

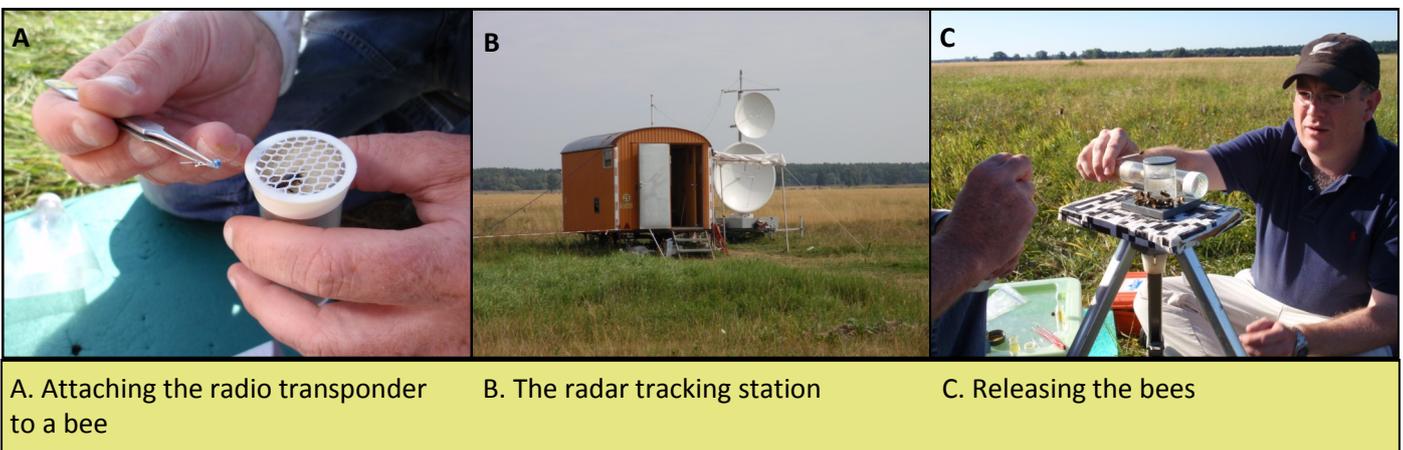
LENScience Senior Biology Seminar Series

Circadian Rhythms: Keeping Time

Post-Seminar Challenge Questions

1. The period of most circadian rhythms is not exactly 24 hours. Explain the need for the entrainment of circadian rhythms and the role of environmental cues in this process.
2. Changes in our daily rhythms such as those caused by Jet Lag and Daylight Saving affect most people but are particularly difficult for teenagers.
 - (i) Explain why people are affected by the change in time that occurs when daylight saving starts and finishes and why this is particularly difficult for teenagers.
 - (ii) Which end of daylight saving (April when we put the clocks back an hour, or October when we put the clocks forward an hour) is more likely to have a negative effect on teenagers and why?
 - (iii) Use your knowledge of human circadian rhythms and evidence from the seminar to explain the quickest way for someone to adjust to the new time at the start and end of daylight saving.

In the data presented in Figure 5 (page 7 of the seminar paper), the honey bees that had been anaesthetised for 6 hours were tracked in a direction approximately 60° from the expected direction, whereas the bees that had been anaesthetised for only 30 minutes were tracked in a direction 4° from the expected. The pictures below were taken during one of the trials.



3. Using your knowledge of the ability of the bee to use the sun as a compass, discuss the differences seen in the results from the different treatments and predict the results of further treatments carried out using different durations of anaesthesia.
4. Figure 7 (page 8 of the seminar paper) shows the levels of mRNA expression from the clock gene *cryptochrome*. Use your knowledge of gene expression and the regulation of gene expression to discuss how clock genes can act as a biological clock.