

full and fair test should be the priority item on both the federal and state regulatory agenda...

“The task facing the communications industry—both the companies involved and the regulators—is to let go of the unnecessary trappings of the past and embrace the future as quickly, as courageously, and as wisely as we can. The end continues to be the public interest, but the means must change to fit the times.

“In just a few weeks, America will go to the polls to elect a president. Whoever takes the oath of office next January faces formidable challenges. The most pressing challenge will be to forge policies to invigorate America’s economic growth, invigorate America’s investment and productivity, and invigorate America’s global competitiveness...

“My message to the future president is: ‘Recognize the importance of the U.S. telecommunications industry to the future economic health of our nation. Support and develop policies that strengthen this industry—not hobble it by unnecessary regulation, or micro-management of these markets. Support policies that liberate rather than limit the innovative and competitive spirit that resides in this industry.’ We can help America work even better.”

**Dr. Francis S. Collins:
The Genome and Medicine**

Dr. Francis S. Collins was director of the National Center for Human Genome Research when he addressed The Economic Club of Chicago on February 23, 1995.



“Many people think of genetics as diseases that affect a small number of individuals, somebody else’s children, not necessarily something that has an immediate impact. But, I would ask you, what runs in your family?

If you think about it, what do your relatives have, maybe at a higher frequency than other peoples’ relatives do, at least in your perception? And I think most of us have something. For me it’s cancer. It’s also alcoholism. And those are conditions both of which we know have genetic origins, but we don’t understand them very well. What is it in your family? And would you want to know if I could set up a booth out there at the end of the dinner, and ask you to donate a blood sample, would you want me to tell you tomorrow, in fact, what are your specific risks for future illness? Whether the thing that runs in your family is relevant to you? Or whether you’ve escaped that? Would you want to know? It’s time to start thinking about those questions, because the possibility of doing that is coming along very quickly.

“Now, the reason that I say genetics ought to be thought of in broader terms than we have before is basically that virtually all disease, except maybe getting hit by a bus on the way to this dinner, has a genetic component. Even infectious diseases, which you think of as being caused by a virus, or bacteria, do have some interaction with the host. That is, the person who’s exposed. And we know that some people exposed to, say, the AIDS virus, never become positive for that whereas others do after only a brief number of exposures. What’s the

difference? It may, in fact, be encoded within their genetic material what their susceptibility is going to be. The Genome Project offers the opportunity to uncover the genetic basis of virtually all disease. And that really is going to have a profound impact on the way we understand disease...

“So, what is DNA anyway...This is a cell. Your body is made up of about ten to the fourteenth power of these. And, as a first approximation, every cell has within it the same DNA. That’s sort of stunning. You carry around a complete blueprint inside every cell. And every time you make a new cell, you’ve got to copy this stuff. And there’s a lot of it. Here you see it sort of spilling out of the nucleus. And if you could look at it, you’d see it’s this double helix that Watson and Crick uncovered more than forty years ago. And the information capacity of this molecule is really very simple. It consists of the series of letters which have only four possibilities – A, C, G and T, that are arrayed along the strand. And A always pairs with T, and G always pairs with C. So, if you know the sequence of one strand, you know the sequence of the other. That’s the information storehouse of all living things. Now, this is a fairly well-kept secret.

“I don’t know how many of you got turned off to biology in high school. But I sure did, because they didn’t talk about things that were interesting, powerful and principal-based like this. They talked about memorizing the parts of the crayfish... It’s really a shame. I’m glad there are high school students here tonight facilitating this. And I bet you have learned biology in it’s most powerful, compelling, beautiful form, which is often based upon this basic molecule of DNA and the information that flows from it to RNA, and then to protein...

“Now, this sequence of letters, there’s only four of them, has to encode everything that a cell has to do, that a person has to do. All of that information has to be built into that sequence of A, C, G and T. So, how many of those would you think it would take to specify a human being? What would you guess is the number of As, Cs, Gs and Ts in all of the

human DNA? This stuff we call the Genome? It’s a hard thing to guess. I would have guessed a really big number. I mean, really big number. It’s actually a number you could almost get your mind around. It’s three billion basically. Three billion. Now, that’s a big number. But when you live in Washington, as I now do, three billion is almost nothing. So, all is relative, I suppose. And in fact, when you think about it, that’s pretty surprising. Three billion A, C, G and T is everything you need to go from being a single celled human embryo, which you all were, I promise you, and develop into an adult human being who’s sitting here now absorbing this information, I hope, and enjoying it, I hope. And doing all the things that you have to do as a very complicated organism, with the many functions you have to carry out in any given moment. That’s all built into three billion of these letters. Pretty remarkable.

“Now, in addition, of course, all of the genetic pre-dispositions to illness are built into these letters as well. And many of them are very subtle. If you had a C there, instead of a G, and it was in a very important gene, that had a very important function, that might cause you to develop an illness. Maybe as a child. Maybe as an adult. And the goal of the Genome Project is to uncover those influences. It’s wonderful basic science. It’s probably good for the economy. In fact, I’m sure it is. But, the real goal of this project is to understand human health well enough to do something about the diseases that we don’t have very good answers for right now. And let’s face it. Most of medicine now is pretty empirical. You describe an illness. You hope to develop some treatment for it, often based on empirical information. And if you’re fortunate, it does some good. But, there’s a vast amount of things we don’t understand. The promise of the Genome Project is to go to the most basic level: that of the gene. And try to sort out what’s really going on. And then be able to do something about it...”