> transkriptomik

mikrobiyota -> mikrobiyom -> mikrobiyomik





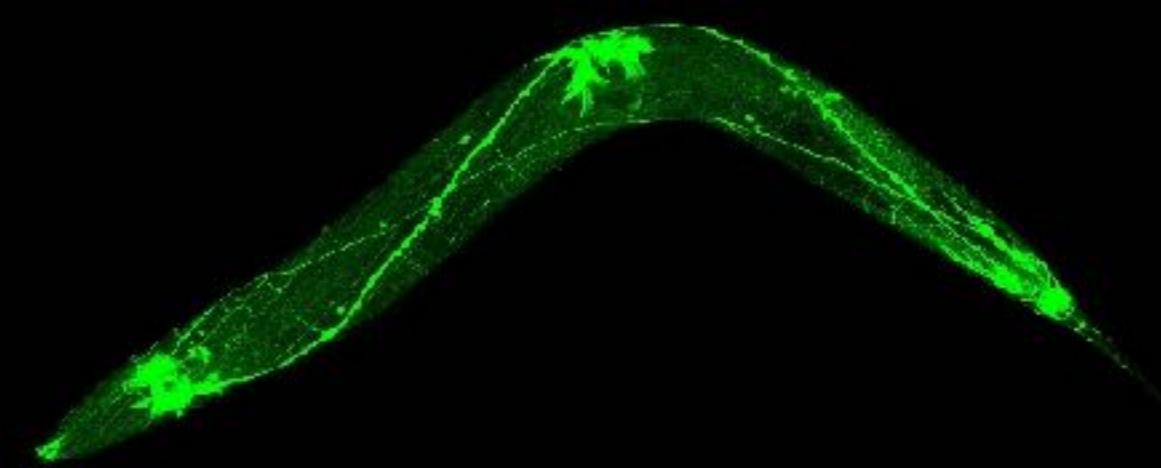
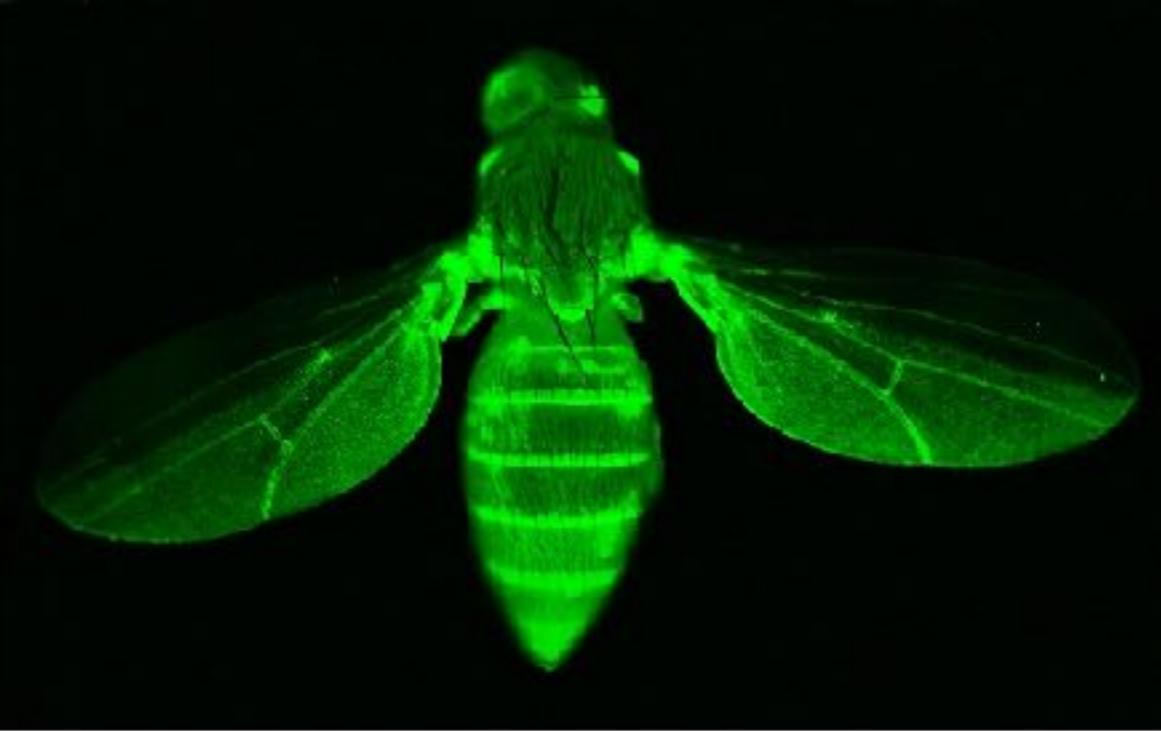


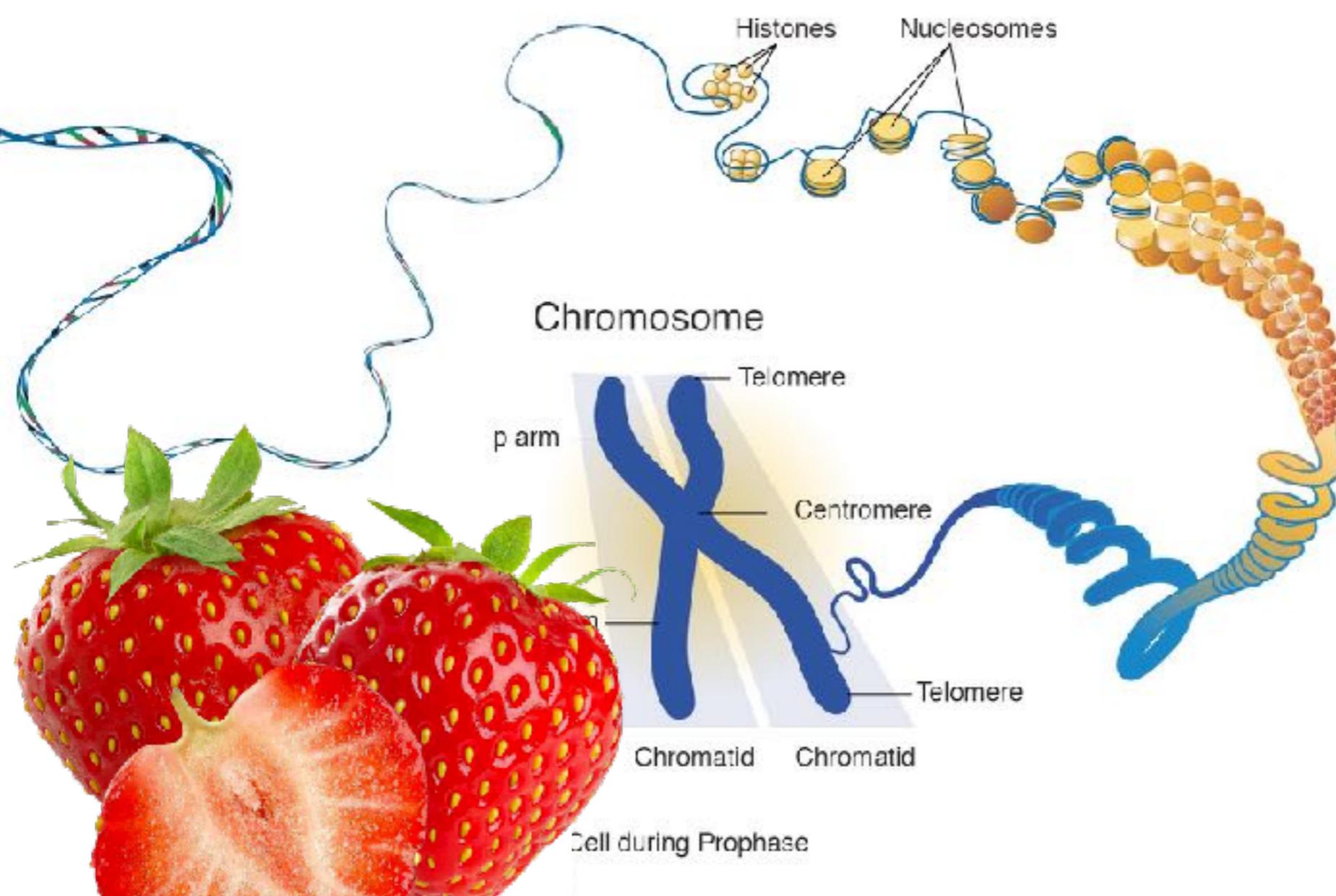
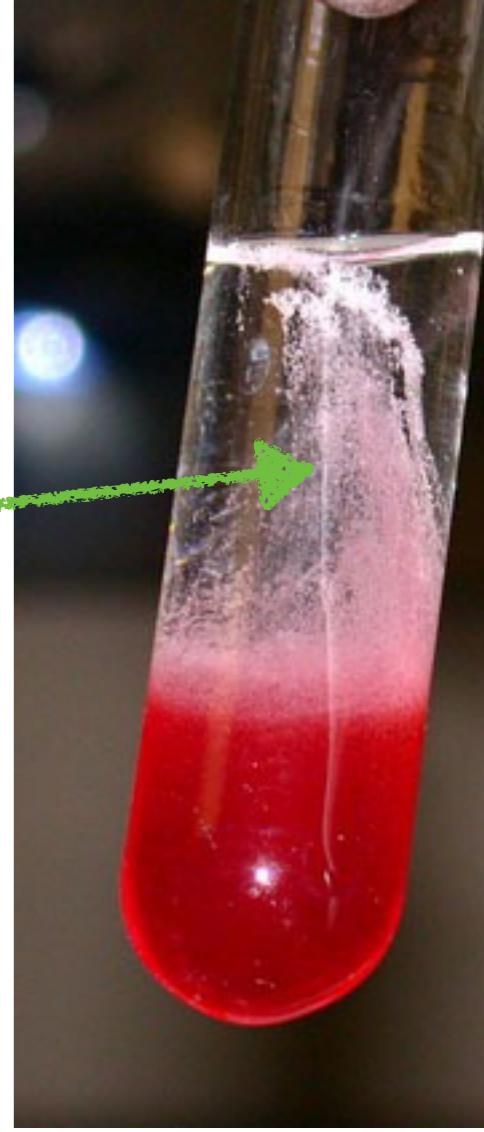
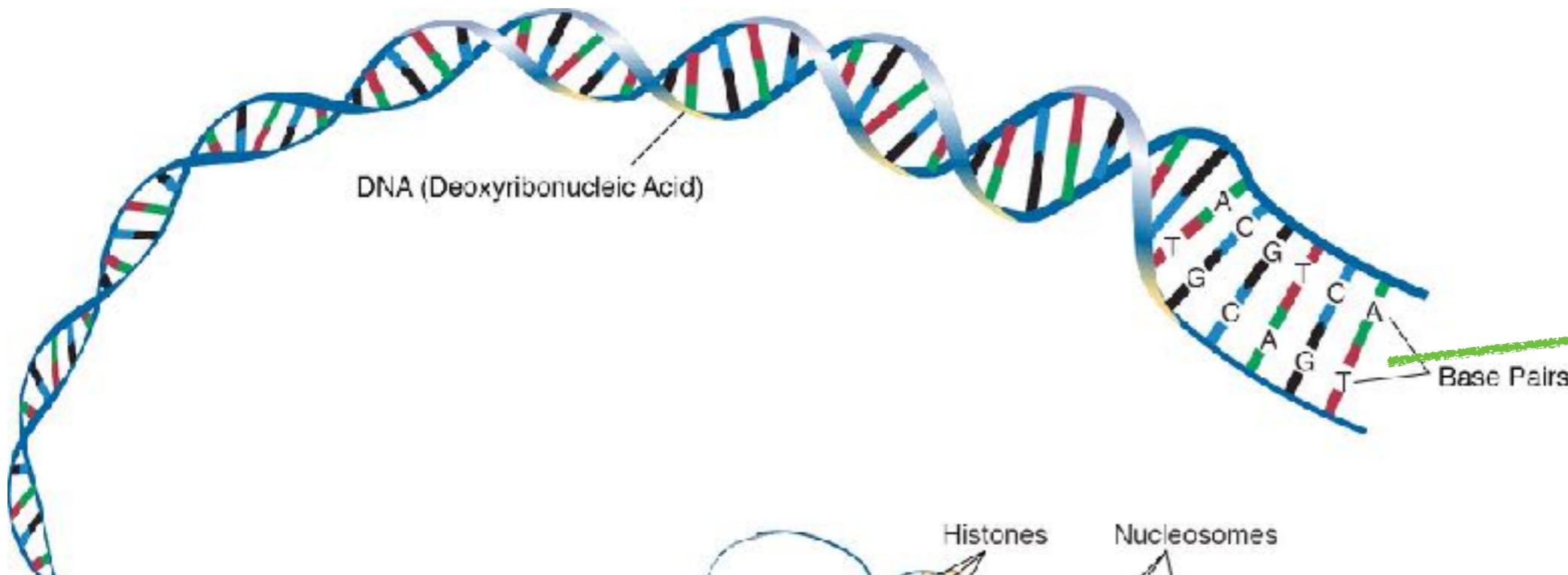
Franklin &
Fishing
~~Ind. Mass.~~
Type G

Plate 1

DANS LES DORTOIRS







- + [Eukaryota \(eucaryotes\) \[superkingdom\]](#)
- + [Metazoa \(metazoans\) \[kingdom\]](#)
- + [Chordata \(chordates\) \[phylum\]](#)
- + [Craniata \[subphylum\]](#)
- + [Mammalia \(mammals\) \[class\]](#)
- + [Euarchontoglires \[superorder\]](#)
- + [Primates \[order\]](#)
- + [Haplorrhini \[suborder\]](#)
- + [Simiiformes \[infraorder\]](#)
- + [Catarrhini \[parvorder\]](#)
- + [Homoidea \[superfamily\]](#)
- + [Hominidae \[family\]](#)
- + [Homininae \[subfamily\]](#)
- [Homo \[genus\]](#)
 - [Homo heidelbergensis \(Heidelberg man\) \[species\]](#)
 - [Homo sapiens \(human\) \[species\]](#)
 - [Homo sapiens neanderthalensis \[subspecies\]](#)
 - [Homo sapiens ssp. Denisova \(Denisova hominin\) \[subspecies\]](#)



İnsan

- GRCh38.p7 sürümü
- 3,547,762,741 baz çifti(bp)
(yani bu kadar çift ATCG ...)
- 20,441 Protein kodlayan gen
- Tüm genomun ~%1 protein kodluyor.

Hangi çağdayız
biliyor musun?

Hayır
multi-omik
çağı

Omik çağı



Sizce kaç tane insanın
genomu sekanslanmıştır?

Genom Projeleri

- 1K Genom Projesi (26 populasyon, 2504 kişi)
- 100K Genom Projesi (UK- Fizyolojik veriyle birlikte)
- 1M Genom Projesi (US-Obama başlattı.)
- 2K Genom Projesi (Çin-sadece en zeki 2K)
- The EarthBioGenome Projesi (9K Ökaryot, 150K diğer taksonlar)
- The Cancer GenomeAtlas-TCGA (11K kanser hastası verisi)
- ...

- $3,547,762,741 \text{ bp} \times 2$
= 7,095,525,482 bp (46 kromozom)
- A-00, T-01, C-10, G-11 → 1 byte
(4 nükleotid 1 byte; 8 bites)
- $7,095,525,482 / 4 = 1773881370.5 \text{ byte}$
- Yani bir insan hücresinde
gb bilgi bulunuyor? ~1.77 GB

■ Bu hesapta, pozisyon bilgisi ya da kromozom bilgisi gibi diğer bilgiler yer almıyor. Yani sadece lineer DNA.

Gerçek Dünya

Kısa okuma : ~80 - ~200GB veri

- ya da daha fazla. . .



- Google —> Google Genomics
- Amazon Web Services —> Life Sciences
- Apple —> iPhone, Genetic app.
- SevenBridges —> Veri yönetimi/Analizi (AWS ile birlikte)
- 23andMe —> Genetik analiz servisi(1M'dan fazla kişinin verisine sahip)
- Ve diğer pek çok şirket

WHAT WILL SCIENTISTS DO WITH THE DATA?

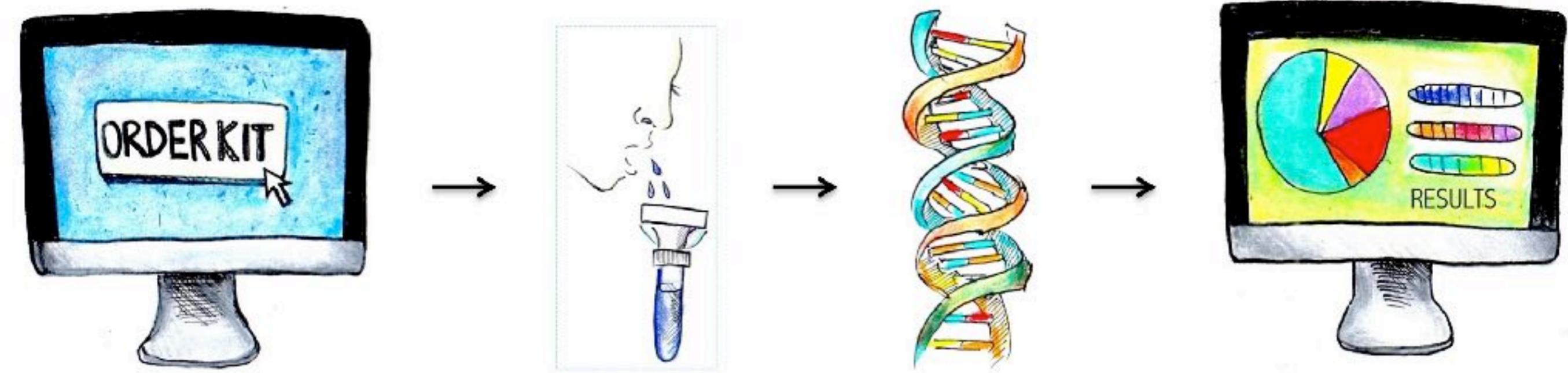


UNDERSTAND WHICH
DIFFERENCES ARE IMPORTANT

BEST TREATMENT

- USE CURRENT MEDICINES BETTER
- NEW DRUGS
- NEW DIAGNOSTIC TESTS

- Onkogenomik
- Farmakogenomik
- Nadir Hastalıklar (Ve bu insanların bir araya gelmesi)
- Bağışıklık Sistemi hastalıkları
- Vb...



Yeni bir iş modeli.



Benim Genim

İnsanların kendi genetik verilerine kolay
erişebilmesi bir haktır !



- Daha hızlı, daha küçük!
- Erişilebilir!



DNA'nın interneti

- Genom verileri için bulut teknolojisi yaygınlaşıyor.
- İnsanlar kendi genom verilerine şirketlerin sunduğu ara yüzler üzerinden ulaşıyorlar.
- Halka açık veri tabanlarında kişisel bilgilerden arındırılmış veri setleri herkesin erişimine açık yer alıyor.



“Mesele kişisel değil.”

istediğim genom verimi,
doktorumla sadece “paylaş”
butonuna basarak
paylaşabilir miyim?

Peki ya beş yıl sonra sigorta
şirketim benim genom
verime erişim isterse?

DIYBIO-BIOHACK-BIOSPACES

- Yaşam bilimlerinde “Açık Kaynak” felsefesi
- Hem deneysel - hem de informatik olarak
- Laboratuvar cihazlarını kendin yap!
- Canlıları hackle
- Faydalı ol!
- Biyo-güvenliğe dikkat et!

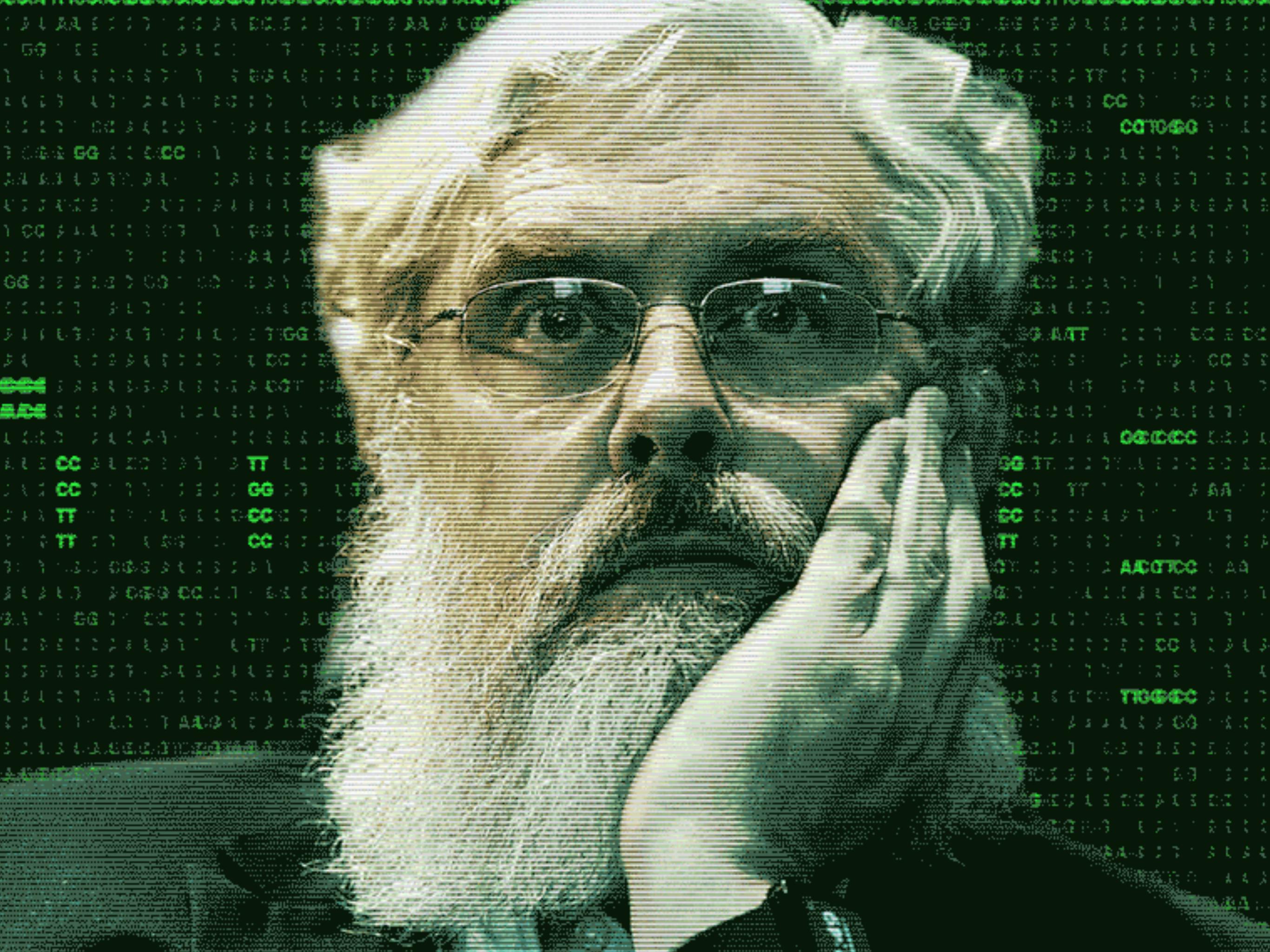




- Atölye tarzı ortak lablar
- Kişisel garaj labları
- Açık kaynak ekipman/yazılım
- Güvenlik/biyogüvenlik hassasiyeti



Peki bu gün kendi
genomunuz hakkında ne
biliyorsunuz?



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- https://www.ncbi.nlm.nih.gov/assembly/GCA_000001405.25#/def
- <https://medium.com/precision-medicine/how-big-is-the-human-genome-e90caa3409b0#.1fk6iqgiu>
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- <http://www.newyorker.com/magazine/2014/07/21/one-of-a-kind-2>
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- <https://www.technologyreview.com/s/537081/apple-has-plans-for-your-dna/>

Son bir soru

Gelecek genomda mı?

- Evet genom'da
- <https://medium.com/turkce/gelecek-genomda-72eb5fee7d01#.eimpy5oj5>
- <https://www.forbes.com/sites/luketimmerman/2015/04/29/qa-with-jay-flatley-ceo-of-illumina-the-genomics-company-pursuing-a-20b-market/#44b85bf842e7>



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