

TrendsTalk

Biology of Parasitism: A Broad and Deep Parasitology Discovery Course

What was the motivation behind Biology of Parasitism (BoP)? When did it first start?

Although we were not part of the course when it started, we reached out to John David (Professor Emeritus, Harvard T.H. Chan School of Public Health), the first BoP course director, and Dyann Wirth (Chair, Immunology and Infectious Diseases, Harvard T.H. Chan School of Public Health), a faculty member of the course at its inception who subsequently

Laboratory about hosting the course; the MBL agreed.

How is the course structured and how has that evolved over time?

The original course was structured in two parts: six weeks of lectures and topic-based lab instruction followed by four weeks of independent research projects, culminating in presentations at the MBL annual meeting. The lectures and labs covered a broad range of approaches and medically-important parasites, with a bit more immunology focus than current day.



Biology of Parasitism, Class of 2016

Since 1980, the Marine Biological Laboratory (MBL) at Woods Hole, MA, USA, has hosted the Biology of Parasitism (BoP) course. For the duration of the course, graduate students and postdocs work alongside and interact informally with experts in the field. Photini Sinnis and Gary Ward, two former students of the MBL Discovery courses, are the course directors for 2017. In this short interview with *Trends in Parasitology*, Photini and Gary spoke about their commitment to teaching the next generation of scientists and shared the secrets to the success of BoP.

became course director. They both point to the critical role of Joshua Lederberg, who realized that advances of modern science and medicine had left parasitic diseases behind and felt that a parasitology course similar to the bacteriology course at Cold Spring Harbor could transform the field. Ken Warren, a leader in the field of parasitology who had galvanized the support of the Rockefeller and MacArthur Foundations for the Great Neglected Diseases, worked with Lederberg to find faculty and a venue for the course. They approached both Cold Spring Harbor and the Marine Biological

Over the years, the scientific emphases of the course have changed as the field of parasitology has evolved, however, the emphasis on molecular approaches and the latest science has been a constant throughout. The course has always been designed to go both broad and deep, exposing the students to a wide variety of cutting edge techniques, research questions and parasite systems.

The length of the course changed over the years from 10 to 7 weeks, with the 4 weeks of independent student research being eliminated. The shortening of the course reflects the increased demands on the time of students and faculty, which make it difficult for people to be away from their home laboratory for 10 weeks.

From the start, the course has been structured around morning lectures from luminaries and rising stars in the field, followed by experimental work in the afternoons and evenings. The current course is divided into topic-based lab/lecture 'modules', each 1–2 weeks long and run by a different expert in the field. In 2017, the modules will focus on the immune response to helminths and *Toxoplasma*; the biology and insecticide resistance of mosquitoes that transmit malaria; developmental differentiation of *Giardia*; drug resistance in African trypanosomes; mechanisms of malaria sporozoite motility; and metabolomics of *Trypanosoma cruzi*.

A typical day in the course begins with a 2 h lecture in the morning from an invited speaker chosen by the module directors to complement the work being done in the lab portion of the course. A subset of the students joins the speaker for lunch in the dining hall. All students return to the lab after lunch to begin the experimental work for the day, which usually lasts well into the evening. Between experiments, the students wander in and out of the break room where they interact informally with that day's speaker and the speaker for the next day. Lunch and breakroom time with visiting lecturers are two of the many informal networking opportunities available to the students; many a postdoc have been arranged in the BoP break room in the wee hours of the morning.

When did you first become involved with the course? What motivated you?

Similar to many former BoP course directors, we were both students in one of the MBL Discovery courses and have participated in the BoP course over the years as lecturers and module directors. Both of us are committed to teaching the next generation of scientists and believe that BoP course is a uniquely effective way to engage some of the best and brightest students and postdocs in parasitology research and connect them with the larger parasitology community. It is fun and rewarding for us and all who have served as course faculty to follow the great things that these students go on to do in their careers.

What are the criteria for student selection?

Admission into the course is competitive. Applications are reviewed by a committee of current and former course faculty. The committee reviews the applications for research experience, strong letters of reference, a personal statement that makes a good case for how the candidate will benefit from the course and a clear commitment to parasitology research. We strive to admit a class that is diverse in

every sense of the word, including geographic diversity and diversity of research interests/organisms. It is almost always a very international class.

We admit 16 students per year, typically mid- to late graduate students and postdocs. We occasionally admit more senior applicants; for example, two years ago we admitted a junior faculty member who was looking to move his research focus from nematode-insect interactions to parasitic worms of humans and other vertebrates.

There has been a lot of discussion on the needs and attitudes of students towards education and the best pedagogical approaches to address them. How has BoP dealt with these challenges? Are there any examples of success you would like to share?

Active learning plays a very big part in this course; the students spend many hours in the lab, learning by doing. They work alongside experts in the field, using state of the art equipment to address real problems in parasitology research. This is a major part of the excitement and attraction of the course, both for the students and the faculty; these are not lab exercises, these are real experiments asking important questions, the outcome of which is not known by anyone at the start of the module. The module directors set the general parameters of what will be studied, but within that context the students have a lot of flexibility to design their own experiments or take them in new and interesting directions. This is why MBL calls BoP a 'Discovery Course'.

The quality of the research done in the course is reflected in the many papers subsequently published in which BoP students are acknowledged for having generated the idea or the preliminary data that led to the published study. In terms of the students themselves and the effect the course has had on their careers, a

recent survey of course alumni from the last decade revealed that 56% of respondents considered their experience in the course 'transformative'. 26% of the BoP alumni are currently finishing up their doctoral studies, 45% are postdoctoral fellows and 23% are faculty members at academic institutions.

What is the secret to the success of BoP?

Bringing bright, motivated students together with established leaders and rising stars in the field, and providing them with a stimulating but informal setting for scientific interaction. This environment encourages students to ask questions, challenge ideas and engage intellectually with the faculty and one another. The faculty are committed to a high level of engagement with the students and they organize experimental modules to be flexible and incorporate new ideas that arise during their time with the students. The informal interactions that take place between students and faculty extend to interactions with the broader MBL scientific community. The MBL is a special place to be in the summer: there is an atmosphere of scientific engagement and excitement from which everyone benefits.

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Science & Society Promoting Science in Secondary School Education

Anthony Chiovitti,^{1,†}
Jacinta C. Duncan,^{1,†} and
Abdul Jabbar^{2,†,*}

Engaging secondary school students with science education is crucial for a society that demands a high level of scientific literacy in order to deal with the economic and social challenges of the 21st