

JAMES RENNIE BEQUEST

REPORT ON EXPEDITION/PROJECT/CONFERENCE

Expedition/Project/Conference Title: Biology of Parasitism: Modern Approaches

Travel Dates: June 9th - August 7th 2004.....

Location: Marine Biological Laboratory (MBL),
Woods Hole,
Massachusetts 02543,
U.S.A.....

Group Member(s): Gráinne Long.....

Aims:

Through attending the above course, with its intensive daily lectures, seminars and lab work, I aimed to:

- Greatly increase my knowledge and experience of a range host-parasite systems.
- Learn how different disciplines approach parasite biology and gain technical expertise in the various scales of parasite analysis (cellular/molecular/biochemical & immunological).
- Gain valuable experience in experimental design and methods in parasite biology.
- Improve my presentation skills.

OUTCOME (not less than 300 words):-

This report summarizes both the scientific and personal experiences gained by myself through attendance of the 'Biology of Parasitism: Modern Approaches' summer course at the Marine Biological Laboratory, Woods Hole, Massachusetts. I was awarded a travel-allowance by the James Rennie Bequest, which enabled me to attend the above MBL course. The Biology of Parasitism course allows sixteen post-graduate/post-doctoral students to gain experience and training in a diverse range of modern approaches applicable to the study of various protozoan and helminthic parasites.

Scientific & personal experiences gained through attendance of MBL course:

The focus of the MBL 'Biology of Parasitism: Modern Approaches' course was on both parasite function and host-parasite interactions, encompassing a mix of molecular & cellular biology, immunology and biochemistry. The course was divided into four two-week modules, each of which was centred around two laboratory projects, run by leading researchers from similar fields. Daily morning lectures were delivered by expert faculty members from around the world, followed by intensive discussion sessions. Bench work, data analysis and group presentations occupied the great majority of time.

Attending this intense course has taught me an immense amount about a vast range of parasite systems, given me confidence and competence in many new experimental techniques and greatly increased my awareness of the diverse range of approaches employed for investigating new questions in parasite research. I feel I now have new approaches and ideas for my own research, which I will benefit from both during my PhD and beyond. In addition I have made a great many contacts in the field of parasitology, which I have no doubt will be hugely invaluable to me throughout my future scientific career. I have also made a great many friends, with whom I hope to remain in close contact with in the future. Below is a description of the faculty & research projects during my time at MBL this summer.

Project one:

“Stage regulated surface antigens in the bloodstream forms of *Trypanosoma brucei*”
Dr. Keith Matthews, University of Edinburgh.

During this module we studied the regulation of different expression site associated genes (ESAGs) in distinct antigenic variants and strains of *T. brucei* through the techniques of gene cloning, riboprobe generation and northern blotting. We localised ESAG9 gene expression on cells through the generation and transfection of epitope tagged ESAG9 in conjunction with immunofluorescence analysis. We investigated the regulatory signals that control bloodstream expression of ESAG9 through mapping of polyadenylation sites using the techniques of 3'end amplification, cloning and analysis

Project two:

“Tracking *Toxoplasma gondii* antigen-specific T Cell responses”
Dr. Christopher Hunter, University of Pennsylvania, Philadelphia, USA.

In this module we used transgenic *T. gondii* parasites that express exogenous antigens of known T cell receptor specificity to track the development of antigen-specific immune responses using TCR transgenic T cells. This adoptive-transfer experimental approach enabled monitoring of infection events *in vivo*. Analysis of antigen-specific T cell responses involved was performed using a combination of fluorescent activated cell sorting (FACS), ELISAs and ELISPOTs.

Project three:

“Novel activities at the *Toxoplasma gondii* parasitophorous vacuole (PVM)”
Dr. Toni Sinai, University of Kentucky, USA.

In this module we used a number of biochemical and cell biological approaches to analyse *T. gondii* I κ B kinase (IKK) activity. Subcellular fractionation, pulse-chase labelling and western blotting experiments enabled investigation of protein function, activity, turnover and localisation. In addition, we isolated RNA from infected tissues and used macro arrays to compare changes in host transcription in infected compared to uninfected host cells and assessed the effects of specific drugs on host transcription profiles.

Project four:

“Mitochondria and Plastids of parasites: Cell Biology & Therapeutic potential”
Dr. Geoffrey McFadden, University of Melbourne, Australia.

During this module we studied the division of apicoplasts and mitochondria through confocal microscopy of parasites that have been tagged with fluorescent reporter proteins and treated with division inhibiting drugs. We also studied mitochondrial protein import using pulse-chase in the presence of anti-mitochondrial drugs. In addition, quantitative assays for measuring the anti-malarial activity of a variety of apicoplast poisoning drugs was carried out in order to assess their effects on the malaria parasite.

I feel attending the MBL ‘Biology of Parasitism: Modern Approaches’ summer course was one of the best scientific experiences I have had to date. The vast majority of the research undertaken in the above modules addressed previously unanswered questions and our results often shed new light on the projects at hand. During all four modules students were encouraged to contribute ideas and design additional experiments to further the investigations. This approach broadened my awareness of the potential for cross-disciplinary application of techniques and equipment. Most importantly I feel that the course has given me a large insight into current parasite research and equipped me with ideas, techniques and contacts, which I hope will help shape a fruitful personal research career. I wish to say a huge thank you to the James Rennie Bequest, whose financial assistance helped enable my participation in this course.