

Short Answer Essay Techniques

(Please remind me to record if I forget)

23 September 2022

Taking attendance



BIOU3GE: Evolution
and Genetics

UNIVERSITY of
STIRLING 

- ▶ Required at start of on campus sessions
- ▶ I get the code 15 minutes before class
- ▶ You can put the code in the Stirling app
- ▶ Just let me know if it does not work

How is this module going so far?



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- ▶ Are the learning materials clear?
- ▶ Do you know what you need to do each week?
- ▶ Are you managing your time and keeping up?
- ▶ Any other suggestions?

Why do we have this lecture on short answer essays?

- ▶ Help you prepare for assignments, all of which will require some writing
 - 1. Short answer essay plan (0%)
 - 2. Population genetics assignment (25%)
 - 3. Phylogenetics lab report (25%)
 - 4. Short Answer Essay Journal Portfolio (50%)

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 2. Population genetics assignment (25%)
 3. Phylogenetics lab report (25%)
 4. Short Answer Essay Journal Portfolio (50%)
- ▶ Explain what a short answer essay is and how to prepare one
- ▶ Explain the formative short answer essay planning assignment

Short answer essay journal portfolio

- ▶ Introduced in response to student comments
- ▶ Replaces the traditional 4 hour exam setting
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- ▶ Expected word count 500 (\pm 100)
- ▶ Expected references 2-6

Short answer essay technique

1. What is a Short Answer Essay?
2. How to prepare your answers
3. The essay planning assignment
4. Questions and Answers

What is a short answer essay?

An extended written answer to a **specific** question

- ▶ Approximately 500 words
- ▶ Usually 1-3 paragraphs
- ▶ References not included in word count



The short answer essay format is used in all assignments and the exam (short answer essay journal portfolio)

What we look for when marking

- ▶ Demonstrates a clear understanding of the topic and aim of the essay (its context & significance)
- ▶ Logical progression of ideas such that conclusions are clearly justified from the evidence presented
- ▶ Answers are comprehensive and correct
- ▶ Use of relevant references to the scientific literature
- ▶ Clear and concise scientific writing
- ▶ Interesting and relevant examples (if applicable)

Example short answer essay question

“In *Improbable Destinies*, Losos describes convergent evolution and also discusses cases where convergence does not appear to have happened (e.g. Chapter 3). Describe why convergent evolution does not always occur.”

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3. **Summarise your notes** from step 2 and organise them to synthesise what you have learned
4. **Make an essay plan** structuring your answer as a series of ordered bullet points

How to approach short answer essay questions

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8. **Proofread** your short answer essay for grammar and spelling

Recommended structure for a short answer essay

Introduction

- ▶ Demonstrate that you understand the question
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Conclusion

- ▶ Summarise the conclusion answering the question

Example short answer essay question

“In *Improbable Destinies*, Losos describes **convergent evolution** and also discusses cases where convergence does not appear to have happened (e.g. Chapter 3). **Describe why convergent evolution does not always occur.**”

Introduction

- ▶ Definition of convergent evolution
- ▶ Brief example of nectar feeding birds to help explain context
- ▶ Note that evolution does not always produce convergence for 3 reasons

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Body

- ▶ Unique environments (e.g. eucalyptus forest produces koalas)
- ▶ Multiple solutions: phenotypes (e.g. rats dig with teeth or claws) or functions (e.g. run or hide to evade predation).
- ▶ Different ancestral phenotype (e.g. whales swim with 'legs', penguins swim with wings)

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Conclusion

- ▶ Several reasons for non convergence
- ▶ Especially for rare environments, challenges solvable in different ways and unrelated species

Scientific writing style

- ▶ Be clear & concise
- ▶ Logical flow between sentences & sections
- ▶ Formal style (not too personal)
- ▶ **Read scientific paper abstracts to develop a feel for scientific writing**

The formative (ungraded) assignment

Read Chapter 1 of 'Why Evolution is True' (in the reading list)

Produce a short answer essay **plan** (not a whole essay) for:

What is some of the important evidence for the theory that life on earth has arisen through Darwinian evolution rather than conscious design?

Submit on Canvas by 03 OCT 2022 (23:59 UK time)

Full details in assignments

Convergent evolution can be described as the process of different species (or the same species but in different places) independently and predictably adapting in the same way to similar environmental changes. For example completely unrelated or distantly related animals, insects, plants etc. can adapt similarly due to their environment, ranging from adaptations in the shape or function of body parts to the way these organisms may act. There are many examples of this type of evolution, one example used by Losos, 2017, regards the praying mantis. Known commonly for its upper body and sharp forearms making it easier to snatch prey, the praying mantis isn't the only insect with this distinct feature. The mantidfly has an almost identical copy of the praying mantis' upper body including the ability to strike quickly on prey. However these two species are 'separated by hundreds of millions of years of insect evolution' the only thing really linking them together being the way they have evolved separate from one another but with the same benefit of having this special ability to catch prey. This is backed up by a quote from Losos: "convergence is the expectation [...] we should not be surprised to discover that multiple species, often distantly related, have evolved the same feature to adapt to similar environmental circumstances". However, convergent evolution may not always occur, even when we may expect to.

An argument for why convergence may not occur is that some species can only be found in unique environments, for example the koala (Losos, 2017). Its main focus being to live in eucalyptus trees to live off their leaves. These leaves contain poison, causing the koala to use most of its energy to break down these compounds and digest the nutrients and as a result this causes the animal to use most of their time sleep, and seeing as eucalyptus trees are naturally found in Australia, this is the only place koalas can naturally occur. Furthermore, this argument suggests that if the environments are similar; then convergent evolution must therefore occur and while this can be mostly true, you still discover a few exceptions. This leads to another argument that “natural selection is either not as predictable or as powerful as some make it out to be” (Losos, 2017), as the kangaroo and the platypus only occur in one place whereas there are similar environments across the world which they could also occur in.

There can also be different functional ways to adapt to an environmental condition and this is a strong argument for why convergent evolution does not always occur. For example, there are many ways for the prey of lions to adapt in order to survive, one species may develop camouflage in order to hide from the predator whilst another species may evolve with more powerful legs in order to sprint away (Losos, 2017).