

# Using Django for Genome Engineering

Anasstassiya Zidkova, Filip Sedlák



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Most of us like to play cars



<http://nspt4kids.com/parenting/developmental-skills-while-playing-with-cars/>

Some of us like to disassemble cars ...



... in order to study how they work

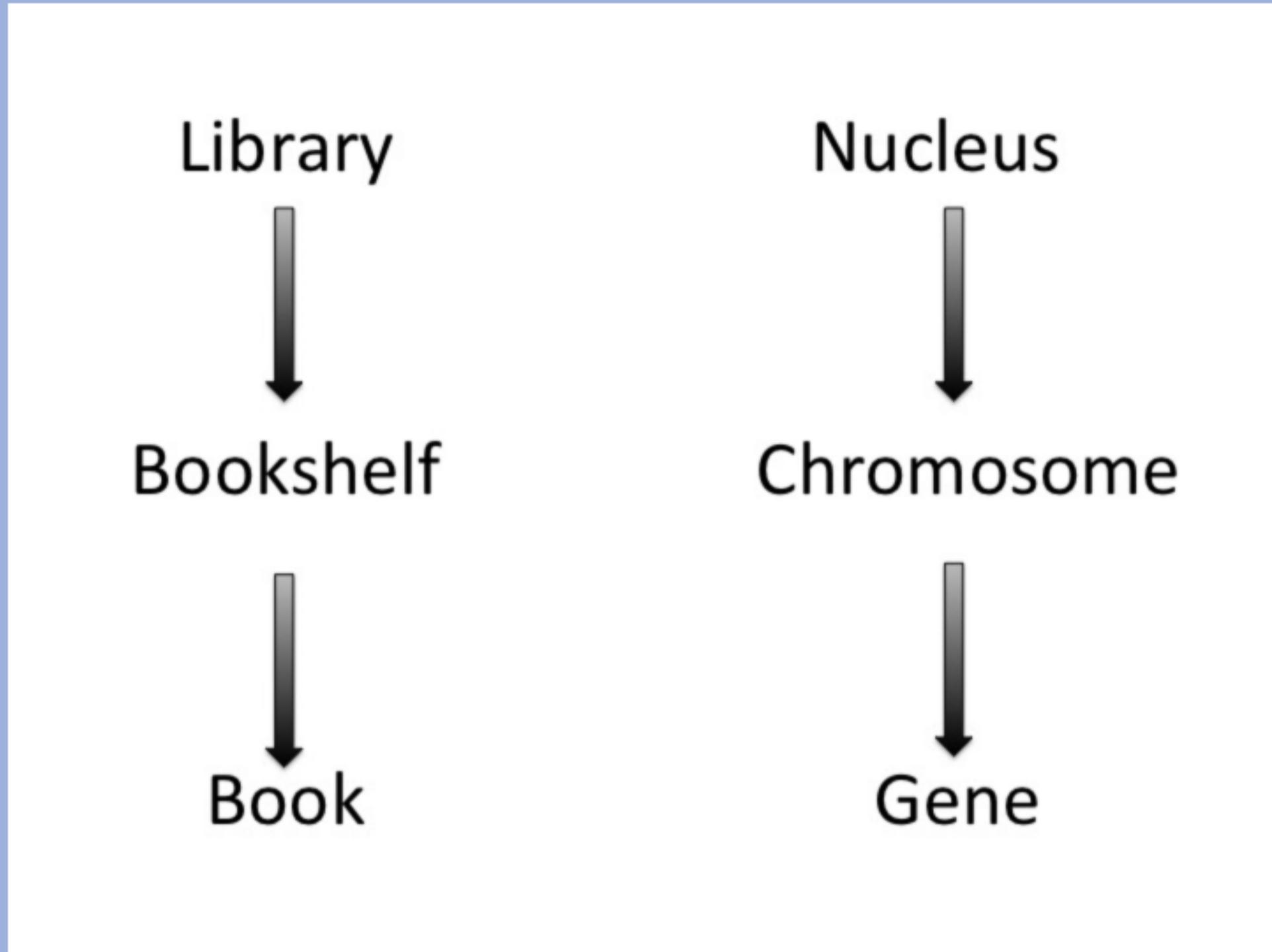
<http://imgur.com/gallery/DEJwM>

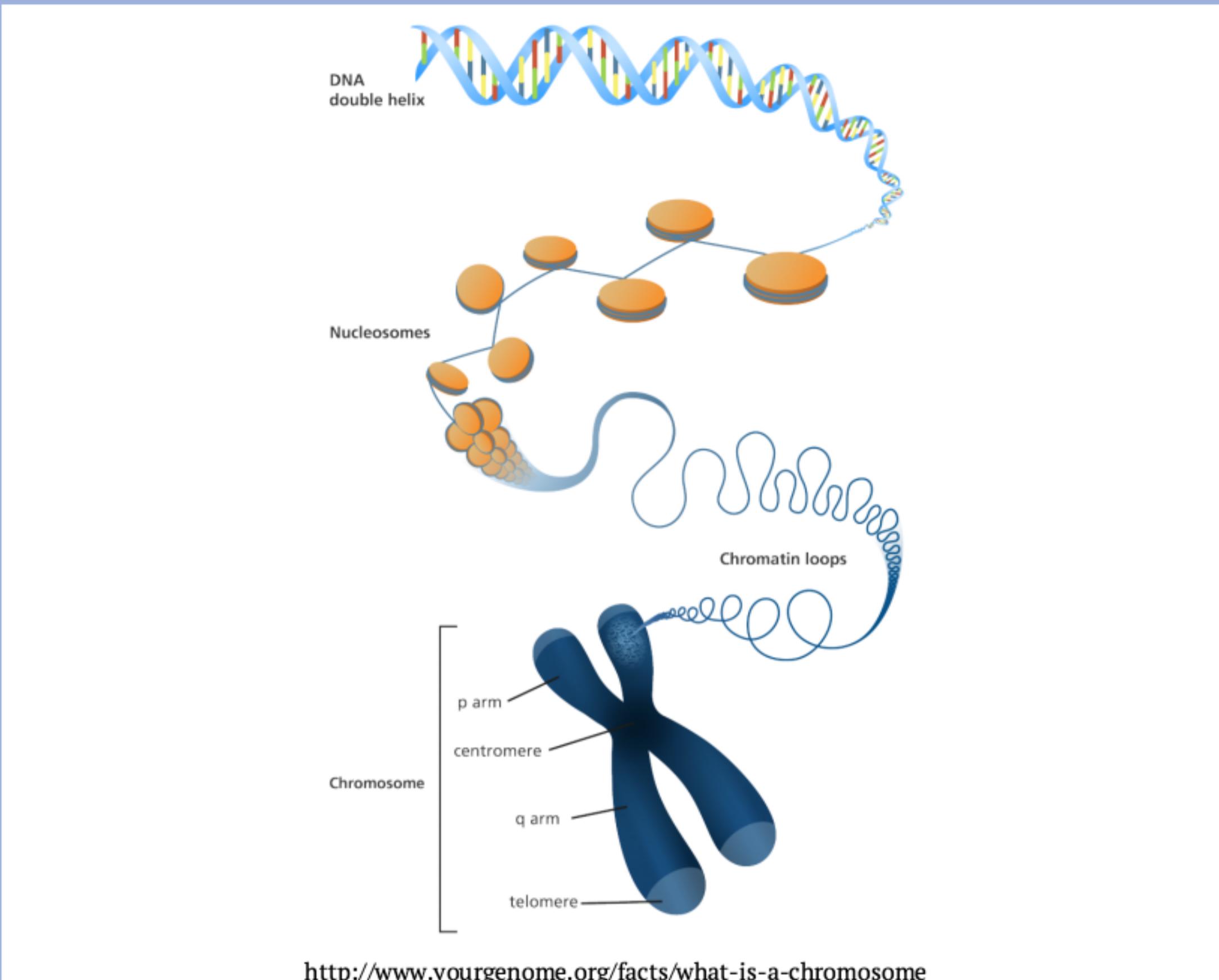
Can we use the same approach to study living organisms?

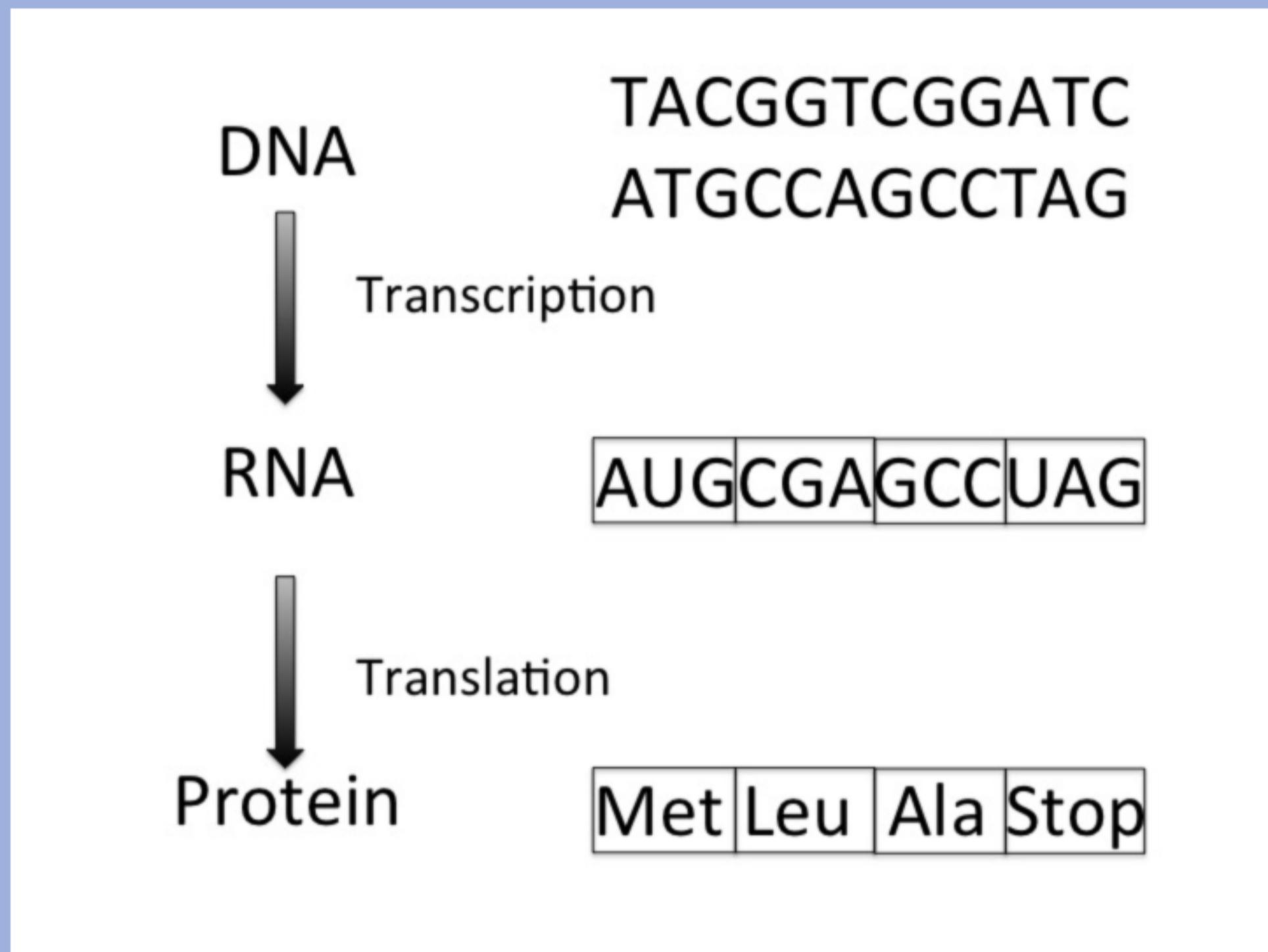


<http://vignette4.wikia.nocookie.net/lesmiserables/images/6/6b/Awww-cute-seal-white-snow.jpg>

Now let's make a short intro into genetics ...





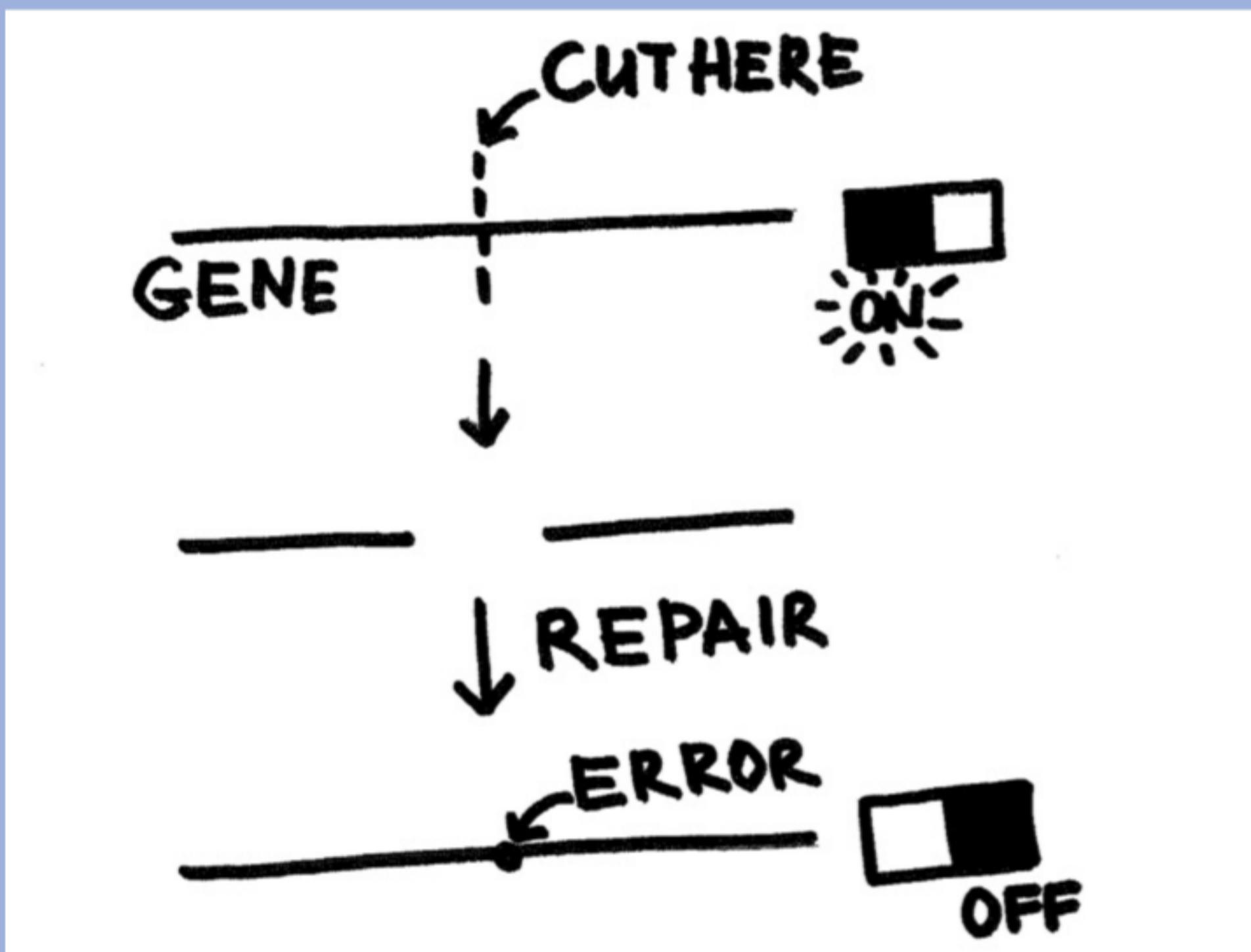


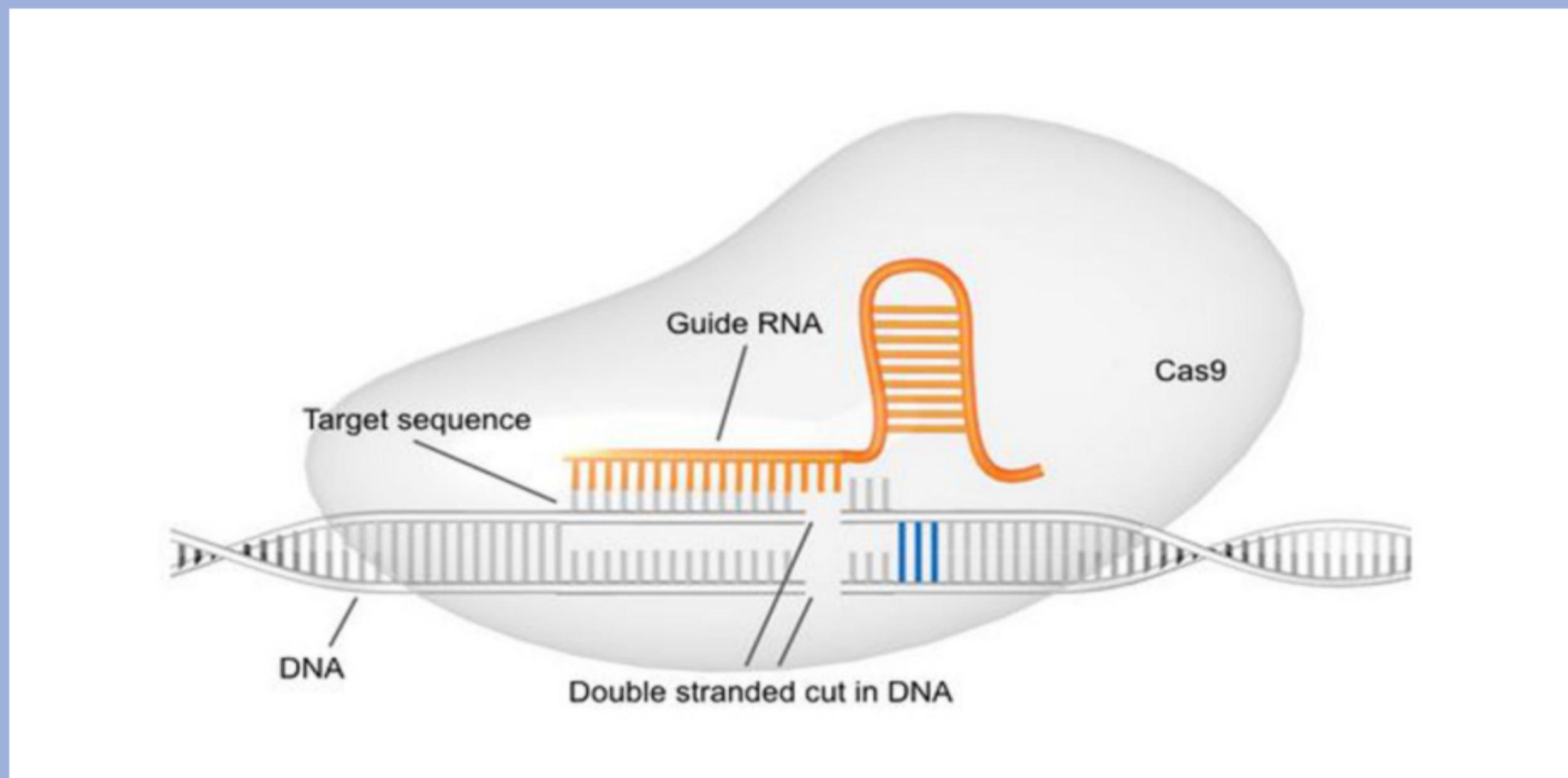
I remember you!



<https://creativemarket.com/microvector/109424-Retro-pointing-finger>

How it works ...



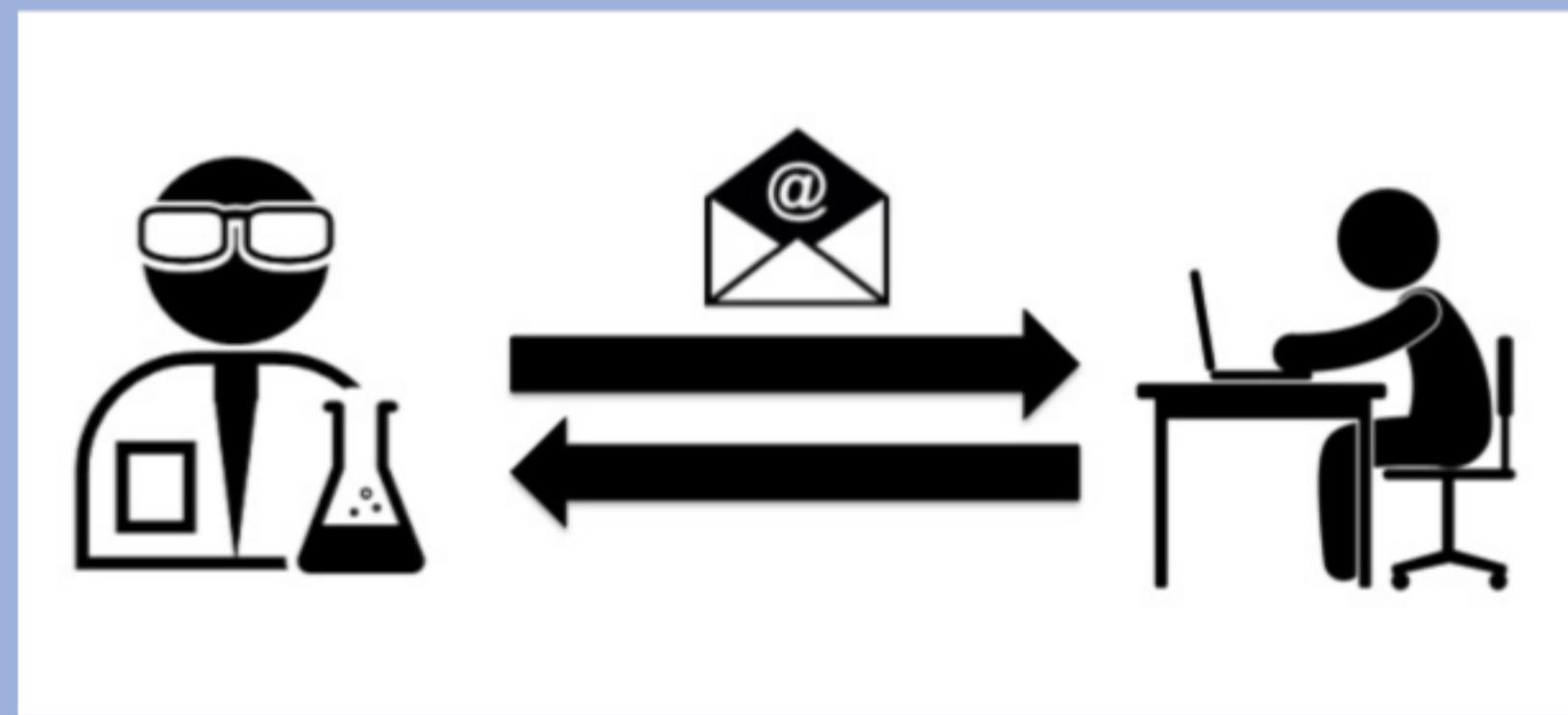


<http://synbiobeta.com/caribou-biosciences-raises-11-million-series-a/>

>gi|588471275:c167555-158324 Python bivittatus unplaced genomic scaffold,  
Python\_molurus\_bivittatus-5.0.2 Scaffold2188, whole genome shotgun sequence  
AGTTCCCCAGCTATAGAAAGCCACATGGATCAAT TGG GGGAGGAAGACCCAGACCCATCACTGAGTCCAC  
CTCTGAGCCAAGAGACCTTGAGGAGATCTGGGCTTTGAAAATGATCAGCCCTTCATGGTGAGTACGGG  
GTTCAACCTCAGCCACTTGAAGAT TGGCTGGACTTCACACTCCCAGAATTCCCCAGCCAGGGAAATGA  
CCTGGCTGGTCATCCCAGAACATCTGGAATGGGTTTGAAGAT CCTCAACAGGAGGGAGG EGG CTTCTGG  
ATGCCTGGCAACTCAGTCTCCAGCTGT TGGCAAGGTTGGTCTAGAGCAGTGTCTCAACCTCGGCCGC  
TGGAAAGATGGGTGGACTTCAACTCATGCTGGCTGGGAATTCTGGGAGTTGAAGTCCACCCATCTCAAG  
TAGCCGAGGTTGAGAAACACTGCTCTAGAGGCACTGCGAGCCTTGATTGGTTTGCCTACAGATTTATCC  
ATGGTTAATCCAACCGTGGCTTATTCAATTGAACATAAT GGGAAATGGGCTCAGGAGCTCAI GGG ACCCCAAA  
CCGTTCTATGTTTAGAATACGGAGCAGCTGATGGCCTCCACCCAGCCATCGCCTTCCCCGAGGAGG  
GGGCCAGCGCCATGGAGCA GAACACCTACCCGCTGC TGGATCCCCACGTCTCCACCACCCGCTGGCCCC  
TCTGGCAGAAGGTTACCTGAACGGAGGAGACTTGTCACTCCCTCCCGAACCACACTA TGGCGAACCCCC  
GGGGTCATGCTCCAGCTGGCGAAGATTATCCTCCGGGGACAGCAGCGCTCTCCCTCCACCGAAGATT  
ATCCTGGGTGCTATGGCTTAATTGGAGTTGAGCAATCGGGACCGCCAAGTCTGTCACTACACTGT  
ACGAGTCCTGCAAAGTGGGGCCG GGGAGAGAGGCCAGCTGATPAGTGCAGGGGTCCAGGGTCC  
TTCCCCCACACGTATCCTCTGTCTGGCAGGGCGTCCGGGGGTGTGCAAAAAAGTCTGTGACTGCGTG  
ATCTGCCCCCTCCCTGCAGATTGGGGAGACCTGGGTCAACATAACCTAGAGTCGTTTCTGCC  
TAAAATGCACAACCTGGATTGTCTGGGTCTTGGATCTGGTTCTGTAGCTTCCACCAAGGACCGCGAGG  
TTTTTTGAAAGCCCTCGCTTCTTCAGGAGGGCAGTTCTGGGTGTGAAACGTGCCAGCTGTGCACCA

query hit count mismatches

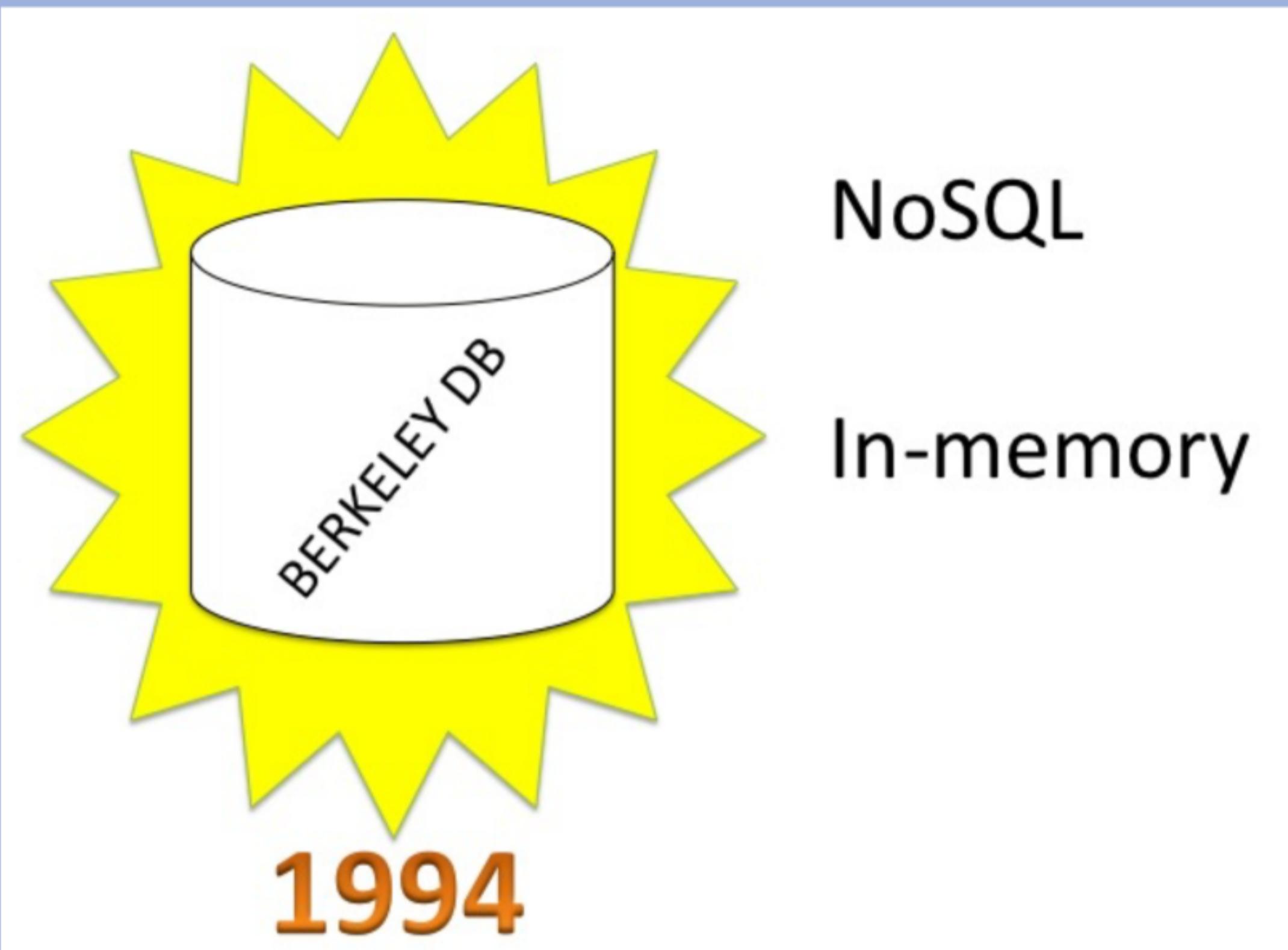
CTGGCAGTGGAGCATGCATC	CTGGCAGTGGAGCATGCATC	1	0
CTGGCAGTGGAGCATGCATC	TGGGCAGTGGAGCGTGCATC	1	3
CTGGCAGTGGAGCATGCATC	TTGGCAGTGGAGAATGCCTC	1	3
CTGGCAGTGGAGCATGCATC	CAGGCAGTGCAGCAAGCATC	1	3
CTGGCAGTGGAGCATGCATC	CAGGCAGTGGAGCCTGTATC	1	3
CTGGCAGTGGAGCATGCATC	CTTGCAGTGGAACATGCTTC	1	3
CTGGCAGTGGAGCATGCATC	CTGTCTGTGGAGCAGGCATC	1	3
CTGGCAGTGGAGCATGCATC	CTGCCAGTGGAGCATGAATG	1	3
CTGGCAGTGGAGCATGCATC	CTGGGATTGGAGCATGAATC	1	3



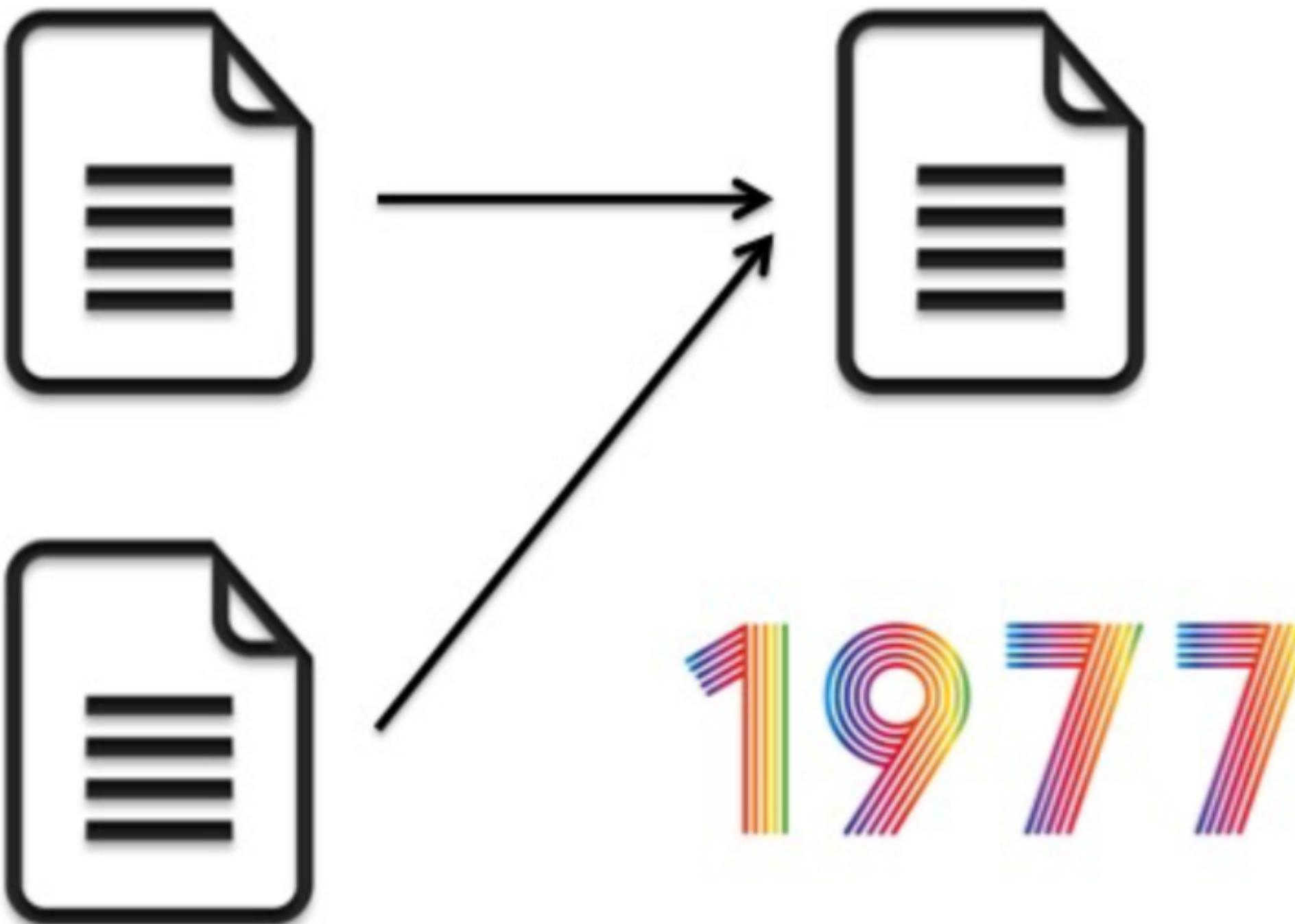
A → 0100001 → 00  
G → 01000111 → 01  
C → 01000011 → 10  
T → 01010100 → 11

```
def make_byte(four_letters):
    letters = {
        "A": 0b00,
        "G": 0b01,
        "C": 0b10,
        "T": 0b11
    }
    return sum(
        [letters[letter] << (2 * i)
         for i, letter
         in enumerate(four_letters)])

>>> hex(make_byte("ACTA"))
'0x38'
```

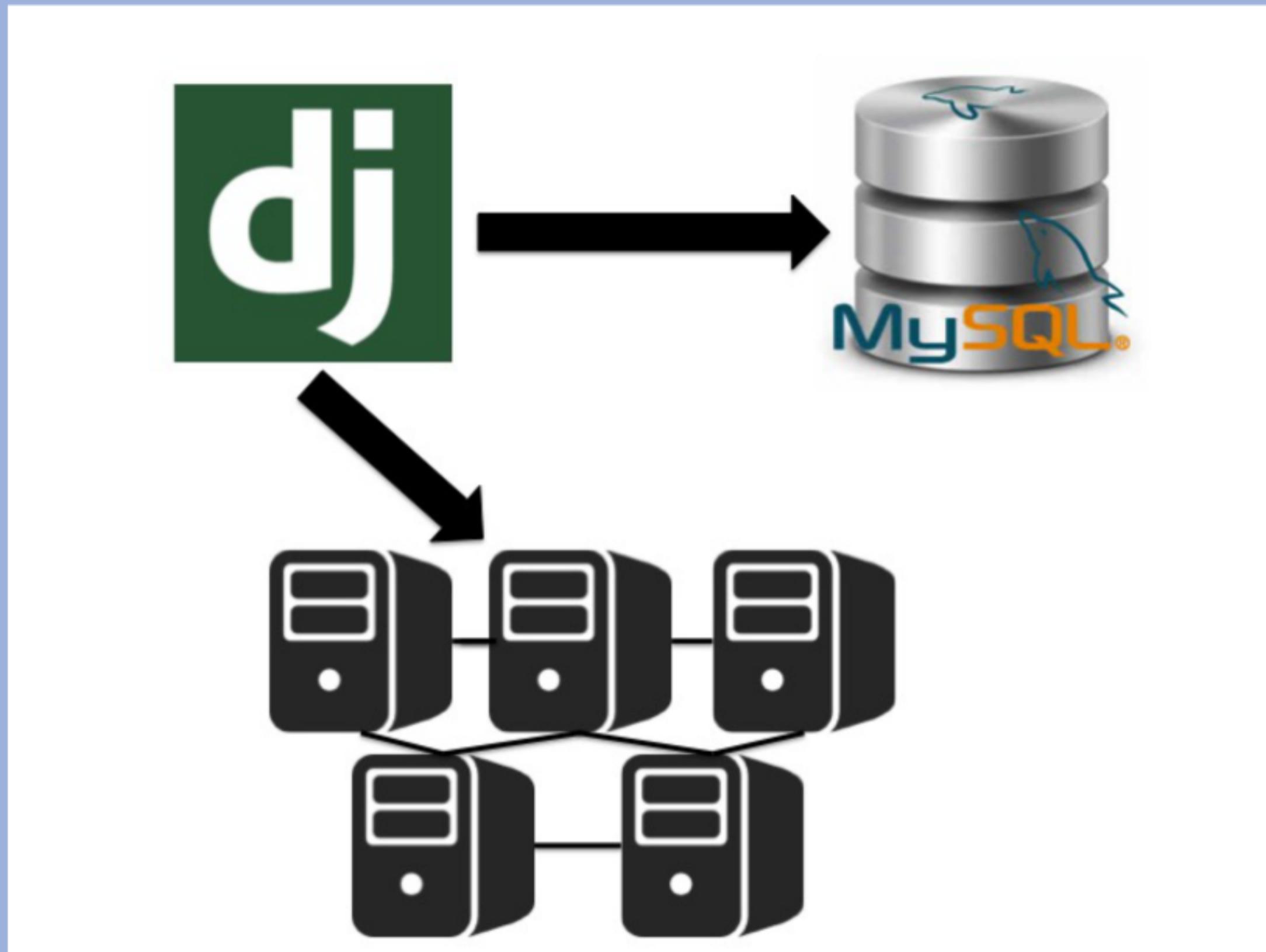


# Makefile





CTGGCAGTGGAGCATGCATC	✗
GCAGTGGAGCATGCATCTGG	✓
ATGCATCTGGAGGGCAGAGA	✗
ATCTGGAGGGCAGAGACGGC	✗
TGGAGGGCAGAGACGGCAGG	✗
AGAGACGGCAGGCGGTACCC	✓
CAGGCAGGTACCCCGGCGCGC	✗
GCGGTACCCCGGCGCGCCGG	
GTACCCCGGCGCGCCGGCGG	
CTGCAGACGTCCGTGCCAG	



CRISPR Web application

MSD

Design CRISPR sgRNA

Merck/MSD email

Q Search and Select an Ensembl ID or a Gene Name ...

Submit

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INSTRUCTIONS

How to use the CRISPR Webapp?

- Provide your Merck/MSD email.
- Search and Select one ENSEMBL or a Gene name.
- Submit the form.
- Wait for computation response via email.

Made by [Team QALA](#) with the support of [GpGx](#).

CRISPR Web application

MSD

Design CRISPR sgRNA

Merck/MSD email

Q oc

OC90  
Description: otoconin 90 [Source:HGNC Symbol;Acc:HGNC:8100] ENSG00000253117

OCA2  
Description: oculocutaneous albinism II [Source:HGNC Symbol;Acc:HGNC:8101] ENSG00000104044

OCEL1  
Description: occludin/ELL domain containing 1 [Source:HGNC Symbol;Acc:HGNC:26221] ENSG00000099330

OCIAD1  
Description: OCIA domain containing 1 [Source:HGNC Symbol;Acc:HGNC:16074] ENSG00000109180

OCIAD2  
Description: OCIA domain containing 2 [Source:HGNC Symbol;Acc:HGNC:28685] ENSG00000145247

Made by Team QALA with ❤️



<https://heywhatwhatdidyousay.files.wordpress.com/2013/06/happy-scientist.jpg>

**THANK YOU FOR ATTENTION!**

