JAMES RENNIE BEQUEST

REPORT ON EXPEDITION/PROJECT/CONFERENCE

Conference Title: Mechanisms of DNA Replication and Recombination .....

Travel Dates: January 5th to January 11th, 2005 .....

Location: Keystone, Colorado .....

Group Member(s): John Eykelenboom (PhD Student of Leach lab, ICB).....

Aims: To expand my knowledge in this research area and to present a poster of my current PhD work .....

OUTCOME (not less than 300 words):-

With money received from the James Rennie Bequest Fund I was able to attend the Keystone Symposia organised conference concerning DNA replication and recombination. My PhD project is based on DNA replication and recombination in *Escherichia coli* and therefore much of the content of this conference was of great interest to me. The conference had over 300 attendees, with 45 plenary talks, 8 workshop sessions and 250 posters displayed.

Poster sessions were a relaxed affair with food and drink provided and during the second session I displayed my recent findings on a poster entitled "Genetic Recombination at a Palindromic Sequence in *Escherichia coli"*. In response I had some constructive discussions about my work with people studying in similar subject areas (in *E. coli*, *Saccharomyces cerevisiae* and mammalian systems) and also met several ex-University of Edinburgh students (ICMB) keen to learn about the current work of our lab.

Plenary sessions were held first thing in the morning and in the late afternoon, they included a broad range of interesting topics from "Mechanisms of Recombination" to "Chromosome Dynamics". As the conference was not specific to a single organism talks included mechanisms and systems employed by prokaryotes and eukaryotes. This led to lively discussions at the end of each talk and highlighted the many similarities, differences between highly diverged organisms in many basic processes. The work discussed by the speakers included combinations of genetics, biochemistry, microscopy and structural biology. Some of the talks are discussed briefly below.

Several talks were based around relatively new techniques involving single molecule analysis, which I thought were of particular interest. A number of labs around the world have been developing microscopes and staining techniques that allow observation and accurate measuring of single DNA molecules. Stephen Kowalczykowski (University of California, Davis) observed exonuclease activity of the *E. coli* recombination complex RecBCD on a single molecule of DNA by labelling the DNA (with an intercalating dye called Yoyo) and by fluorescently labelling the RecD subunit. They demonstrated that the complex activity is attenuated at specific sequences. Piero Bianco (University at Buffalo) used similar techniques and showed us work that visualises human protein Rad54 stimulates strand exchange between two homologous DNA molecules. Finally, Oren Levy (Nicholas Cozzarelli group, University of California, Berkely) showed us work looking at the translocase activity of the *E. coli* translocase FtsK (thought to be involved in chromosome segregation). These three pieces of work demonstrated the usefulness of 'single-molecule' techniques for analysis of protein-DNA interactions.

Also of particular interest to me was a talk by Dale Wigley (Cancer Research UK, Clare Hall laboratories). He described the recent structural work his lab has done with the protein complex RecBCD. The complex 3D structure has now been solved and from its structure several predictions have been made as to how the complex works to carry out its DNA processing role. Previously defined genetical and biochemical roles of the complex were assigned to various conserved motifs of the protein

Benedicte Michel (INRA. Paris) and Susan Lovett (Brandeis University) talked about the link between replication and recombination in *E. coli*. They discussed their independent work that suggests how replication can bypass DNA damage using DNA recombination pathways that avoid removal of the replication machinery instead giving it a fresh chance to proceed.

The meeting was both enjoyable and informative and I wish to thank the Rennie Bequest Foundation for providing money for me to attend and present a poster. This opportunity has given me valuable experience and expanded my knowledge in this vast research area and helped me as I continue to work towards my PhD.