William Davison

The effect of CO_2-induced acidification on the cost of digestion in fish

My project investigated the impact of high CO_2 in the water on the metabolic cost of digestion in rainbow trout. Previous studies show that post-feeding, many organisms show a peak in oxygen (O_2) consumption followed by a slow return to pre-feeding levels, a process termed the specific dynamic action (SDA). To investigate this I kept animals in individual tanks and measured several physiological variables before and after feeding with a standardised food ration. The main variable of interest was O_2 consumption rate which was continuously recorded using automated respirometry for 5 days each week. Animals were fed on the second day to observe the changes to the O_2 consumption that followed. In addition I have measured the excretion of ammonia and bicarbonate into the water throughout to characterise the acid-base fluxes post-feeding that are associated with the alkaline tide (i.e. the rise in bicarbonate in the blood that compensates for the secretion of hydrochloric acid by the stomach). A third approach, using a separate cohort, has been to take blood samples to quantify the changes in blood acid-base chemistry (i.e. the alkaline tide) as a result of feeding. However, there have been a number of problems associated with the automated respirometry equipment. As a result so far I have been unable to make any definitive conclusions regarding the impact of high CO_2 on the SDA. Despite this, I am hoping to continue work on this topic in the lab of Rod Wilson over the coming weeks so that we can fulfill the aims we set out to achieve. Despite many technical difficulties so far, this internship as a whole has been invaluable to me as I have worked alongside various projects within the department developing skills pertinent to the fields of physiology and marine biology. It has also cemented my desire to pursue a PhD.