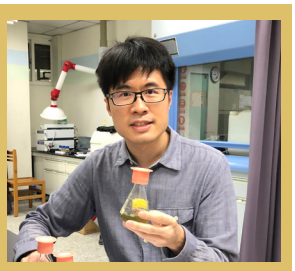
Ming-Yang Ho



Ming-Yang Ho is an Assistant Professor and Group Leader at National Taiwan University. The Ho Lab studies cyanobacteria, particularly their environmental diversity and abilities to withstand extreme environments, as well as their photosynthetic mechanisms, and potential practical applications.

Above: Field sampling at a wetland in New Taipei City, Taiwan

Tell us about your background. How did you first become interested in photosynthesis and cyanobacteria?

I first became interested in photosynthesis when I was in high school. My Biology teacher suggested that we could combat global warming or food shortages by inventing an artificial chloroplast factory to fix carbon dioxide and produce sugar. That idea fascinated me. Right after I entered college, I learned that cyanobacteria are like free-living chloroplasts and I started working on them. To work towards solving global warming or food shortages, I have changed my research direction several times; from cyanobacteria to rice and algae, and now back to cyanobacteria.

What is your lab working on currently?

My lab currently works on the diversity and evolution of photosynthesis in cyanobacteria. Cyanobacteria, as the ancestors of oxygenic photosynthesis, have evolved diverse mechanisms for harvesting light. One of their remarkable abilities is to use far-red light for photosynthesis, which plants and most algae cannot. On the other hand, during three billion years of evolution, some cyanobacteria maintained ancestral features that allow us to reveal changes in photosynthesis over time. These are the two main topics in my lab: (1) figuring out the process and the diversity of photosynthesis using far-red light. (2) Understanding the evolution of photosynthesis by analyzing cyanobacteria that retain primordial features. Our approaches include sampling and isolating pure cultures, genetics, microbial physiology, spectroscopy, biochemistry, metagenomics, and phylogeny.

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What does a typical day look like for you?

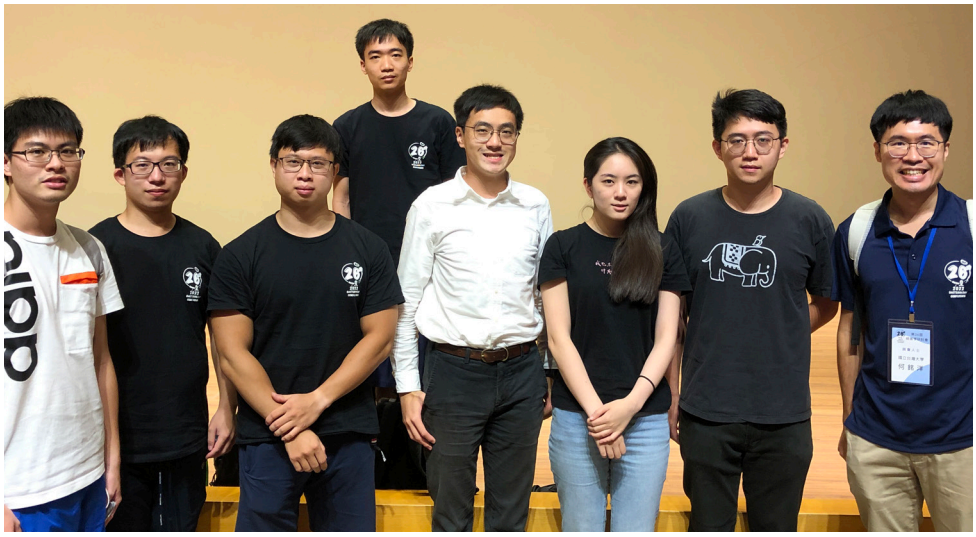
I teach in the Fall and Spring semesters. Other than that, I spend most of my working time in the lab. Typically, I come into the lab in the morning, have quick chats with assistants and students, and then focus on research, teaching, or service. I usually write in the morning when I am wide awake. In the afternoon, I prepare teaching materials, read the latest research articles, and mentor students. My door is usually open so that lab members can reach me quickly when they need help. In the evening, after dinner and some rest, I reply to emails and organize what I need to do the next day.

What do you most enjoy about your work?

I can work on the topic I am interested in and lead many talented lab members towards the same goal. There are always unanswered scientific questions, but as the head of a lab, I decide the questions to dig further into. By leading a group of members, I can be enthusiastic about the scientific questions and brainstorm how to address them. I enjoy working in that environment.

What do you find most challenging?

To set up a new lab. That was the first thing I did when I returned to Taiwan to start my independent lab. I learned how to be a good scientist during my Ph.D. and postdoc, but I was never trained to start a new lab from scratch. Hiring the first group of lab members was challenging. The wrong people will result in an uncomfortable atmosphere and bad habits for the lab at the beginning, which are difficult to change later on.



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What is your lab hoping to work on in the future?

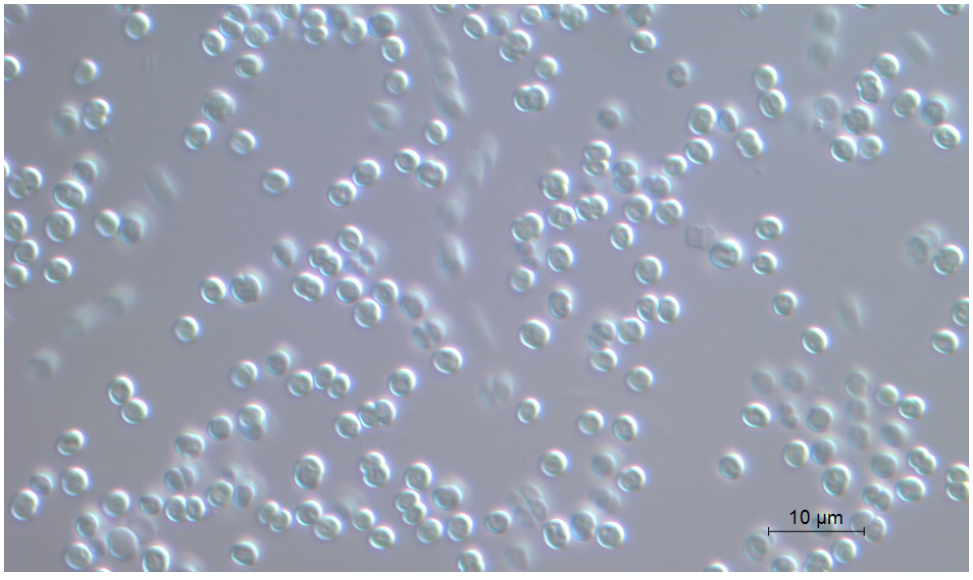
I hope my lab can research outcomes with practical usages. For example, a light-inducible expression system to help regulate protein expression under changing light conditions. Another interesting direction would be to enhance photosynthesis by making crop plants capable of harvesting far-red light.

What advice would you give to aspiring scientists in this area?

Find your topic, devote your time to that, and be the first to discover something new in that field.

Who are your scientific heroes?

My first hero is my Ph.D. advisor, Prof. Don Bryant. He taught me how to be a great scientist and how to mentor students. Also, Prof. Bob Blankenship. His book *Molecular Mechanisms of Photosynthesis* is my starting textbook for photosynthesis.



Left: Cyanobacterium *Synechocystis* sp. PCC 6803. *Top right:* Ming-Yang and his group members attending a Microbiology conference.