

## **Considerations in Decolonizing Biological Sciences in Higher Education**

### **By Jessica Hoopengardner**

Every 40 days, a language goes [extinct](#). A whole culture, unique conceptions of ideas, and an understanding of the world is lost. The loss of cultural diversity is a loss in its own right, but it has even larger implications for humanity. Cultural diversity and biodiversity make up the diversity of life. As we live in the era of pandemics and climate change, humanity's problems are increasingly global. However, by globalizing science through Western colonialism, we make ourselves less equipped to deal with our problems. By decolonizing science higher education, we can make more significant strides as humanity. Here I will discuss considerations we need to make when decolonizing our science higher education.

#### **Science is Linguistic.**

Today [98% of scientific papers](#) are published in English. English serves as a barrier for scientists who are not native English speakers, which increases the inequality in publishing. While English makes it easier to communicate with other English speakers, it creates a privilege for the Western world. Also considering that English is [only one of 7,000 languages on Earth](#), what are we missing when we publish almost exclusively in English? For example, 30% of English words are verbs, but Potawatomi has 70% of words as verbs. How would our understanding of science shift if we based it in Potawatomi? Tamil? Xhosa? While we only focus on English in science, we are losing other languages at an alarming rate. We often take it for granted that English is the *lingua franca* of science. By prioritizing English, we are losing linguistic diversity, which lowers cultural diversity, which lowers our ability to fight global problems head on.

#### **Science is Local.**

Colonialism forces assimilation in thought, arguing that there is one colonial truth. This positivist point ignores the locality of biology. Physical and cultural environments shift as one changes location. Nothing makes the locality of biology more apparent than the coronavirus pandemic. In the United States, the whole country shut down watching the horrors of the pandemic play out in NYC. However, the brunt of the pandemic had not reached whole swaths of the country, and by the time it did, people were tired of being at home. In a country of 300 million people, we lose the ability to fight COVID-19 when we only think on the federal level or even only at the state level.

Despite the pandemic being a once in a century phenomenon, the locality of biology holds true for other aspects. White scientists created the concept of race by moralizing environmental and cultural differences among populations. By creating a universal system of categorizing people, we stripped the humanity from individuals and wrongly justified oppression of anyone "different." Ecology and environmental sciences have some universal truths but biodiversity can shift the conversation depending on where one is. We cannot possibly teach students the truths of all areas, but we need to equip them to listen to local scientists and citizens. By taking in local perspectives, we can build solutions alongside indigenous knowledge, not on top of indigenous knowledge.

### **Science is Interconnected.**

Why are microbiology, molecular biology, human biology, and microbial ecology different fields? Simply because we decided to split them up. Specialization allows us to have tidy and neat fields, but specialization creates arbitrary differences that Mother Nature does not follow. The specialization of fields leads to a lack of communication between those fields, which then has dangerous consequences. For decades, we sprayed the pesticide DDT, eradicating malaria in the U.S. DDT also almost extinguished our bald eagle population, caused infertility issues in humans, and is now a probable human [carcinogen](#). We were hyper focused on malaria without considering downstream consequences. Now the costs of eradicating malaria may have been for naught. As temperatures rise due to climate change, vector-borne diseases like malaria will become [more common](#) in the US. Lyme disease numbers have [already doubled since 1991](#) due to shorter winters. We have to stop treating major issues as discrete problems, instead using collaborative, systems level thinking.

Take my field, microbiology, for example. I focused on single celled organisms in discrete ways. When we studied pathogens, often we looked at them one by one and only looked at how they interacted with the human immune system. Yet these discussions connected to so many other fields of science and beyond. Some of my microbiology professors made these connections in their teaching. “How does toxoplasmosis change the psychology of [rats](#) and humans?” my eukaryotic pathogens professor would ask. We discussed the rejection of Western science in [South Africa](#) and how that affected the prevalence of HIV and AIDS in my virology course. In my microbial genetics course, we questioned how the nontherapeutic use of antibiotics in [agriculture](#) affect the diversity of our microbiomes. Teaching these connections promote decolonization by breaking down arbitrary barriers—and teaching this way is good pedagogy. Of my microbiology courses, the ones that focused on systems level thinking stuck in my mind. We don’t lose the essence of our fields when we connect them with others: We actually strengthen our work.

### **What Can We Do?**

The issue of decolonizing the biological sciences can’t be solved with one fix. The idea of the individual white male scientist having eureka moments continues to shift to communities of global scientists working together. However, we need to keep making changes. We need to take pride in linguistic diversity and help save the languages that are going extinct. We need to encourage students to see the nature of science in their own backyard. We need make connections to other specializations and fields to show how the biological sciences can’t stand on their own. Each of us in the field need to reflect on how we contribute to Western power structures and how we can decolonize our practices. We won’t be able to solve our problems otherwise.