

# Introduction to Biology. Lecture 29

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- 1 Questions and answers
  - Exam 4
- 2 Where we are?
- 3 How plants got their seeds
  - Origin of seed plants



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# Questions and answers

## Exam 4



# Results of Exam 4: statistic summary

## Summary:

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
19.00	35.00	40.00	39.62	45.00	56.00	25

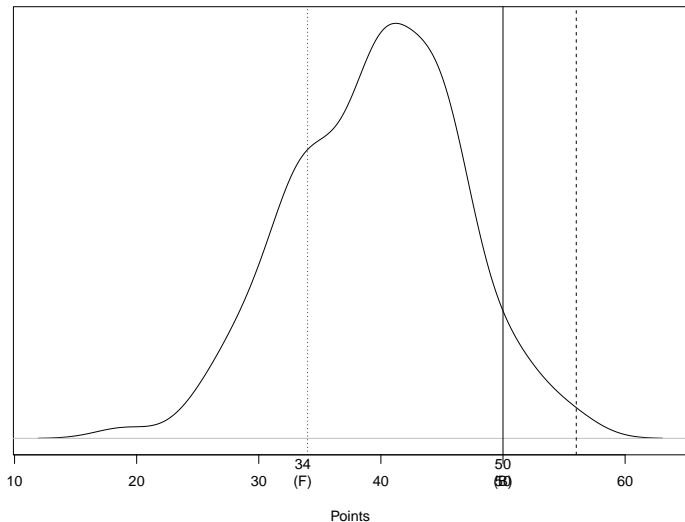
## Grades:

F	D	C	B	max
34	39	45	50	56



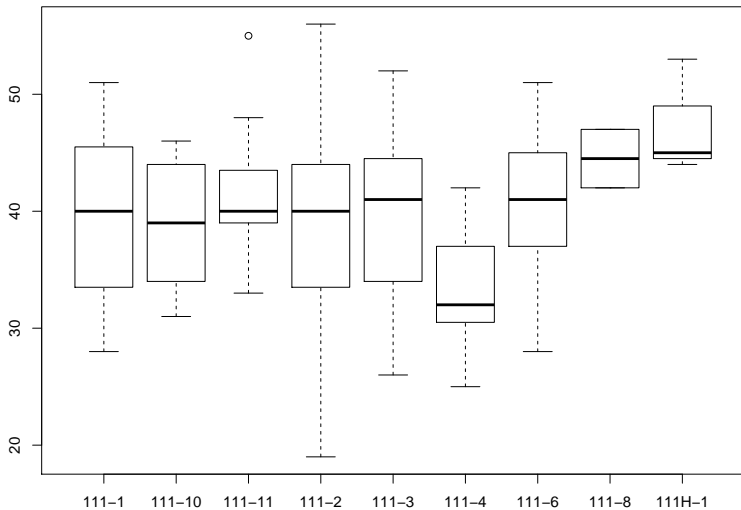
# Results of Exam 4: the curve

Density estimation for Exam 4 (Biol 111)



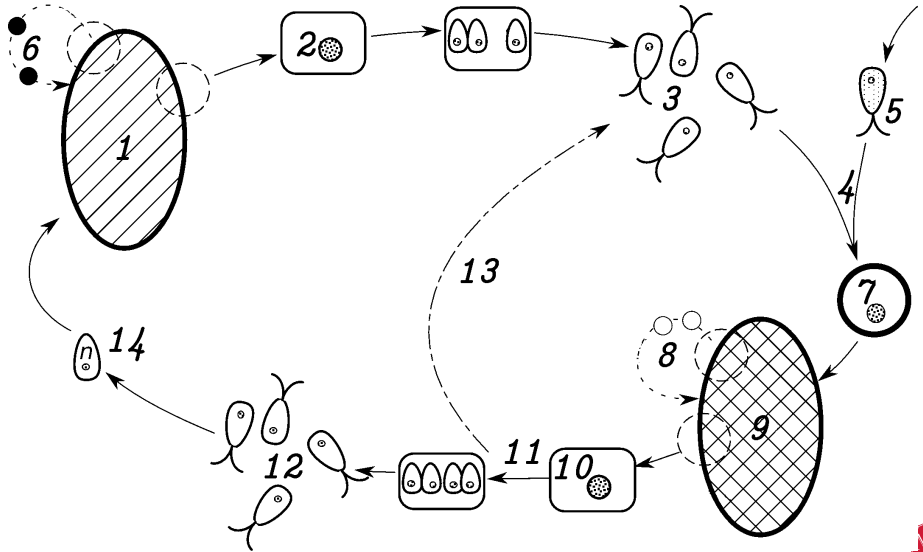
# Results of Exam 4: sections

## Competition between Biol 111 sections (Exam 4)





# Results of Exam 4: the scheme



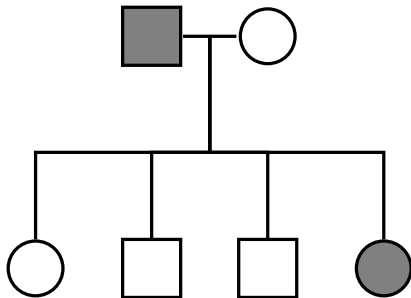
# Results of Exam 4: some questions I

- On the scheme, #1 is:
  - Ⓐ Diploid
  - Ⓑ **Haploid**
  - Ⓒ Tetraploid



# Results of Exam 4: some questions II

- Is the disease from the pedigree chart below:



- A Dominant
- B Recessive
- C I need more information

# Results of Exam 4: three questions had *mistakes* in the key

2. On the scheme, name of #1 is:

- A **Haplont**
- B Sporangium
- C *Diplont*

15. You have 23 father and 23 mother chromosomes. In the each of your gametes:

- A **46 chromosomes: 23 are still from your father, 23—from mother**
- B 23 chromosomes: 11 mother's and 12 father's
- C *23 chromosomes: 1 to 23 are father's and 23 to 1 are mother's*

Everybody have received 3 extra points. I apologize for inconvenience.



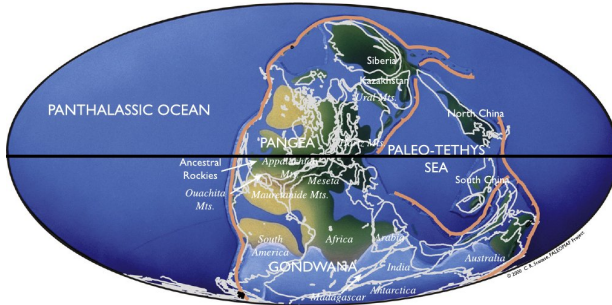
# From Carboniferous to Permian

- Devonian period: 419 Mya
- Carboniferous period: 358 Mya
- Permian period: 299–252 Mya



# Carboniferous period

306 Ma Carboniferous

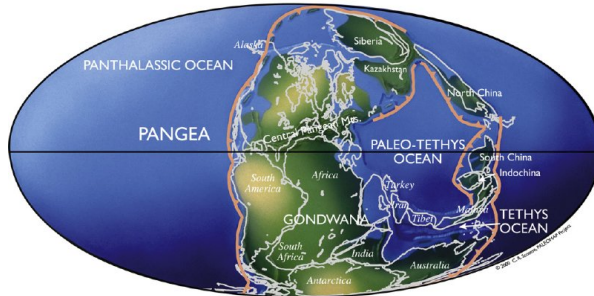


- Hot, wet tropical climate in Europe and North America (Laurasia), dry arctic forests in Siberia (Angarida)
- Pteridophyte and primitive seed plants forests dominated tropics, insects started to fly
- Reptiles appeared



# Permian period

255 Ma Permian



- Last period of Paleozoic era, ended with a mass extinction in the sea and also on land
- Pangea formed, with a giant central desert
- Primitive synapsid reptiles dominated the land



# How plants got their seeds

## Origin of seed plants



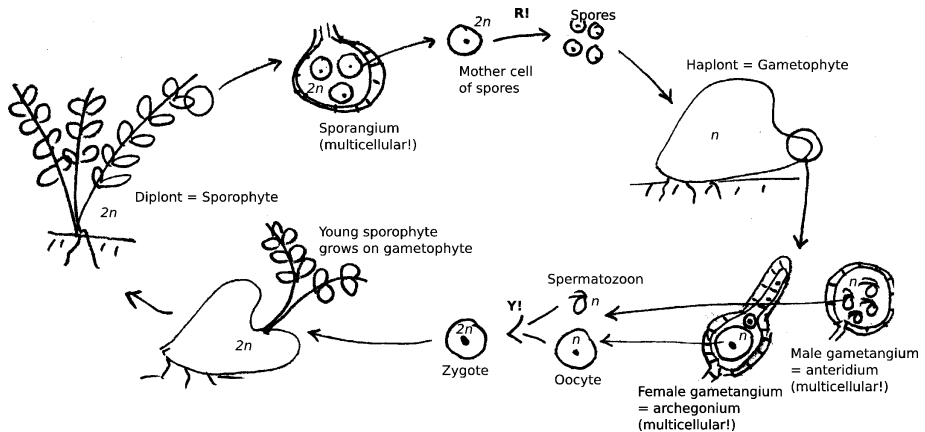


# Life cycle of land plants

- Sporic life cycle with interleaving generations
- Diploid stage grow directly on the haploid stage and even parasitizes on it (e.g., in mosses)
- Originates from the life cycle of algae: diploid stage was an adaptation to the distribution of spores
- Eventually, diploid stage begin to dominate the life cycle



# Life cycle of sporic plants



# The conflict between size and reproduction

- Competition for the light resulted in growing up; growing up resulted in *secondary thickening*—trees appeared
- Seed plants started as trees, and these trees were diploid stage
- Haploid stage still existed and probably was a minute *prothallus*
- Diploid stage followed the *K*-strategy (slow and smart) whereas haploid prothallus followed the *r*-strategy (random explosions)
- This is a conflict: diploid stage cannot adapt better because free haploid stage was too cranky, it became a hindrance on the way of evolution
- Decision: take haploid stage on the diploid stage and grow it inside



# The seed

- Seed is the chimeric organ consists of three parts: mother diploid tissue (seed coat), daughter diploid (embryo) and female haploid stage (endosperm)
- Main problems: need for pollination, extremely slow growth (two years in pine tree, up to five years in cycads)



# Summary

- Trees need a control over their reproduction, that was a reason to take haploid stage inside
- Seed = seed coat ( $2n$ ) + endosperm ( $n$ ) + embryo ( $2n$ )



# For Further Reading



Permian.

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



Seed.

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

