Thinking Outside the Local Laboratory Box: the Hong Kong JUSTL Program

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ABSTRACT

The Hong Kong "Joint Universities Summer Teaching Laboratory" (JUSTL) Program is an annual eight-week, intensive research and learning experience for Hong Kong postgraduate Life Sciences students. This new program is based at the Marine Biological Laboratory (MBL), Woods Hole, MA, USA, an internationally recognized center for research, education and training in Biology since its establishment in 1888. The MBL can easily be considered a truly unique scientific institute; it was described recently by renowned essayist, Lewis Thomas, as perhaps representing the USA's "national biological laboratory". Each summer, the MBL brings together a collection of leading scientists from across the United States and from around the globe. Its famous summer courses (including those in embryology, physiology and neurobiology) are widely known throughout the international biosciences research community, and it can list over 50 Nobel Laureates who have either taught or taken these courses, or who have used the MBL's research facilities. Thus, the main objective of the JUSTL program is to enrich each student's individual educational experience by challenging them to develop their research ability, critical thinking, creativity, independence and interactive people-skills in one of the premier research environments available to life scientists. During their time at the MBL, JUSTL students conduct individual research projects, attend lectures and seminars, and undergo training in the latest specialist techniques. They also interact with volunteer MBL summer scientist mentors drawn from leading research universities and institutions from around the world. In addition, the hope is that upon returning to their home laboratories in Hong Kong, JUSTL students will share their training and educational experiences with their peers. The program is jointly funded for six years by the Hong Kong Croucher Foundation and the Government of the HKSAR. It was founded and is directed by Prof. Andrew L. Miller of the Department of Biology, and is administered through HKUST. The inaugural JUSTL program ran for the months of June and July, 2007, and six Hong Kong students participated; three from HKUST, and one each from the University of Hong Kong, the Chinese University of Hong Kong and the City University of Hong Kong. This unique and innovative program brings together postgraduate Life Sciences students from all Hong Kong's research universities and offers them the chance to learn and develop in an international setting. This reflects a growing and necessary feature of current Life Sciences research and thus one that needs to be addressed by the provision of progressive learning experiences, such as the JUSTL program, by Hong Kong's universities.

Keywords

Education, research, training, creativity, international

THE IMPORTANCE OF CULTIVATING AN ENVIRONMENT FOR SCIENTIFIC CREATIVITY

Individuals who do not participate in scientific research often underestimate the importance of creativity in the scientific process of furthering our understanding of the natural world. This is not, however, a problem when considering the arts, but it somehow gets forgotten or overlooked where science is concerned. Attributes such as logic, reason, and analysis spring to mind when considering the activities of scientists, but rarely does a hard-to-define entity such as creativity. It is my firm belief, however, that creativity and thinking "outside the scientific box" are crucial elements in surmounting the numerous log-jams in our understanding of scientific problems. With this in mind, I am convinced that placing bright, intelligent young scientists in a scientific environment that is conducive to engendering creativity, be it for even a relatively short period of time, can have a profound effect on their subsequent professional development. This is precisely what the JUSTL program hopes to achieve. Just as a promising young painter might briefly study in Florence and find a career-lasting fount of creative inspiration, so might a young scientist visit the Marine Biological Laboratory (MBL) in Woods Hole, and discover in him- or herself, the inspiration needed to be original and creative, and thus make a significant contribution to scientific discovery. This is not to say that the research laboratories of individual scientists in Hong Kong are not creative environments. They certainly are - their publication record clearly indicates that this is the case. But the aim of the JUSTL program is to provide an additional challenging opportunity for gifted and burgeoning young scientists to extend themselves beyond what is available in their scientific training in Hong Kong. Furthermore, they can then feed back into Hong Kong's research laboratories some of the experience and specialist training they received via their participation in the JUSTL program.

The most important component in providing a creative scientific environment is, I believe, the specific activity of the scientists themselves. The key is to have an organizational structure and institutional culture that allows individuals to focus on thinking about science and doing science, as opposed to having to participate in a number of other unrelated activities that is the norm in a typical university setting. Such activities include administration, non-research based teaching, fund-raising, and endless committee work. What is required, therefore, is a unique institution, providing this unique environment, and this is what the MBL has developed into during its past 100-plus years of existence. Thus, during the summer season, the MBL represents a place where the very best, experimentally active biology researchers can escape from the strictures and administrative confines of their own universities, and immerse themselves in what they love best; designing, doing and talking about research. This is the type of creative environment to which JUSTL students are exposed for eight weeks during their working visit to the MBL.

The MBL is widely recognized as an international center for research, education, and training in biology. It was established in 1888 as an institute where individuals were provided with instruction on how to teach biology and where marine organisms were used as model systems in the study of cell biology, neurobiology, and embryology. It has developed over the decades to become one of the most respected independent teaching and research laboratories

in the world. In its current form, during the summer the MBL's approximate 200 year-round scientists and support staff are joined by an additional 800 scientists and graduate students from over 200 institutions around the world. The majority of the visiting scientists, as well as those in residence at the MBL, still use marine organisms as model systems for understanding basic processes in cell, developmental, molecular, and neurobiology. Many studies have had broad biomedical implications, and to date over 50 Nobel Laureates have been associated with the MBL in one form or another. In addition, the MBL's Ecosystem Center houses a large group of marine ecologists, microbiologists, and population geneticists. Scientists are also attracted by the opportunity to collaborate with each other, as well as with investigators at the other scientific institutions in Woods Hole. The latter include the Woods Hole Oceanographic Institute (WHOI), the National Marine Fisheries Service, the United States Geological Survey, and the Woods Hole Research Center (devoted to research in ecology and environmental policy). Thus, in the small village of Woods Hole during the summer months, this concentration of research-orientated individuals results in a scientific community unparalleled anywhere else in the world. It represents, therefore, an exceptional environment for JUSTL participants from a broad range of research disciplines to immerse themselves in.

The MBL houses a number of unique research facilities. These include a state-of-the-art Marine Resources Center, which provides training in the latest approaches in husbandry and mariculture of a diverse range of marine organisms; an NIH-supported BioCurrents Research Center, dedicated to the study of transport mechanisms across the plasma membrane; a Central Microscopy Facility, housing advanced equipment for multiphoton laser scanning microscopy combined with computer-aided imaging; and the MBL/WHOI library, considered one of the most complete science libraries in the world.

The JUSTL Program has been organized to coincide with the MBL's premier educational courses, which run throughout the summer. These include the world-famous Embryology, Physiology, and Neurobiology summer courses held on an annual basis for over 100 years. These draw their instructors from leading researchers in their respective fields and each offers a daily lecture or seminar series, open to the Woods Hole scientific community at large. Furthermore, the "MBL Friday Night Lecture Series" brings in speakers of particular note who are of interest to a wider audience. Additionally, a number of courses and groups sponsor informal evening or lunch-time seminars. JUSTL students are encouraged and expected to attend these summer course lectures whenever possible, as well as the research seminars specifically designed for JUSTL participants.

The major portion of each JUSTL student's time is, however, dedicated to an individual research project, as well as training in specialist research techniques under the direction of one of the JUSTL program MBL summer mentors. Students will thus have the opportunity to interact with fellow scientists from around the world and experience first-hand the intensity, enthusiasm, and excitement for which the MBL summer experience is known.

Program Eligibility and Selection Procedures

As the JUSTL program is funded primarily by the Hong Kong Croucher Foundation, participants must be permanent Hong Kong residents. This is a binding requirement of any program that receives support from the Croucher Foundation. With regards to JUSTL program participation, in addition to their academic abilities, students are selected on the strength of their creativity, curiosity, initiative, imagination and their commitment to pursuing a career in biosciences research.

Further information can be obtained from:

1. JUSTL program: http://ihome.ust.hk/~aequorin/justl/index.html
2. MBL: http://www.mbl.edu/
3. Croucher Foundation: http://www.croucher.org.hk/