



# BIOSPHERE

## The Weekly Bulletin of Biology

No Colloquium: Black Friday

### Kerry Cooper, New Microbiologist

We have a new microbiologist, Dr. **Kerry Cooper**. Recently, we sat down to find out something about his world.

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*Biosphere*: Welcome to CSUN.

*Cooper*: Thanks.

*B*: To get started, what's that thing that ends up in every course you teach? Is it a central idea or a body of facts or what?

*C*: Let me think ... it's students. That's what ends up in every class. My wife has helped me gear my teaching to put students at the center of their own learning. They have to take an active role. I develop activities that help them learn, group projects, and stuff like that.

*B*: So that's natural in lab. How about lecture?

*C*: When I taught the Genetics lecture class, I gave them a short sequence of unknown DNA, and then I taught them a few software tools. They had to find the start and stop codons, BLAST the gene, and go to PubMed for some information. Then they presented conference-like posters. People came to the event, and the students gave their spiels. It tied in with many of the things I had already gone over in the lecture.

*B*: It was like homework?

*C*: Yeah, they had about six weeks total to do the project. There was also more regular homework. I think it helped the students by driving home the concepts.

And it was a bit of an oral exam without them even realizing it. At the "conference" we even had snacks.

*B*: How are you going to teach Med Micro?

*C*: I won't change it that much. It's preparing students to be Clinical Lab Scientists, so it has to be pretty consistent over the years. You march through the different pathogens.

*B*: How do you think the phylogenetics revolution has affected your field?

*C*: Maybe not as much as you would think. Our understanding is still changing a lot as we get more genomes sequenced. But the doctors need to get from symptoms to treatment, and they don't really keep up with genomics. For example, in my work, it would make sense to sink the genus *Shigella* into *Escherichia*. Our understanding of *E. coli* has come to be more and more inclusive with lots of different pathogenetic and non-pathogenetic strains, and what we call "*Shigella*" could just be among those, but that would confuse people who are used to the traditional classification and distinction.

*B*: What will be your main research project for the next couple of years?

*C*: I'll be working on food-borne pathogens, comparative genomics of *E. coli* strains that cause diarrhea and strains that don't, and some other relatives. Plus, I'll be studying DNA methylation and its role in gene expression. There's a method, when you have a genome sequenced, to get both the genome and also a methylome.

We actually had a strain that changed expression of *curli*. We found that when it was expressing *curli* it had one methylation pattern, and a totally different methylation pattern when it was not expressing *curli*.

**B:** Where were you before you came here? Take us backwards.

**C:** I worked in a US Department of Agriculture (USDA) lab in the Bay Area. I was doing comparative genomics of diarrheic *E. coli*. There are six major serotypes that are diarrheic, and some of these strains became dangerous because of convergent evolution and acquiring the Shiga toxin phage. Just one of these was the “media darling,” but over half the cases of *E. coli* diarrheic outbreaks resulted from other serotypes, so we were working on all of those.

**B:** What did you do prior to that?

**C:** I was at the University of Arizona doing another post doc. I was working on *Campylobacter*. Some years it’s the #1 food-borne pathogen in the country. It causes sporadic disease most of the time, not so much outbreaks. *Campylobacter* is associated with undercooked chicken and raw milk. In that study, I was working out the mechanisms of pathogenesis. We were working with newborn piglets. I might go back to that work if we get funded.

**B:** Would you bring newborn piglets to CSUN?

**C:** No, no. I would just work with the bacteria. My collaborators at UC Davis and Cal State San Bernardino would take care of the pigs, or we’d contract with a company that handles the piglets.

**B:** Would that project be worth putting years of your life into if it wasn’t funded?

**C:** Yes. It’s really interesting. When it comes to *Campylobacter*, there seems to be two kinds of pathology. One is bloody dysentery. The other one is watery diarrhea. We hypothesized that the toxins were causing these pathogens, but that seems not to be the case. It seems there

are no genetic differences. Now I think it is differential genetic expression. We would be doing transcriptome work. There’s also some evidence that the ones that produce bloody dysentery are invading the host’s cells, whereas the ones that produce watery diarrhea are just in the gut lumen and secreting things that affect receptors of the cells of the gut wall.

**B:** Yum. And before that?

**C:** That was my Ph.D. work comparing two kinds of *Clostridium*. They can cause a wide variety of diseases. We have *Clostridium perfringens* in our gut. It is the cause of gas gangrene. It comes in #3 on the food poisoning scale. The enterotoxin gene can be chromosomal or plasmid. Most of my work on was not on that. It was on a huge multibillion-dollar loss in the poultry industry, which can cause huge outbreaks. The *Clostridium* is already in the chickens, and following a shift in the diet, they can be physically damaged, and the *C. perfringens* population explodes. The chickens get gas gangrene of the gut, and the birds die. Related to that, I was a food inspector for three years after my bachelor’s degree.

**B:** How about a little human-interest stuff?

**C:** I played basketball in a small school in Kansas ... actually, one thing you might put in *Biosphere* is that I would love to connect with students here who play basketball or really any student athletes. Any student athletes who are interested in my work in the lab. We used to practice from 3:00 to 7:00 in the morning, and then we had to go to class. If we missed class, we had to run five miles. It was tough. I know what it’s like.

### *Biosphere: The Weekly Bulletin of Biology*

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