Cranedale Centre

FRESHWATER ENERGETICS

Abstract

Students randomly sample a thriving calciferous stream for flora using open quadrats and thoroughly kick sample for fauna using D-nets. Identification is aided by specially made dichotomous keys, before weighing the catch and eventually quantifying the energy flowing through each trophic level

Aim

- To quantify the flow of energy between trophic level in a freshwater ecosystem

Learning Objectives:

- To grasp the importance of photosynthesis as the main route by which energy enters an ecosystem
- To become familiar with the usage and meaning of the common terms: producer, consumer, decomposer, trophic level, trophic efficiency, dissipation
- To relate the abiotic conditions of the stream to the needs of each trophic level
- To record the percentage cover of producers using open quadrats
- To experience kick sampling with D-nets to establish biomass of consumers
- To hand draw a pyramid of energy to scale using primary data
- To calculate the efficiency of energy transfer between trophic levels

Learning Outcomes:

- To define the ecological terms used in an energetics study
- To identify the adaptations for respiration possessed by freshwater organisms
- To describe the use of a bomb calorimeter to establish the kilojoules of energy at each trophic level
- To evaluate the use of Cranedale secondary data for the energy values of each species, in place of using a bomb calorimeter
- To suggest mechanisms by which energy is dissipated from a freshwater ecosystem
- To set out the necessary steps in fieldwork to meet the aim of the investigation
- To recognise the hazards associated with freshwater fieldwork and explain how to minimise their likelihood of occurrence
- To evaluate the use of percentage cover as a measure of producer abundance
- To distinguish species at each trophic level using a dichotomous key
- To explain why trophic efficiency may differ at each trophic level
- To interpret the trends in primary data
- To assess the validity of the calculated trophic efficiency in relation to Lindemann's Law of conservation of energy
- Where appropriate, to explain unpredicted trends in the data
- To select and justify the use of an appropriate statistical test
- To evaluate the limitations in equipment and sampling techniques used in data collection