

"Bon Exploration!"--A Parisian Research Experience for Undergraduates with the Pasteur Institute of France

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A hard and productive day's work at the lab followed by an evening enjoying the sights, sounds and culinary delights of Paris—sound too good to be true? The Pasteur Foundation Summer Undergraduate Internship offers such a unique opportunity to students nationwide. Open to undergraduates of U.S citizenship, this program brings participants for 10 weeks to the world-renowned Institut Pasteur in Paris, France, conducting biomedical research in a culturally diverse and stimulating milieu. The Pasteur Foundation is a non-profit corporation that works to raise funds to support the Institut Pasteur, whose mission is to ameliorate public health by contributing to the prevention and treatment of infectious diseases. The institute accomplishes this through research, teaching and public health initiatives. The prospect of an undergraduate-level scientific exchange between France and the USA was put forth by a researcher named Deshmukh Gopaul, who returned to France to work at the Institut Pasteur after an academic stay at the University of Pennsylvania. He found working with undergraduates during his U.S experience very rewarding, and was somewhat frustrated that, in France, it was more difficult to tap into the energy and creativity that this incredibly able, eager population brings to labs. "Deshmukh planted the seed of the idea for this program that was created to bridge a gap with American students. We were able to launch it by securing an initial grant and the rest is history!" says Caitlin Hawke, Coordinator of the Pasteur Foundation of New York, "We're now into our sixth summer and going strong."

The Pasteur Foundation Summer Undergraduate Internship, started in May 2003, aims to encourage students in their pursuit of a scientific career and to enable them to experience an international laboratory environment. The program attracts hundreds of applicants each year, with well over 200 top-notch U.S. undergraduates competing for four spots in four different labs at the Institut Pasteur. The main criteria for selection are: an excellent academic record, hands-on lab experience, and enthusiasm to adapt and explore a new culture and lifestyle. Ms. Hawke adds, "I would even caution that the program is extremely competitive given the limited number of positions, so I encourage prospective applicants to consider carefully the depth of their commitment to pursuing a career in science prior to applying." Every year, Caitlin Hawke recruits four new labs, choosing from over 130 labs at Institut Pasteur. "Some PIs [principal investigators] are really quite enthusiastic, and I can tell that they will provide a nurturing but challenging environment for my students." Students conduct research supervised by a lab mentor, and, at the end of 10 weeks, they make an oral presentation and submit a work report on their research.

Yearly, Ms. Hawke aims to recruit labs with concentrations in a variety of scientific arenas. "I try to get a cross section of subjects represented in each summer's lab selection; for instance, this year we have one of our high-tech platforms participating, the dynamic imaging platform." Gloria Jih, an intern in 2005, actually worked with Dr. Gopaul, with whom she says she interacted frequently. The Gopaul lab seeks to find a solution to the problem of antibiotic resistance by studying integrases and respective substrates. "My project was to clone a putative integrase from the genomic DNA of *Plasmodium berghei*" explains Gloria. Andrew Le, a rising senior at Harvard who participated in the program this past summer, worked in Pascale Cossart's laboratory studying histone modifications in host cells during infection by *Listeria monocytogenes*; he was able to find which lysine on histone 3 is deacetylated during infection. The mentors help guide the project and propose interesting questions for the intern to answer in the course of his/her research. Interns are given extensive independence on their projects and the ability to make important decisions regarding the direction, specific aims, and approaches for the project is a valuable skill for future scientists. Gloria says that the research experience was very helpful when she applied to graduate school; she is currently pursuing her PhD in Cell Biology at Harvard University. Similarly, Andrew explains that he learned both classic and novel microbiology techniques, which will help him in his ultimate goal of characterizing brain tumor cells. The lab environment also gave him perspective on how he would run his own lab. "The system put in place by Pascale Cossart made for a very productive lab and trained excellent scientists. In that regard, I was influenced by what I saw this summer." Alongside the intensive research, the unique avenue for cultural exploration is a singular valuable feature of the program. The internship is an excellent alternative to study abroad programs for science-oriented undergraduates. "Learning a language well should be an important part of any undergraduate's experience; it is a wonderful tool to have for the rest of your life, but often the science curriculum takes precedence" attests Ms. Hawke, "so for talented students who just cannot pull themselves away



Taking in Paris: Richard Parenteau was an intern last summer; he just entered an MD/PhD program in San Francisco (Click image for larger version)

from their lab work for a whole year, this is the perfect program. They get to pursue the curriculum of their major and then take the summer "off" -- guilt free -- by working in a lab abroad!"

Indeed, the Institut Pasteur is something of a symbol of French culture and, according to Gloria Jih, the program really helps interns embrace this symbol: "The internship offers an opportunity to experience the day-to-day life of Parisians and enjoy the many summer festivities the city has to offer. I stayed at the institute's intern housing, which was very conveniently located right next to a Metro stop. The institute's cafeteria also served amazing French cuisine. Furthermore, everyone in lab was very helpful in dishing out tips on living in Paris." In turn, interns are encouraged to speak with their colleagues and international students in French. Ms. Hawke remarks that making the effort is a huge gesture. "English is often the common tongue. But the American way isn't the only one, I think that this becomes apparent to our undergrads; they get to see that there is more than one rhythm at which to conduct science, run a lab, and contemplate experiments." Every lab has its own culture, and the Pasteur Foundation Internship gives U.S undergraduates a chance to integrate the Pasteurian approach into their current and future scientific endeavors. Gloria reflects this sentiment: "The exposure to a different lab culture--ways of thinking and doing things--was very helpful in adjusting to different labs later on, such as rotating through three different labs (for the purpose of choosing a thesis lab) during the first year of graduate school. Furthermore, the experience of working in a lab abroad enriched my ability to dialogue and network with international researchers." In addition, the Pasteur Foundation supports a postdoctoral fellowship program at Institut Pasteur, thus providing further networking opportunities for both undergraduates and postdoctoral fellows.



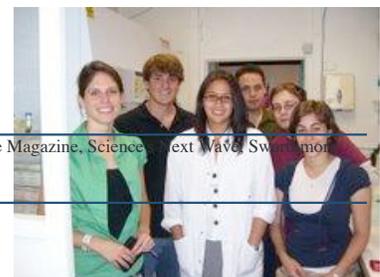
Lark Coffey, an American postdoc at the Institut Pasteur, mentored intern Petra Gest during the summer of 2007. (Click image for larger version)

The Pasteur Foundation Summer Undergraduate Internship encourages undergraduates to develop their motivation, self-sufficiency and independent thinking. Interns must arrange their own travel and housing in Paris, and they receive \$400 per week plus a \$300 subsidy to help pay for travel and the required insurance. "It is hard to arrive alone in a country, at a large institution, in a lab, especially if you don't speak French," explains Ms. Hawke, "You have to trust your instincts. That is an important skill to develop, for life and for a scientific career." Furthermore, since the group of interns is so small, students will often plan trips and dinners together; thus, one is not alone in navigating the foreign waters. Gloria reminisces, "The other interns and I got to know each other quite well. We continued to keep in touch afterwards, even more so now, as our studies have brought us all to Boston over the past few years." Interns also interact closely with their fellow lab members, and one of Andrew's most memorable experiences from his summer is barbecue hosted by an engineer in the lab, where he learned "ball"--the French national pastime. Unlike many other programs, the Pasteur Foundation internship does not have structured activities, thus one has the liberty and flexibility to shape his/her daily routine to fit his/her own interests. Gloria says she only attended talks and seminars that were of relevance to her, thus making it a greater learning experience. The Institut Pasteur offers top notch laboratory facilities, a welcoming atmosphere, and numerous opportunities to contribute to ongoing research involving various diseases. The Pasteur Foundation Internship encourages young scientists to use these resources to form a global approach to their research. To find out more about the internship, visit www.pasteurfoundation.org, and make sure to read the FAQ. Applications are open only to juniors and seniors of U.S citizenship. For Summer 2010 internships, the application deadline is in December 2009. You can also follow the program on Twitter at: www.twitter.com/PasteurUS. What better way to cap off one's college career than a Parisian scientific and cultural experience—a truly once in a lifetime opportunity.

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JYI is supported by: The National Science Foundation, The Burroughs Wellcome Fund, Glaxo Wellcome Inc., Science Magazine, Science@Next Wave, Swarthmore College, Duke University, Georgetown University, and many others.
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A group photo of U.S undergraduates in a Pasteur lab last summer (Click image for larger version)