

LENScience Senior Biology Seminar Series Ancient Secrets in the Seaweed Pre-Seminar Questions and Discussion

Pre-seminar School Discussion

This seminar will take you on a journey with Ceridwen Fraser, a Post Doctoral Fellow from the Allan Wilson Centre whose work has made headlines around the world. Ceridwen spent the past three years investigating Bull Kelp populations in the Southern Hemisphere. While she set out to find out about how these populations are genetically connected, along the way she has contributed some significant information about understanding of past climate change events. Her knowledge will contribute to predictions about the effect of future climate change.

In your programme this year you are challenged to understand processes and patterns of evolution. The work that Ceridwen has done uses understanding of processes and patterns of evolution along with biotechnological techniques to answer questions about the effect of climate cycles on Bull Kelp populations.



Images from a Scientist: Ceridwen Fraser, Allan Wilson Centre and University of Otago

A Review of Processes and Patterns of Evolution: Focus questions

Use your knowledge of Y12 and 13 Biology and the information in the seminar paper to discuss the following questions.

1. Ceridwen's research was investigating populations of the species *Durvillaea antarctica*. *D. antarctica* is a very large algae. What are the defining characteristics of algae.
2. Defining the term species can be problematic. Create a concept map for the terms "species" and "population", and explore with your group why the term "species" can be problematic.
3. A population has a specific gene pool which is defined as the genetic make up of the population. Using a concept map, outline the factors that impact on the stability of a gene pool.
4. What is gene flow? How does gene flow (or lack of) contribute to speciation?
5. List the stages in the process of allopatric speciation. What are the important factors necessary for a new species to form?

Vocabulary

Climate Cycles
Climate Systems
DNA Extraction
DNA Sequencing
Extinction
Gene pool
Genetic Diversity
Glacial Period

Green House Gases
Habitat
Haplotype
Inference
Interglacial Period
Invertebrate
Last Glacial Maximum
Macro-algae
Non-glacial Period
Phylogenetic Tree

Polymerase Chain Reaction
Population
Rafting
Sea level
Sea-ice
Selection Pressures
Speciation
Species
Species Distribution Patterns

Level 3 Achievement Standards linking to this seminar:

AS 90716 Describe animal behaviour and plant responses in relation to environmental factors

AS 90717 Describe processes and patterns of evolution

AS 90718 Describe applications of biotechnological techniques

Key Concepts from Level 3 Biology that link to this seminar:

Below are selected objectives from the Year 13 biology programme that link to this seminar. THESE ARE NOT A FULL LIST OF THE CONCEPTS IN YOUR COURSE. You may wish to review these concepts before the seminar.

Processes and Patterns of Evolution

- Define the term species and ways in which speciation occurs
- Define gene and allele frequency, speciation, gene flow, genetic equilibrium.
- Identify sources of genetic variation and agents of change that lead to change in a gene pool.
- Define the terms genetic drift, founder effect and bottleneck effect.
- Explain the role of natural selection in speciation
- Describe patterns of evolution: convergent, divergent (incl. adaptive radiation), co-evolution, and the speed of evolutionary change i.e. punctuated equilibrium, gradualism.



Biotechnology

- Describe the techniques involved in gene cloning and how gene cloning meets human needs and demands.
- Describe the techniques involved in DNA profiling and how DNA profiling meets human needs and demands.
- Describe the techniques involved in genome analysis and how genome analysis meets human needs and demands.
- Show understanding of applications of biotechnological techniques by using core knowledge to link ideas



IMPORTANT NOTICE

The post seminar challenge questions are in a separate document, which will be on the website later this week.