

# Introduction to Biology. Lecture 17

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October 15, 2014



## 1 Questions and answers

- Exam 2

## 2 Where we are?

- Nucleus, intrones and telomerase
- Precambrian life



- 1 Questions and answers
  - Exam 2
- 2 Where we are?
  - Nucleus, intrones and telomerase
  - Precambrian life



# Questions and answers

## Exam 2



# Results of Exam 2: statistic summary

## Summary:

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
25.00	34.00	40.00	41.34	47.75	65.00	9

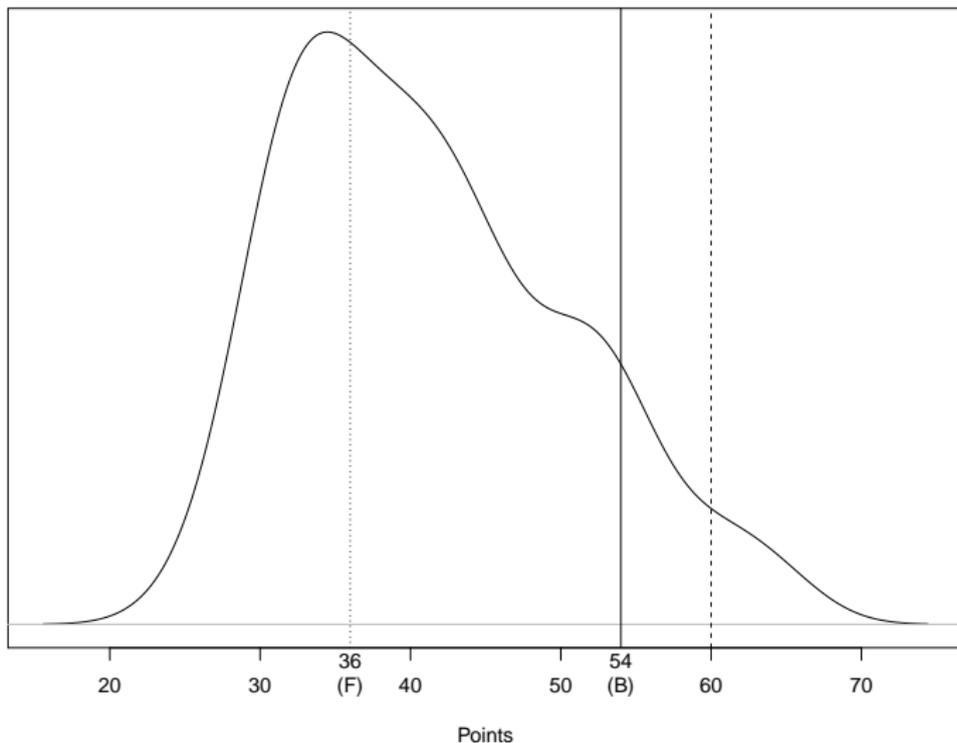
## Grades:

F	D	C	B	max
36	42	48	54	60



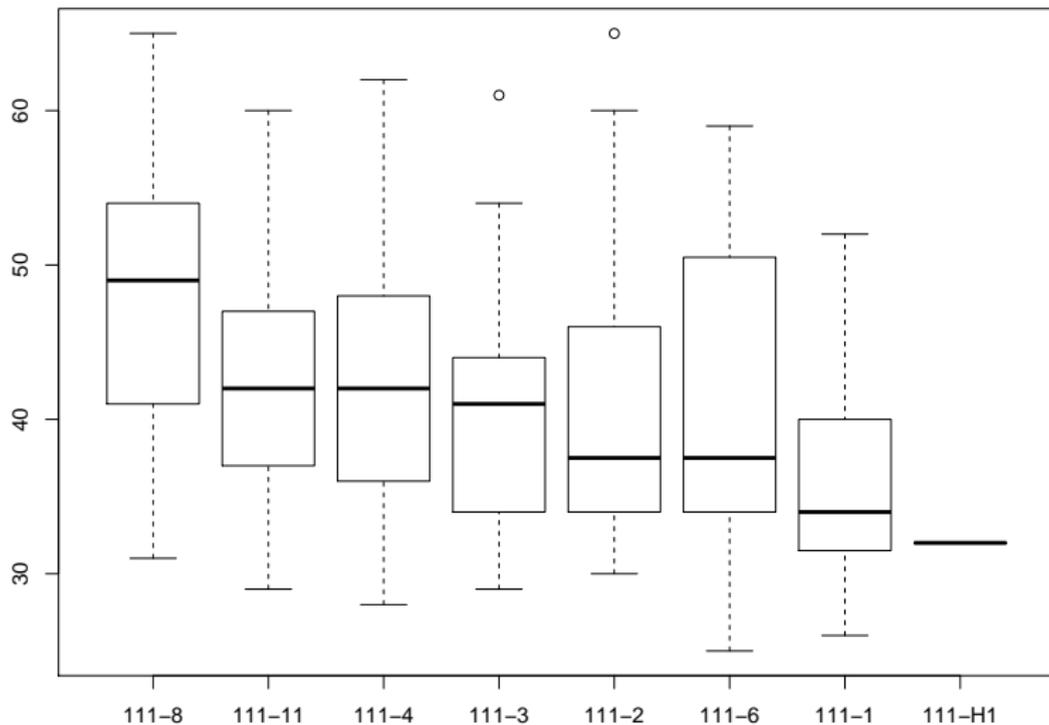
# Results of Exam 2: the curve

Density estimation for Exam 2 (Biol 111)



# Results of Exam 2: sections

## Competition between Biol 111 sections (Exam 2)



# Results of Exam 2: three questions

- What is ATP?
  - **A** Universal source of energy in the cell
  - **B** Molecule which is similar to nucleotides
  - **C Both of above**
- Cell wall:
  - **A Defends the cell mechanically**
  - **B** Is a barrier for water
  - **C** Both of above
- Since DNA is two complimentary chains, duplication of each chain:
  - **A** Makes two exact copies
  - **B** Makes two “mirror” copies
  - **C Makes one exact and one “mirror” copy**



# Where we are?

## Nucleus, intrones and telomerase



# The logic of acquiring nucleus

- In bacterial mat, many bacterial groups coexist
- Due to the evolution, they become more and more dissimilar
- However, **horizontal transfer** of DNA continued
- To prevent the transfer of alien genes, some cells “decided” to separate DNA with membranes



# Nuclear envelope

- There are many ways to create nucleus-like structures. For example, it could be guarded with one membrane but then pores will be impossible
- Eukaryote ancestors created the *nuclear envelope from ER*

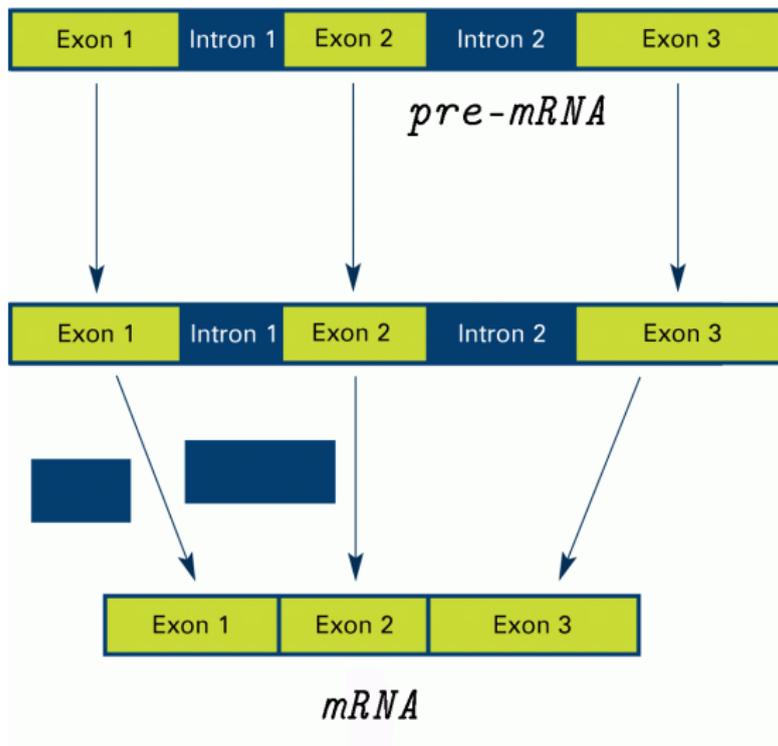


# Introns

- Creating a nucleus run the cascade of consequences. First of all, cell now may keep much more DNA
- Some of this DNA may now contain insertions—**introns** which are removed before mRNA go through the nuclear pore
- Introns increase the variability of DNA and allow to make many variants of proteins



# Introns and exons



Only archebacteria and eukaryotes have introns



# Linear DNA

- Circular molecules of DNA are harder to keep, difficult to enlarge and slower to duplicate
- Eukaryotes change circular DNA into linear
- Every linear DNA molecule is “I-chromosome”



# Telomerase and aging

- Unfortunately, replication of linear DNA has a problem: with every replication, the very end of DNA molecule *is not replicated*
- **Telomerase** adds some nonsense DNA to the telomere and thus prevent the shortening of DNA molecule
- Unfortunately, sometimes telomerase is not working well and DNA was cut... This is one of main reasons of **aging**



# Where we are?

## Precambrian life



# Precambrian life

- In Cryogenian, Marinoan glaciation covered the whole Earth
- In Ediacarian, multicellular and then multi-tissued eukaryotes appeared



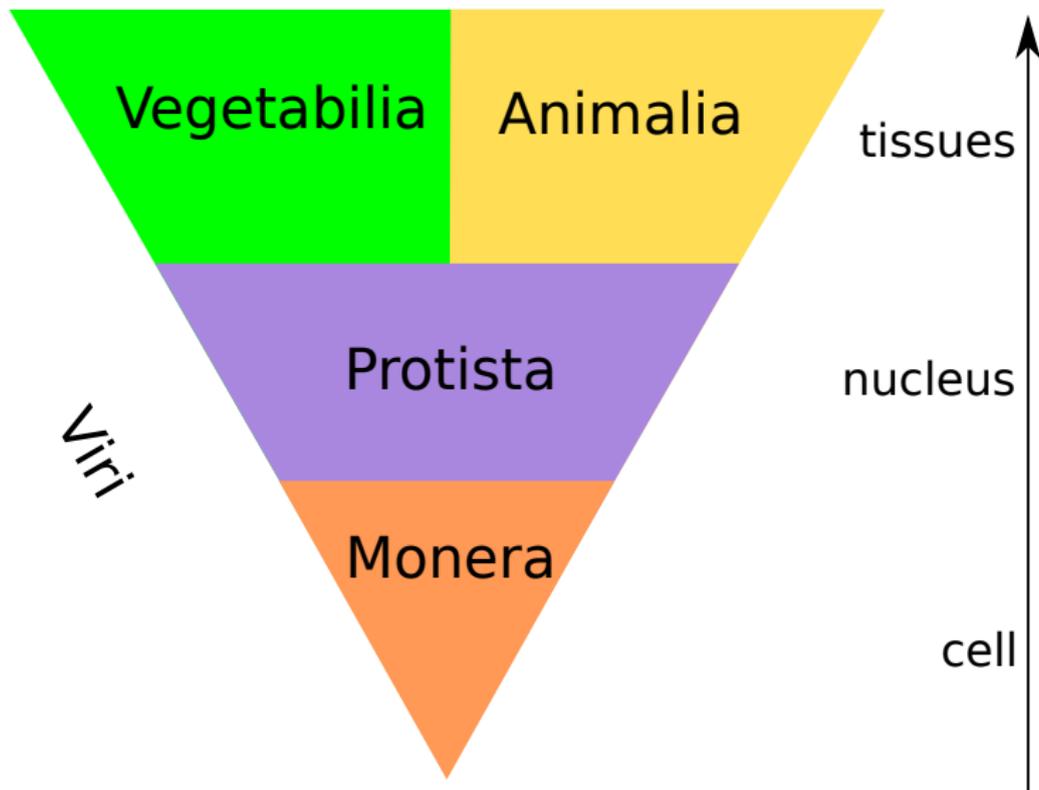
# One of first multicellular alga with reproductive cells



*Bangiomorpha*, putative red alga from Proterozoic



# Cells, tissues, kingdoms and viruses



# Summary

- Introns, linear DNA molecules and telomere/telomerase system differ eukaryotes from most prokaryotes



# For Further Reading



**Introns.**

<http://en.wikipedia.org/wiki/Intron>

