

in conversation:  



**Victoria Orphan**

and

**Dianne Newman**

—2016 MacArthur Award-  
Winning Scientists—  
on Friendship,  
Microbes, and  
How to be  
a Role Model.



## THE AWARD

Awarded to individuals across multiple fields who show extraordinary creativity in their work, the MacArthur Fellowship comes with no strings attached and a stipend of \$625,000 over five years.

## THE PLAYERS

**Victoria Orphan** (left), a James Irvine Professor of Environmental Science and Geobiology, studies the molecular microbial ecology of anaerobic communities (microbes that exist without free oxygen in their environment), with a particular focus on microorganisms that live in deep-ocean sediment beds and consume large quantities of methane released from seeps in the ocean floor.

**Dianne Newman** (right), the Gordon M. Binder/Amgen Professor of Biology and Geobiology, focuses her work on microbial stress responses, with an emphasis on how microbes generate energy and survive when oxygen is scarce. Her research looks at microbes in everything from ancient sedimentary deposits to chronic infections, yet all of her projects involve asking similar physiological questions.

Watch Newman and Orphan discuss “the call” and what came next at [magazine.caltech.edu/post/in-conversation](http://magazine.caltech.edu/post/in-conversation).



## THE PHONE CALL

**Dianne Newman [DN]:** I was in my office. Where were you?

**Victoria Orphan [VO]:** I was in the kitchen. I had just come back from a run and, of course, this was during the political season, and there were lots of morning election calls and you're not typically inclined to pick up the phone.

**DN:** I was meeting with my postdoc and I saw my cell phone ring, and I ignored it. Ten minutes later, the same number called and that time I picked it up.

**VO:** I kept thinking, "Come up with something very profound to say." And I was just, "Oh my God! Oh my God!"

**DN:** I actually asked if it was a joke. I didn't see it coming at all. I never in a million years thought this was going to happen. I got quite emotional and expressed to them just how touched I was, how honored I was, and stunned actually.

**VO:** You feel like you're in shock!

**DN:** Being able to share it with [you,] one of my best friends, made it a lot nicer. It deflected a bit of the awkwardness and made it something that could be a shared, joyous experience, and the fact that we're both women in a similar field allowed it to transcend us and be something positive for our fields and a celebration of women in science.

This week we're going together to talk to a sixth-grade class in Ventura, and I think we'll be aware that we are showing all of those kids, boys and girls, that if you're passionate about what you do, you really can go far.

**VO:** I didn't quite appreciate the value of being an outward role model for women as much as I do now. We've had a lot of fun talking about creative ways we can do outreach. This amazing teacher in Ventura had her class write us letters. They had read about us and had very specific questions about our research. For me, I think that was a peak moment since this award, getting letters from these students.

**DN:** That was, by far, the highlight. No question.

## JUMPING OFF MOUNTAINS

**DN:** I hired you; I have to claim credit for that. I was the chair of the search that hired you.

**VO:** Yes! But even before that, we were in Switzerland together at a geochemistry meeting. That was the first time I met the famous Dianne, and I remember being so impressed with you because you went parasailing off the top of the Alps even though you were scared to death. I thought, this is where I want to be, with these fearless women. Then I came to interview here, and you were already on the faculty.

**DN:** It became immediately clear how much you could contribute to the division and how you really walked the line beautifully between someone who was sincerely interested in what was going on with Earth's systems processes and also someone who was a serious molecular ecologist and knew how to apply state-of-the-art tools to those problems, which is what the MacArthur Foundation also, I'm sure, appreciated when they selected you.

**VO:** I remember thinking that, at first blush, it seemed surprising that a geological and planetary science department would start a geobiology program, but it showed this amazing vision for the future that they could embrace that and put together, with your help, this all-star team of geobiologists who have come together in a very synergistic way to cover many of the different elements of geobiology.

## SCIENTIFIC JOURNEYS

**DN:** How did you first get into science?

**VO:** My dad was an engineer and a physicist, so there was always that sort of element in the household, and I really loved the outdoors, especially the oceans. I grew up in San Diego, right near the beach, and I spent a lot of time at Scripps aquarium, and was very curious about how the ocean worked.

**DN:** When did you discover microbiology?

**VO:** In college. I had the opportunity to go on an oceanographic research cruise and there was a graduate student who was studying bacteria in the ocean. It didn't look like much, you know, little bright blobs under the scope, but the sheer numbers of microorganisms in a seawater sample is just awe inspiring. I got off the cruise and took a course from his adviser. How about you?

**DN:** It took me a little longer.

**VO:** Yeah. You had a very circuitous route.

**DN:** I did not have geobiology on my radar in college. I was a German studies major, and I was struggling between going on to graduate school in engineering or going on to study comparative literature or going to law school. It wasn't until my first semester in graduate school at MIT, where I took a class in environmental microbiology, that I suddenly discovered the wonderful world of microbial metabolism, and it was a revelation.

It took me a while to land on a problem that I wanted to commit to. Since I had studied a lot of classics as an undergrad, I always had an interest in the past, and when I had the opportunity to come here to Caltech and be in the GPS division, I felt an interest and also an obligation to work on things that were of relevance to Earth scientists.

**VO:** I think you hit on something too that I have really valued being within the GPS division. Being with the Earth scientists, you get little tidbits of information about where the interesting questions are and how you can bring together disciplines in new ways.

## SCIENTIFIC INTERSECTIONS

**VO:** Over the past 14 years or so that we've been at this institution together, I feel like we have really learned from each other and appreciated our own individual approaches to science in a way that has enhanced our own research.

**DN:** Definitely. At our core, we're both environmental microbiologists and I think we both recognize the myriad ways that diverse microorganisms shape our entire world, whether it's the atmosphere, lithosphere, hydrosphere, or even, you know, the human body.

I think we are cut from the same cloth in recognizing that any of these areas of existence is critically dependent upon microbes. What I've always seen as something really amazing about what you do is your ability to study them in nature, in places that are remote and hard to access.

Now, for students, they don't need to choose between being someone who's out in the field versus someone who's doing mechanistic research at the bench. You can and should do both if you want to get to the heart of a problem in a rigorous way. It's possible these days to navigate back and forth between these two poles of a problem. That's an exciting thing!

**VO:** It's also the nice thing about the CEMI [Center for Environmental Microbial Interactions], a virtual center at Caltech that brings together all the people who are enthusiasts of microorganisms or work with microorganisms. Really the value is being able to draw on your colleagues' expertise to help enrich your project or answer specific questions as they come up.

**DN:** Yet, very few of them are actually microbiologists.

**VO:** Yeah. Very few would call themselves microbiologists, but ...

**DN:** Which is what makes it so great! The thing is, you don't need to be a microbiologist to love microbes, right? Microbes represent the best systems you can study in many ways because they are so tractable and they're so important in so many disciplines.

For that reason, we have people from chemical engineering, people who are applied physicists, applied mathematicians, neuroscientists even, whose techniques are now being adapted to studying the microbial world! That all these people have coalesced to form this entity we call CEMI is such a quintessentially Caltech thing.

**VO:** Historically, I don't think people would have equated microbiology with Caltech...

**DN:** Definitely not.

**VO:** ...because we were so diffusely distributed among the divisions, so to have this virtual center, we are now on the radar screen and we're getting people who want to come to Caltech to do microbiology.

## SPREADING THE WORD

**DN:** I do think that while the MacArthur Fellowship is at its core an award to individuals, there is something inescapable about them having chosen two women at the same university in a similar discipline, whether you call it environmental microbiology or geobiology, that speaks to where the field has come from when we started here.

The response of our geobiology community was really extraordinary. That's one of the things that's so rewarding in general about a life in science, that you have the chance to work with talented and generous people from all over the world.

**VO:** It sits at the core of what geobiology is about. Our successes are grounded in diversity—diversity of disciplines, diversity of ideas, diversity of cultural backgrounds from around the globe—and it's made this very fertile ground to strike out in new directions and make new discoveries about how the earth works and the roles that life has played in shaping the changes in the chemistry over the earth's history. It's going to require an international effort to do that to its fullest potential.

**DN:** Absolutely. I know it's something we've talked about in light of recent changes in Washington, D.C., and attitudes toward immigrants. Really any science at any major university these days is an international enterprise and is something that absolutely depends upon the ability to attract the best and the brightest from anywhere in the United States or abroad to help in opening up new frontiers of human endeavor and knowledge.

**VO:** We've talked a lot about how we can use this award as a platform to increase recognition and appreciation for the role science plays in everyday life. I've taken it to heart that we can get out there in the communities and in schools outside of the Pasadena area to help share our own excitement about science and, hopefully, give people some sense that we're just regular people; down-to-earth people who are just passionate about what we're doing.

It's the best-kept secret in the world. The fact that we can walk into this university every day and follow our passions and our curiosity as a career. It is just amazing and something we need to be able to share with everybody. 🗣️

