IIP PASTEUR INSTITUTE

Helena Ma | 2017 | Chemical and Biological Engineering
Unité Dynamique des Interactions Hôte-Pathogène
Institut Pasteur, Paris, France
International Internship Program, Princeton University

Institut Pasteur

25 Rue Docteur Roux, 75015 PARIS

- A private, international non-profit organization founded by Louis Pasteur in 1887
- Conducts biological research, especially on infectious disease
- ~2400 employees in 130 research units

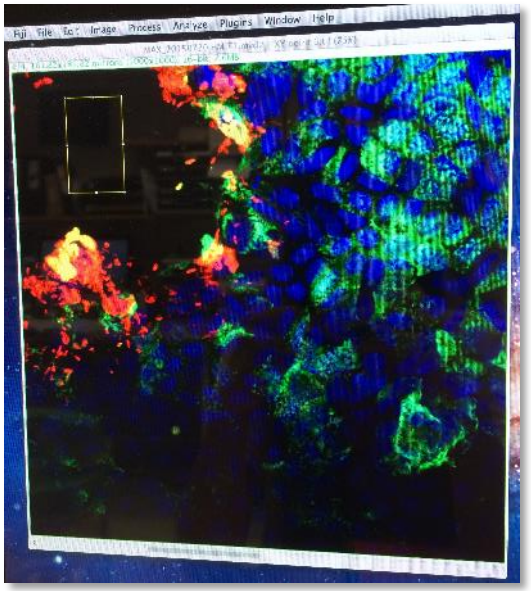
DIHP – Our Lab Group

- Unité Dynamique des Interactions Hôte-Pathogène, or Dynamics of Host-Pathogen Interactions Unit
- Headed by Jost Enninga, started in January 2008
- Studies a number of pathogens, including *Shigella* and *Salmonella* and how they infect host cells
- Research techniques include innovative fluorescence microscopy methods by which infections are filmed and visualized
- Currently consists of 4 postdocs, 3 Ph.D. students, 1 engineer, 1 technician, and 1 assistant from 6 nationalities
- Lab is young, open, and collaborative – an atmosphere that's very important!

The Project

- Ph.D. Project of Camille Rey
  - Still in progress, so I won't get too detailed
- Studies *Shigella flexneri*, a bacterium that causes dysentery, with an in vitro quasi-physiological model
- *Shigella* is known to invade a specific type of intestinal cell called an M cell, thought to be where infection begins
- Long-term goal: find out how infection spreads from M cells to neighboring enterocytes
- Short-term goals: find a reliable marker for M cells and induce cells to express fluorescent proteins like actin (cytoskeletal)

Pictured:
Helena (left)
and supervisor
Camille (right)



Pictured:
Shigella
infection.
Blue: nuclei
Red: bacteria
Green: actin
Yellow: bac
outside of cell

A Day in the Lab

Work Responsibilities

- Cell culture
- Running infections
- Staining cells with fluorescent antibodies
- Acquiring images on various microscopes
- Image analysis
- Varies day-to-day depending on what day it is and what experiments are planned

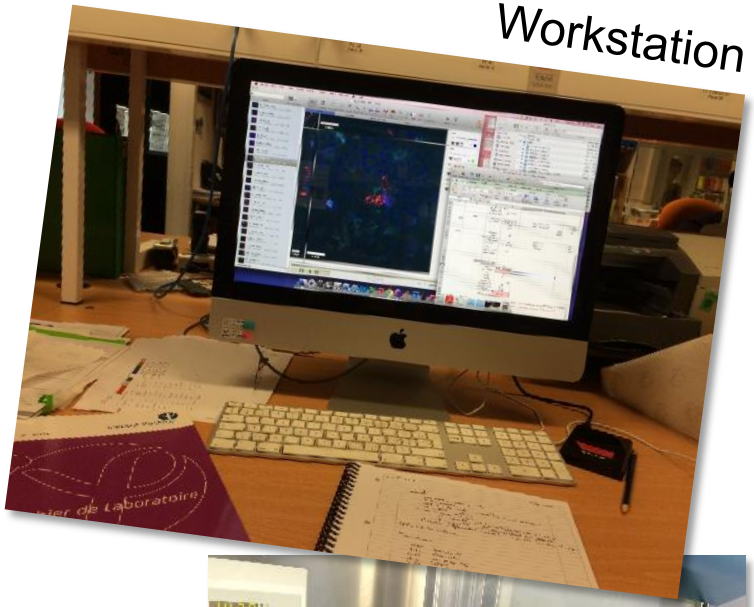
Interpersonal Aspects

- Daily lunch with lab followed by coffee break
  - Enriching discussions about science, our cultures, our careers
- Quasi-weekly lab meetings
  - Gets everyone up to date on how a specific person's project is going/helps with input and direction
- Collaboration!
  - Trade help with the microscope/software/cell culture if someone is gone/etc.

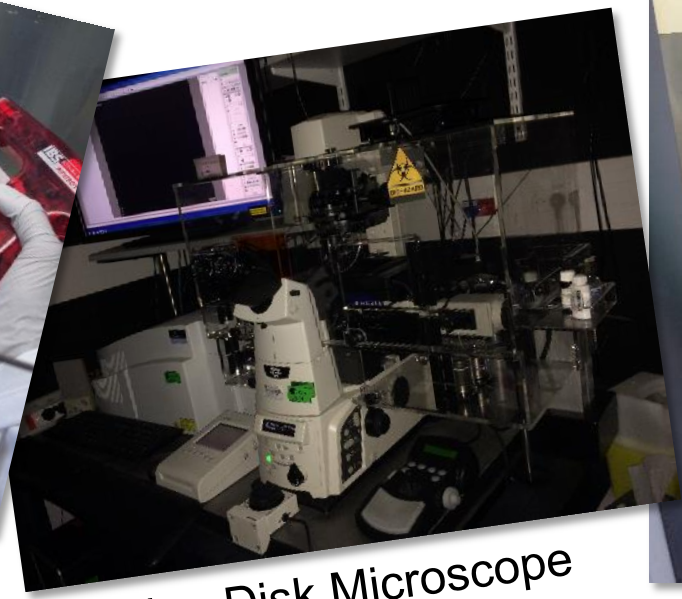
Snapshots

The Office

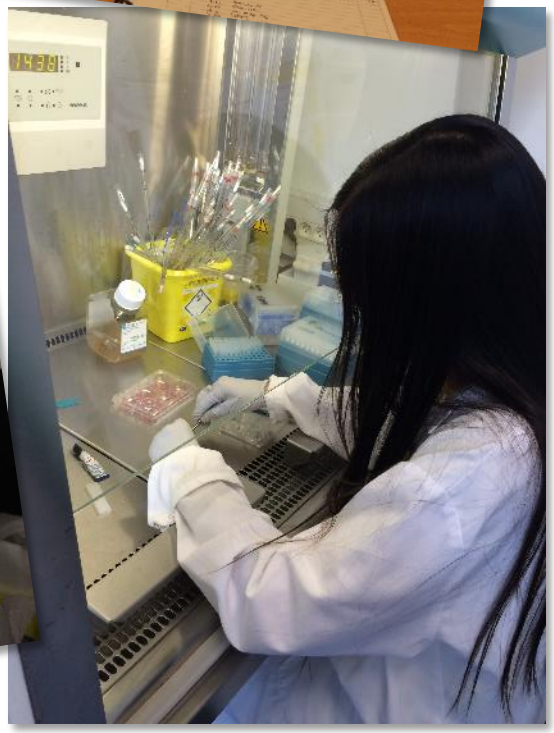
Workstation



Cell Culture

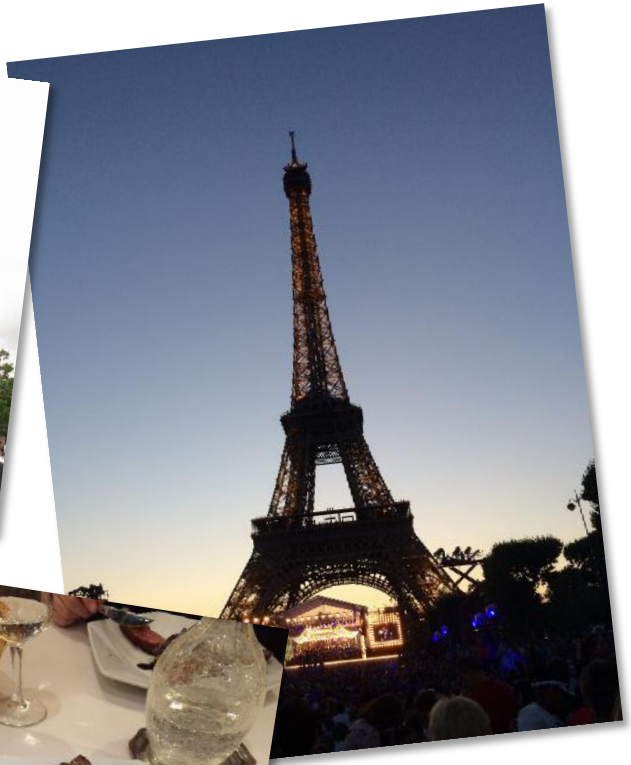


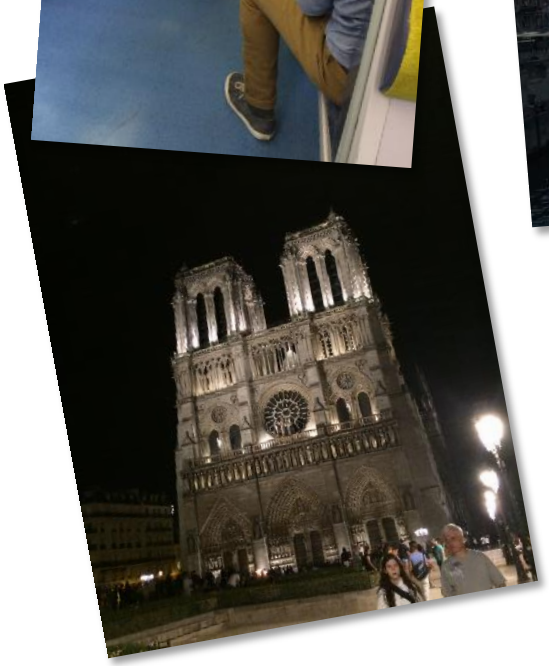
Spinning Disk Microscope



In the Hood

Paris





What I Learned

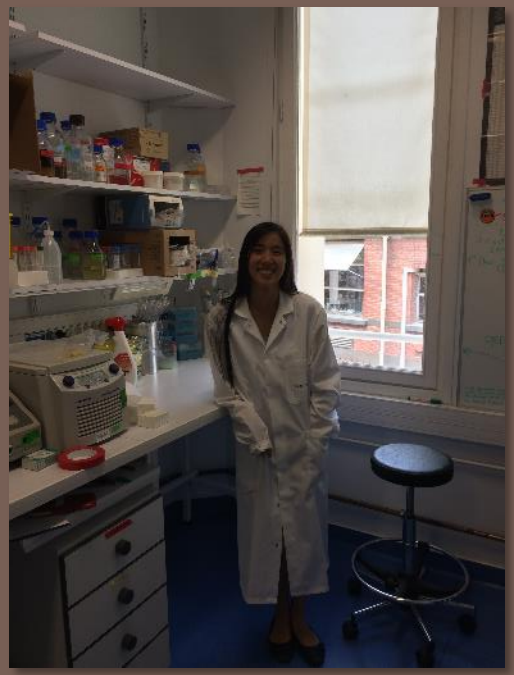
- Skills
  - Handling a great deal of biological equipment and software, and learning protocols
  - Working in an international research institution
  - Staining and imaging
  - Living abroad
    - Slower philosophy of life
    - Windows into other perspectives on work and happiness
    - Living independently (!)
- The Importance Of…
  - Collaborative lab atmosphere
  - Perseverance
    - You really never know. Thought an experiment failed? Think again.
  - Confidence
    - My supervisor says, “In the scheme of things if you don’t know you will succeed, you won’t be able to manage.”
  - Paying it forward
    - Forward transmission of information is crucial.

What I Did

- Although the project was in an early stage, and thus results will need to be tested further…
  - Narrowed down parameters for some experiments
  - Found promising candidates for M cell stains
  - Successfully transduced the model to express a fluorescent protein

Where I’m Going

- My IIP placement…
  - Reaffirmed my interest in research in infectious disease
    - Looking to go to grad school, but also gained valuable perspective from colleagues about when and why to go to grad school
  - Highlighted the possibility of going into industry, as well as the potential value of some experience in that environment since I haven’t had any yet
  - Helped me see the structure of a lab
    - Interested in but not committed to becoming a PI someday, but definitely interested in continuing to do research in this environment for at least some years
  - Helped me visualize living in France, a potential future option for several years if not long-term



CONCLUSION

Highly recommended. Go with an open mind and open heart, and focus on learning skills in lab and lessons for life.

Thanks so much to IIP and Pasteur!

Contact me if you have questions! hrma@princeton.edu