

The Purpose, Practice &
Politics of Science

A Conversation with Harold Varmus & Alan Alda
18 APRIL 2017 AT MACAULAY HONORS COLLEGE

On 18 April 2017, Macaulay Honors College Dean Mary C. Pearl welcomed Professor Harold Varmus and Alan Alda to the college's lecture hall to discuss the ways we speak about science.

These are the highlights of their witty, smart exchange.

ALAN ALDA is best known as an award-winning actor, but his passion for science has inspired a second career as an advocate and educator. As host for more than a decade of PBS's Scientific American Frontiers, Alda interviewed hundreds of scientists and became convinced that much of the success of the show was due to the open, conversational style of the interviews. He felt it would be helpful if scientists could be trained to be clear and vivid, as the people he had interviewed on the show had been. In 2009, he helped create the Alan Alda Center for Communicating Science at SUNY Stony Brook University with a mission to enhance the understanding of science by training scientists and health professionals to communicate more effectively with people outside their discipline. Alda and Varmus are friends—and occasionally collaborators and tennis partners.

HAROLD VARMUS holds undergraduate and advanced degrees in English literature from Amherst and Harvard and a medical degree from Columbia. He's worked as a medical student at a hospital in India and in sophisticated laboratories for most of his career. He's a co-recipient of the 1989 Nobel Prize in Physiology or Medicine for discovering the cellular origin of retroviral oncogenes. He has been head of the National Institutes of Health, Memorial Sloan-Kettering, and the National Cancer Institute. Currently the Lewis Thomas University professor of medicine at Weill Cornell Medicine and a senior associate at the New York Genome Center, Varmus is also a visiting professor at Macaulay Honors College where he leads a seminar called the **Purpose, Practice, and Politics of Science**.

Prof. Harold Varmus: I thought it'd be fun to begin in the spirit of the event. That is: what are we doing—and what should we be doing—about making science better known in the community?

Alan Alda: Well, you started out at a very good place. Why should we care? What is there about it that we care about—rather than the jargon or the technical details, that you can get to, once people want to hear more?

It makes a big difference to think about what they're liable to be thinking as you talk to them. That's why we teach scientists improvisation—because it puts you in such close touch with the people you're communicating with that you can tell either by looking at their face, hearing their response, seeing how they occupy a chair, what their body language is. You can tell if they're with you or if you need to go back a step earlier and get them introduced to what you're talking about.

At the Center, we start out with teaching improvisation, and it has a profound effect. It leads to a richer, more personal way of relating to another person. We've taught over 8,000 people across the United States—doctors and research scientists. People tell us that their lives have been changed by it because they're finally able to communicate what's most deeply felt by them, most emotionally important to them. But they couldn't talk about it before in a way that got other people

interested and excited about it. And now they do.

Contact with the face is an essential first step. I just wrote a book about this, which deals not only with how kind or relating helps scientists to communicate better, but all the rest of us, too. The title of the book is *If I Understood You, Would I Have This Look on My Face? My Adventures in the Art and Science of Relating and Communicating*.

Varmus: The Macaulay students in my class are at the point in the course where they're going to be presenting their class projects to their classmates and to me. The challenge I have—and I appreciate your advice about it— is this: I'm trying to figure out how to make them recognize they've got to engage an audience on these topics. They've got to be interesting, they've got to communicate their interest in the subject. What should I be telling these students about how to engage their classmates in discussing the project they've done? For example, one student wants to know why it took so long for those who were responsible for the water supply in Flint to recognize there was lead in the water and to communicate that.

Alda: That's a wonderful beginning because that's a story. If the student has access to, say, one person who was trying to figure it out or saw an anomaly, saw that there was a problem and wanted to know how far the problem extended and then realize it was a huge problem. Telling the

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story so that we can become involved makes us want to hear the solution, makes us want to hear the end product of the story. Does the person achieve the goal in spite of the obstacles? It's really a good idea to have obstacles in the story...

Varmus: But what do you do with someone who takes a topic that's somewhat more remote? For example, some are concerned about the cost of drugs. They've been alerted to that by public debate and now they want to try to understand why the cost of Hepatitis C drugs is as high as it is.

Alda: Well there's a number of ways you could tell the story about that. You could tell the story about somebody who suffers from it. It's a good idea not to start with a story that is over before the talk is over. You want to conclude the talk with the story. The story has to be really germane but you don't have to have a person as the leading character. The "person" could be a gene or a pathogen that's struggling to take over your entire body, and your job is to stop it.

Varmus: Of course, the other issue here is brevity. If you begin from a remote position how do you bring the topic to conclusion in 10 minutes?

Alda: One of the main things to remember is what's going on in the heads of the people watching. Do you have any hope that most of them will get it if you talk in the technical terms of your laboratory? If you use a term that stands for five pages of text, it's good in the lab; you don't want to say five pages every time you want to refer to this thing. But it's no good when you're talking to us who don't understand it. I know you practice this, but it's a hard thing for people to remember when they're first beginning to talk to people.

Varmus: One of the things that I'm looking for in these exercises is to see someone's passion about the high cost of drugs and to try to then teach that person, the future speaker, to understand the complexity of the problem that these drugs are solving. That is: learning something about Hepatitis C infection itself, how difficult it is to develop drugs against viruses, how successful these drugs happen to be. To think not just about the outrage of \$80,000 for a course of therapy, but to think about the benefits of a treatment that prevents cirrhosis, prevents liver cancer, and—at some level—is worth the price. Thinking about the solutions to the problem are ways of bringing in everyone who either has a business interest or interest in the fundamental science or an interest in medicine, to join in the conversation.

My course [at Macaulay] is intended to teach students, some of whom are going to be scientists, many of whom will be doctors, some of whom will do none of the above (they'll be lawyers or business people) the many ways in which science is connected to everyday life. I know you've been interested in that through your work with the World Science Festival and other things.

Alda: Yes. I'm always trying to find ways to tie the fascination of science into what people are already interested in. You have to meet people where they are now.

Your student for instance [should consider] who's the audience, how much can he hope to bring them in on in two or three minutes. If it gets to be complex, he might not really make a point with more than one or two people in the whole room. What does he want from them? Does he want them to care about it and do something about it? The objective is important.

But tying it into our lives is important. Why should we care? The funny thing is once we do see why we should care, a whole world opens up. Science is fascinating to me personally, not just because it solves technical problems or problems of living—clean water, good nutrition, things that are really important for our survival. They're interesting, but the joy of finding out the fundamental things about nature that are now known but weren't known before is just extraordinary.

I'm not the only person to feel this way. There was a study done—I think by the University of Pennsylvania—to determine the most emailed science articles from The New York Times. What did people pick to email their friends because they found them interesting?

It wasn't stories about health, it wasn't stories about epidemics, things that affect us in a serious way. Instead, it was stories that inspired wonder and awe regarding the universe.

Varmus: I'm glad you're bringing that up because I sometimes feel that in our striving to make science more fundable, more acceptable, and politically appropriate, we're always going back to the utilitarian aspects of what we discover. It's important to remember that sometimes it's just a wonderful thing to be curious about how the universe works.

There's a famous moment of testimony: a guy named Robert Wilson, a well-known physicist, was being interrogated in front of a congressional committee about 50 years ago. I see from your smile you know this—

Alda: It's a wonderful thing; I quote it all the time. Go ahead!

Varmus: He's asked how the physics he's proposing—which was involved in understanding the makeup of atoms—how is that going to help with the national defense. He said, "Well it's not going to specifically help with national defense, but it'll make the country worth defending."

Alda: He didn't get the money by the way. The senator wasn't all that impressed. Even before Wilson said that, he compared the new knowledge they would get to the wealth of music that a culture has and the wealth of poetry and painting and other arts. But the senator had a more utilitarian view.

Varmus: Well, many do. Especially when the price tag is as high as it was.

Alda: The importance of communicating when you're trying to get something funded by Congress is immense. I was talking with Steve Israel, who was a congressman [when] I was trying to get a grant for the Center for Communicating Science at Stony Brook. He said, "You don't know the half of it. I was on a committee. There were scientists lined up in front of us who were telling us what they needed the money for, telling us about their science. On our side of the table the members of Congress were passing notes to each other that said, 'Do you know what this guy is saying?'"

Who in this room would give money to something they don't understand? It's not going to happen. It's urgent that we communicate better.

Varmus: I happened to be in the White House when a number of physicists who had just won Nobel Prizes had a chance to ask President Clinton why the government did not fund the supercollider. He said,



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“Because you guys didn’t make it clear why we should do this.” In essence he was saying, “You didn’t connect it with either the knowledge we have and we would like to have, or some application. Instead, you’re making the argument that if we don’t do this we’ll lose our primacy in the world of physics. That seemed a little egocentric.”

We’ve talked a little bit about politics, we’ve talked a little bit about our interest in communication. I think it’s time for us to hear some questions from the audience.

Audience Member: My question is for both of you. For quite some years now, STEM education has been all the rage in our [K through] 12 schools. Yet, statistics indicate that the level of science literacy in our kids has not improved. Why do you suppose that is and are there proposed remedies?

Alda: I’m doing everything I can to do something about that. My hope has always been that we would train scientists to be good communicators at the same time that we were training them to be proficient, good, reliable scientists—because it’s an essential part of science

The final thing you do after you do an experiment is to report on it. If you need to get funding to do the next experiment, you have to be able to explain what you’re going to do. Science would stop dead without the level of communication we have now. It will improve drastically if the level of communication rises.

I think it’s important for those of us who care about the public understanding science to engage the kids who might one day become scientists. To teach them in a way that engenders the spirit of an awakening to nature. It’s not just a series of principles, and laws, and formulas. It’s

the beauty, it’s the poetry of nature. If we don’t expose them to the amazement of it, I don’t see what chance we have.

Varmus: I think we do a very good job in mining our talent through the science programs. Science magnet schools have been a good thing—I do think we’re training an awful lot of incredibly smart kids. I see them coming into graduate school and medical school; they have been very well trained about science and laboratory work in high school. I think we do quite well with the most talented. But what we don’t do well is in bringing everybody up to speed.

I don’t think ‘scientific literacy’ is the term we ought to use. I think we ought to get people to have a reverence for generating evidence, for thinking experimentally; it’s how you approach the unknown as opposed to how you memorize the known.

We’ll only do that effectively when we have better teachers, and we’ll have better teachers when we have better salaries for teachers. What it really comes down to, from my point of view, is providing the kind of salaries the French provide so that people would rather teach at high school than teach at the Sorbonne.

Dean Mary Pearl: What single message do you have, or what take-home message would you give to high school students about science communications?

Alda: It really does boil down to a general principle: Communication is not spraying information at people, it’s engaging them. You don’t have a communicator and a listener; you have a communicating partner, a communication partner. The task for the person trying to learn to communicate is [to determine] who are the people that you’re trying to communicate with. Where

are they now? How can you get them from where they are now to some place beyond that? That concentration on engagement is the basic principle I've learned over 20 years of trying to figure out how we can make communication better. Of course, it goes a lot deeper than that. I've only told you page one of my book!

Audience Member: A lot of my friends who are studying science don't necessarily get a lot out of lectures. But before exams, they will go online and watch videos about different scientific concepts. I'm curious in terms of multimedia communications, do you think that that will expand the way that we communicate science in the near future?

Varmus: I just want to put in a plug for something called iBiology. The American Society of Cell Biology has put out a whole series of very short lectures. I've given two very short ones—but a lot of longer ones are very good, illustrated with excellent diagrams. All of us learn a lot from going to lectures. There's no reason why these lectures can't be online, and many of them are.

Alda: I know iBiology very well, because the Center for Communicating Science at Stony Brook trained some graduate students who were candidates to be on iBiology. They sent in their audition tapes, and then 2 or 3 were selected to be trained by us. We have one of our most interesting 'before and after' videos because of that. Because we have the talk that this young scientist gave before the training and then the talk after the training. You can actually understand what she's saying after the training—it's amazing!

Audience Member: I'm a Macaulay graduate and I hold two degrees in Physics and Psychology but I'm also an actor. Alan, I know that you work with a lot of science people with actor techniques, like improv, which you taught me. My question is, how do we get actors and entertainers who—whether we like it or not—are at the forefront of communicating with all of us via social media and just their general visibility—how do we get them more interested in science? Because so often when I go to a set and say, "I majored in Physics and Psychology," actors are like, "What's that? I've never heard of that." How do we get them more interested and more vocal the way that you are to get people more excited?

Alda: That's a really good question. You still have people interested in the arts and humanities who are proud not to know anything about science, but you don't have any scientists who are proud never to have heard of Shakespeare. It's a weird division. Science is as beautiful and entertaining as art is, but part of the problem is communication. Those in the arts and humanities, including actors who are not interested in science, are people who are part of the general public who simply haven't been reached by those people who love it and want to share it with other people.

We have to get better at that.



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ABOUT
Macaulay Honors College
AT CUNY

Ranked as one of the top ten honors colleges in the nation, Macaulay provides exceptional students with a rigorous education drawing on the vast academic resources of the nation's largest urban university and the rich, cultural diversity of New York City. Our students represent the top 4% of the 13,000+ incoming freshmen from eight senior CUNY campuses spread across all five boroughs of New York City.

With close guidance from a team of dedicated advisors, Macaulay students can design a highly personalized academic program that allows them to access classes in more than 400 majors across the CUNY system. In addition to maintaining a 3.5 GPA, all Macaulay students must either study abroad, participate in an approved internship, or conduct independent research. To support these activities, Macaulay provides its students with exclusive access to dedicated travel and fellowship funds underwritten entirely by private philanthropy. In addition, Macaulay students who are residents of New York State receive a full-tuition, merit scholarship.