On Friday night and Saturday, November 26th and 27th the International Forum on Globalization (IFG) held a Teach-In at Benaroya Symphony Hall in Seattle on the subject of Economic Globalization and the Role of the WTO. The following is a hypertext transcript of David Suzuki, first speaker of Saturday's panel on "The Last Invasion: Biotechnology, Patents on Life, Frankenfoods--The Role of the WTO in the Corporate Takeover of the Structures of Life". He was introduced by Peter Rosset, Executive Director Food First, The Institute for Food and Development Policy.

The ratitor ***urges one-and-all*** to join the IFG. It's Board of Directors and Associates comprise a unique and unparalleled-in-the-life-of-our-time collaboration of research, intelligence, and concern, magnificently articulated by scholars, writers, academics, scientists, farmers, geneticists, businesspeople, and lawyers. By joining this collective, we support the further expansion of life's needs and thus become more infused with the energy to serve and honor all the life expressing itself throughout our planetary home.

The order form for the cassette tape recordings of this entire Teach-In is available at http://www.ifg.org/tof4.html. **They are magnificent**. ***Everyone*** is urged to purchase these resources from the IFG. Listen to the tapes multiple times, learn what they articulate, share with your friends. The information in these publications is ***extremely valuable!!!***

The Dark Side of Genetics and The Implications of the Biotechnology Revolution

David Suzuki speaking at the Seattle IFG Teach-In
11/27/99

Our first panelist *almost* needs no introduction. Doctor David Suzuki is loved by many who have seen his television program, *The Nature of the Things*, now I understand in its 40th season -- probably the longest-running television program anywhere in the world. He is perhaps Canada's best-known environmentalist. Author of many books, one of which was *Genethics: The Ethics of Engineering Life*. His newest book is *From Naked Ape to Superspecies*. He is the president of the David Suzuki Foundation. And it is my pleasure to present to you, Dr. David Suzuki.

Thank you. I can't tell you what a thrill it is to be invited here to be a part of this. I had every intention of just being a member of the audience and Jerry kept bugging me to take a more active role. I felt I didn't have anything to contribute. I see all of the many, many heroes of my life sitting in the audience and up here on stage. So it's a wonderful privilege for me to be here and I thank the International Forum.

I would like to just set a context within which the others on the panel can describe in more detail the implications of the biotechnology revolution. Although I have been working for many years in the area of genetics and environment, and community economic development, I am by training and by inclination, a geneticist. I graduated in 1961 with a Ph.D. in genetics from the University of Chicago and went on ultimately to have the largest grant in Canada in genetics and the largest lab in genetics during the '70s.

In the 1980s I deliberately left research. I gave up my government grant at the very time that genetics was taking off. At the very time that biotechnology was emerging as not only an exciting area, but one that was very lucrative, financially. Because I felt that there was a need for a group of people who could give credible, knowledgeable critiques of what the implications of this new area might be.

I knew from personal experience what most geneticists either don't acknowledge or don't even know about. And that is the dark side of this very young science.

I am a third generation Canadian. Like my Canadian-born parents, I too was born in Vancouver. In 1942, shortly after Pearl Harbor on December 7, 1941, my family was deprived of all rights of citizenship. Our property was confiscated and we were shipped to internment camps deep in the Rocky Mountains for a period of three years. When the war came to an end we were given a choice of taking a free, one-way ticket to Japan, or going east of the Rocky Mountains. And so as Canadians, we had no choice. Canada was our home. We ended up in central Canada.

The crime for which we were punished was the possession of genes that had come from the country of our enemies, three generations before. What had determined our fate had been set in motion many decades before -- unknown to me.

In the exuberance of the excitement over the discovery of new principles of heredity -- that seemed to apply across the plant and animal kingdoms -- geneticists began to make wonderful, wild statements about the implications of their discoveries. I'm sure most of you know that it ultimately led to what was considered a *legitimate area* of science called Eugenics.

Some of our most eminent geneticists taught courses in eugenics, wrote textbooks in eugenics, published articles in eugenics journals. Eugenics being the attempt to apply the new-found knowledge of heredity to improve the genetic quality or makeup of human society.

I would like to quote just one of these eminent geneticists, a professor at Harvard University. He became president of the Genetics Society of America, Edward East, who wrote in his textbook on Eugenics, "In reality the Negro is inferior to the white. This is not conjecture or speculation. It is a crude statement of scientific fact."

Now, inferior and superior are words that are value-laden terms. They have nothing to do with the science. But in their intoxication with their discoveries, geneticists very easily confused their beliefs and their own values with what were scientifically confirmed truths.

Our incarceration as Japanese-Canadians was a result of the kind of thinking reflected by one of the members of Parliament from British Columbia who said and I quote, "Nine times out of ten, a cross between an Asian and a White results in mongrel wastrel with none of the redeeming qualities of either race." Now, this is not a 3-to-1 ration in a Mendelian cross. But he actually tried to set a number to it: a 9-to-1 ratio.

He went on at a later time to say, "We in British Columbia are firmly convinced, once a Jap, always a Jap." That statement reflected General John DeWitt's thinking, the man in charge of the Japanese-American evacuation, when he said, "It doesn't matter where a Japanese is born. They're sneaky and can't be trusted."

Now, these are all statements of a hereditarian belief; that things like deceit or treachery in fact, can be related to hereditary makeup. Scientists, we have found very clearly from

history, have been quite willing to extrapolate the wonders of their discoveries and the implications for humankind.

Because the kind of thinking that resulted in the incarceration of Japanese-Canadians and Japanese-Americans was reflected as well in the very progressive policies of the NAZI Party in Germany that led to the race purification acts and ultimately to the horror of the holocaust. I want to remind you that Josef Mengele, the infamous scientist at Auschwitz, was a geneticist who at the time he was doing his twin studies at Auschwitz, was carrying two peer-reviewed grants.

That is something, I think, that if geneticists don't know -- and even though I had gone to an undergraduate liberal arts college, I never knew about this history of genetics -- then, it is very easy to overlook the possible dangers and continue to ride the bandwagon of excitement and exuberance over what is truly a revolutionary, new stage in this infant field that is biotechnology.

Today, I see experiments being done in undergraduate laboratories that I never *dreamed* I would ever live to see. I see questions being answered that I never thought possible to answer within my lifetime. So it's understandable why geneticists are excited.

But in our intoxication with the new powers and potential, we now have the possibility to make money. As we rush to apply our new insights, we forget the fact that the reality is most of our current ideas at the cutting edge of science are *wrong.* They are *irrelevant,* or in need of radical modification.

I said I graduated in 1961. It was a good University and we were *hot*. We knew what DNA was. We'd heard of operons and cistrons. We knew about chromosomes and genetic regulation. And we set out to conquer the world with our knowledge.

Today I go into a laboratory and I tell students, the *models,* the *ideas* that we believed were so hot in 1961, and they fall on the floor laughing. Because seen in 1999, the ideas of 1961 seem *absurd* and they *are*. But the very *nature of science,* is that *most* of our ideas at the cutting edge of knowledge *are wrong*. *That's how science progresses.* I tell these young students, 'When you're a hotshot professor 20 years from now, and you tell your students what you believed in 1999, they'll be just as amused by those old-fashioned ideas.

So then what is the *rush* to apply these incremental gains of knowledge that we have as we publish? They are trumpeted as "breakthroughs" -- one of the most *overused* and *wrong* words that I can imagine, in the media; "breakthroughs." These incremental acquisitions of knowledge, now because of the grand hopes and claims, we feel are opportunities that must be exploited immediately. And yet as I say, the vast bulk of what we currently believe is true, will ultimately be shown to be wrong.

This is not in any way, a denigration of *science*. It is the very *way* that science *progresses.* You get a set of observations; you try to make sense of them by constructing an hypothesis. You test the hypothesis and chances are, you go, 'Oh man, was *that* ever wrong. We better do something else.' Or you modify it and change it around. That is how science progresses. But we forget that.

As Rachel Carson pointed out so presciently in 1962, -- in her case it was pesticides, but it can be said to be for all technologies -- technology has enormous benefits but they always have costs. Because our knowledge base is so *limited*, about how the world around us operates, it is almost impossible for us to anticipate or predict what the long-term consequences are going to be. I feel in biotechnology, if it is a revolutionary technology (and it is), all the more reason then to heed the kinds of warnings that Rachel Carson made about another technology generations before.

Biotechnologists -- it seems to me -- want to have it both ways. They want to get lots of people to invest in it, because it is a growth area on the stock market, by saying that it is a revolutionary science with enormous potential. But when critics then suggested that there may be equally dangerous possibilities, they say, 'No no no -- this isn't revolutionary stuff at all. It happens in nature. It is just DNA. We are just moving DNA around and that happens in nature all the time.'

I don't think you can have it both ways. It can't be revolutionary on the one hand, but not on the other. *It is* revolutionary. And it *is* revolutionary because in nature, genes don't normally transfer laterally, or horizontally, across species boundaries. We know genes are not selected by evolution, or natural selection, on an *individual* basis. The *entire genome* is an *integrated entity* in which the sum total of those genes and their expression in the phenotype *is* what is selected.

When you transfer a gene horizontally from one species to another, you alter completely the *context* within which that gene finds itself. And we simply haven't had the time to work out what the basic principles are when we do this *lateral transfer. All* of our concepts of the inheritance of genes and the behavior of genes is based on the study within a species. You cross a male and a female, you look at their offspring, cross them, and you follow down in a vertical fashion within a species.

Now we do it horizontally and there geneticists make, what I believe, is a fundamental mistake. They assume that the principles governing heredity vertically are going to apply equally, horizontally. There is simply *no* reason to make that assumption.

This isn't brain surgery or very intricate engineering. People don't take a gene and very specifically stitch it in to a specific spot, next to the promoters and regulators and all that. As you know, plant geneticists load DNA onto what is essentially little bits of buckshot and shoot it into the plant. This is *not* sophisticated *stuff*.

And we simply *don't have the knowledge* to be able to anticipate what the consequences of this kind of engineering will be. I take what is a very *moderate* position, it seems to me. That is, in view of the fact of the enormous potential as was sited by the Chair here, of these organisms behaving much like an alien species in a new environment, the ecological consequences of the transgenic organisms are immense. The health aspects, of course, at this point, we have no idea. Since we have so many questions, the research, I believe, should go on but it should go in on in very strongly controlled laboratories. But it is far too early and geneticists ought to know better than to rush all of these out into the field as soon as possible.

Some of you who are from Canada know that I really have made my first public statements

on GMOs only within the last month. There has been a very concerted effort on the part of the biotech industry now to attack my credibility. One of the points that is claimed is that the critics don't know what they are talking about and that there is no evidence to support their concerns.

And yet, the vaunted *claims* of the enormous *benefits* of biotechnology are *every bit* -- I would even say *more speculative* and uncertain, than what the proponents suggest are real concerns of the technology. So, until we know in more detail what the basis is, either for the benefits or the hazards, we ought to keep this stuff confined to the lab.

Now in Canada we've gone far too far. This has been slipped into the food stream. There are over 40 different GMOs already in our diets. We have no labeling. There has been no public discussion about this. My position is, at the *very,* very least, there should be mandatory labels. Why? We learned very expensively that research experiments were done with members of the general public in the '50s and '60s without their being informed and without getting consent. We know today that informed consent is an absolute minimum before people become a part of any kind of experiment. *We are part of an experiment with no informed consent.*

So I come to you as a geneticist. I apologize for most of my colleagues who seem so anxious to ignore the kinds of concerns that I have. And say that for the sake of *genetics* for heavens sake, we had better inform them about the history of their discipline and inform them about the *tentative nature* of the kind of ideas that we have and, therefore, the need for extreme caution.

Thank you very much.