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Genomics: The Perception of the Public and the Press

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You are all aware of the story which starts with the pilot's voice coming over the address system in the airplane to announce: "We've got good news and bad news. The good news is that we have a tail wind and we're getting to our destination faster than ever. The bad news is that our compass is broken and we don't have the foggiest notion where that destination is."

Or to put it in Secretary of Agriculture Dan Glickman's words: "The science got a little ahead of the politics."

It is no secret to this audience – or to any person who has paid attention to the genetic revolution – that the discoveries of the science of biotechnology are, in the words of Eric Lander speaking at a recent event we at the Gene Media Forum put on September 20th, "transforming events."¹ They challenge our view of ourselves. They challenge the notion of race, so deeply imbedded in our culture. They will change the nature of the fight against disease. They have dramatically changed agriculture. They have raised the prospect of feeding the poor with more nutritious food. They have raised the prospect of increased longevity. Just as with Darwin's publication of *Origin of Species* in 1859 and the dropping of the atom bomb on Hiroshima and Nagasaki in 1945, the genetic revolution has and will change our view of ourselves and the world.

As always, however, with revolutionary advances come significant and legitimate social, ethical, and political concerns. Concerns about privacy, particularly about medical and genetic information; we now learn, for example, that attempts to increase the security of medical records threatens hospitals' fund raising efforts. While it is true that the use of bioengineered crops can dramatically reduce the use of dangerous pesticides and precious water, it is also true that there are important environmental concerns raised over the use of genetically modified organisms. The concerns over plant biotechnology are very apt to spill over into the area of medical biotechnology.

All of these concerns are real, and deeply felt by a segment of the population. At its heart, however, I think that the concern and the fuss are over some fundamental issues: what does it mean to be human, what is nature, and what is our place in the world? Is globalization good for us? Is science moving too fast, without adequate controls? Who are the winners, and who are the losers?

It sometimes seems to those of us in the business – either in the production of the science or its utilization – that everyone must know everything about it. It has been headlined everywhere, it has been on television, and numerous books have been written. One leading researcher even said he was tired of going over the same ground all the time. We think the public knows all they need to know. Who doesn't know about it?

It turns out that the group that defines itself as ignorant or poorly informed about the issue is a large one. Most people, in fact. The *Los Angeles Times*, for example, tells us that a scant 14% of the population pays close attention to this issue.² The Harris Poll puts the number at 15%.³

Personal experience underlines the point. I have been leading tours through the Paradise Now: Picturing the Genetic Revolution exhibit at the Exit Art Gallery in SOHO, an exhibit of 39 artists exploring a variety of issues raised by developments in genomics. I find that even here, at an exhibit that draws people who are interested in genetics and its social implications, people do not know the difference between a gene and a genome; they may know the phrase DNA but don't really know what it is, and don't understand the far-reaching implications this has.

Generally, the public is supportive of genetic science, as it is supportive of science in general. *Science Indicators*, the comprehensive survey published every other year by the National Science Foundation, for example, finds that “in 1999, 44 percent of those interviewed agreed that the benefits [of genetic engineering] outweigh the harms,”⁴ compared to 38% who felt the reverse. The Harris Poll on June 28, 2000, however, reported that “A clear, but not huge, 48% to 38% plurality believes that the **risks of GM crops and foods outweigh the benefits.**” [emphasis in original]

Hidden in these data are some troubling indications. For example, *Science Indicators* reports: “Although no detectable change occurred in overall public attitudes toward genetic engineering in the late 1990s, there was an increase in the number of reservations among (1) college graduates and (2) that portion of the public classified as attentive to new medical discoveries. Among the former, the percentage who agreed that the harms of genetic engineering are greater than the benefits increased from 20 percent in 1995 to 29 percent in 1999. Among the latter group, the percentage rose from 30 percent in 1997 to 36 percent in 1999.” [emphasis in original]⁵

Any pollster worth his or her salt will tell you, at least in private, that there is no way to validate these figures. With Presidential election predictions, the numbers Wednesday morning may make some pollsters' reputation and destroy others', but in the end, there is still no way of judging the accuracy of any polling other than what will happen on election day. However, there is a certain consistency in these data about public attitudes toward genetic engineering, and we should take them seriously as an indication, not a definition, of how people feel about things. The indication, for example, that the people who pay most attention to the issue are getting more nervous about it is certainly cause for concern. Monsanto ignored the possibility of negative public opinion, and gave us a new term “monsanto-ized.”

We face a very interesting dilemma. On the one hand, Americans, along with others in the developed world, continue to have faith in science and technology to improve their lives. Again, *Science Indicators* reports: “increasing percentages of Americans *agreeing* that ‘science and technology are making our lives healthier, easier, and more comfortable’ and *disagreeing* that ‘we depend too much on science and not enough on faith.’” [emphasis in original]⁶

On the other hand: “Belief in paranormal phenomena, including astrology, extrasensory perception, and alien abductions, is fairly widespread.” [emphasis in original] Also: “The number of people who feel either well informed or moderately well informed about science and technology is fairly low.” 17% felt themselves well informed, while 30% felt they were poorly informed. And perhaps most important: “About three quarters of Americans lack a clear understanding of the nature of scientific inquiry.”⁷

It adds up to a troubling picture. While Americans generally have a positive view of science and technology, it may be no more than skin deep. Much of that attitude comes from the undeniably useful products that have resulted from developments in science and technology. Anybody who longs for the “good old days” has never read a description of mid-nineteenth century Washington, DC, for example, as put forth in Gore Vidal’s novel about the Abraham Lincoln administration. Smelly, muddy streets; no sanitation systems; a disease rampant society; mosquitoes and other bugs everywhere; no air conditioning; the list goes on and on. Science has been, overall, a tremendous benefit to the human race.

The general attitude also comes from the notion of the scientist, portrayed in film, television, and literature, of the selfless researcher working for the public good. Nerdy, perhaps, but well intentioned and a public servant. To be sure, there are enough “mad scientists” portrayed in vehicles of mass communication to warrant mention, but data suggest that the public pretty much ignores this portrayal, and sticks with the “scientist as savior” image. Indeed, science is so much a good thing that we have “scientific diets,” “scientific perfumes;” we even now have a “DNA perfume.” Many commentators, in fact, decry the excessive confidence on the part of the public about the ability of science to solve social problems.

With that in mind, let’s look at some recent headlines from the New York Times about biotechnology.

Biotech Industry Flexes New Muscle; Investors Pump Cash Into Research (August 24, 2000)

Modified Foods Put Companies In a Quandary (June 4, 2000)

The Manic Markets; After Pruning, a Chance To Pick in Biotechnology (April 23, 2000)

Industry Moves to Defend Biotechnology (April 4, 2000)

REDESIGNING NATURE/ A special report.; In the Heartland, Genetic Promises (March 17, 2000)

INVESTING; Another Boom in Biotechnology Stocks (January 23, 2000)

OUTLOOK 2000: ECONOMY & INDUSTRY; Rocky Outlook for Genetically Engineered Crops (December 20, 1999)

OUTLOOK 2000: ECONOMY & INDUSTRY; In the Works: Drugs Tailored to Individual Patients (December 21, 1999)

Plotting Corporate Futures; Biotechnology Examines What Could Go Wrong (June 24, 1999)

There are many more. Science is irrevocably and undeniably now part of the economic enterprise as never before. So much so that it has already changed the nature of universities and the scientists working therein; indeed, according to Craig Venter, CEO of Celera, speaking at the Gene Media Forum's September 20th event "What Can We Expect:" "Some universities are our best biotech companies."

"Ay, there's the rub." Science has become big business. The barriers between "basic" and "applied" research have fallen. This morning's exciting discovery at the lab bench can become this afternoon's IPO.

Again, this is the good news and the bad news. The good news is obvious. We live in a capitalist society. In that society, it is the responsibility of business to bring the products of science and technology to the marketplace, where real people can buy real things that have real benefits. That is wonderful.

The bad news might not be so obvious. But ask yourself which has the higher approval rating among the American public, science or business? If you wanted to cover yourself with a cloak of goodwill, would you choose science or business? To guide you in your answer, you should know that *Science Indicators 2000* reported that confidence in institutions ran in this order: Medicine first, followed by science, the Supreme Court, the military, education, major companies, and organized religion. Last, it should be noted – and we will come back to this later – is press and television.⁸

There is an interesting footnote to these data. While confidence in science has remained fairly constant over the years, confidence in medicine, while higher than that for any other institution, has waned. As high as 60% in 1974 (meaning that 60% of those surveyed had a "high degree of confidence" in it), it fell to 40% in 1999, the latest year of available data.

Let us now turn to the future. What does this mean? Are we content with this relatively low level of public understanding, either of science in general or genomics in particular? If not, what should we do about it?

Anytime one is on an exponential growth curve, the terrain behind you looks flat and that in front of you seems a steep hill. That is, what has been discovered in the past seems relatively little; what has yet to be discovered and which will be discovered seems like a flood of information. Whether it is good or bad – and most of us would agree that it is good – despite the announcements of “The End of Science,” the title of John Horgan’s book, we are still on that exponential curve. As Harold Varmus said at a meeting of the Gene Media Forum, the “race” to complete the human genome is really a race to the starting line. Matt Riddley has a wonderful metaphor in his book *Genome*: the knowledge we are creating is like a meadow in the forest. The larger the meadow of discoveries, the larger the forest of yet-to-be-discovered information.

The implications are obvious. If the science has gotten a little ahead of the politics thus far, in the future it is going to be racing ahead of the politics and of public understanding, unless we do something about it. And the implications of that phenomenon, I think, are just as obvious. A public that does not understand something is apt to reject it. There are enough scary things, both real and imagined, about the genetic revolution which we see before us to satisfy any scaremonger. Huge benefits, as we have said, but also some real issues.

We must, therefore, do something about the relatively low understanding of the public of the genetic revolution. I’m going to talk primarily about one way, but there are many. They all must be tried.

Despite its last place showing in the confidence pennant race, I’m going to talk about the media, both press and television. That is where people get their information. And despite much attention to major newspapers and network television, we learn from the Pew Center on the People and the Press that while 30% of the population watches network news regularly, and 46% read a newspaper every day, 56% watch local television news on a daily basis. Ask yourself how many times you have seen thoughtful, informative coverage of genomics on local television and you see the dimensions of the problem. Nonetheless, it is an area we must deal with.

Science reporting is hard. Cornelia Dean, science editor of the *New York Times*, speaking at the GMF September 20th session I spoke about earlier, said about reporting in this area: “Science journalism has a problem, and it is a problem that must be solved by scientists.” Going on to talk about a science writer’s life – having to write many stories on very different subjects, each one of which has complications which must be dealt with – she stated that there is no way the writers can get it right all the time, without significant effort on the part of the scientific community itself.

That same theme is echoed in some very compelling pieces in the current issue of *Science Writer*, the quarterly publication of the National Association of Science Writers. For

example, Robert Kanigel, a professor of science writing at MIT, says in an article entitled “The Perils of Popularizing Science,” “Here, then, is the essential step, the one that makes popularizing what it is and makes it so difficult: It’s the change of frame. It’s seeing a subject not through the eyes of a neuroscientist, chessmaster, or choreographer, but through the sometimes vacant eyes of the rest of us. To popularize means never writing from one insider to another.”⁹

Roger Highfield, science editor of the *Daily Telegraph* in London, writes in the same publication: “Scientists could learn from the journalist’s obsession with the reader. ... It is ... important to create a genuine dialogue with one’s ‘market.’” Articles, to be effective, “must speak to a basic human need. Scientists take note.”¹⁰

Yes, take note indeed. For Robert Kanigel starts his article by referring to a *New Yorker* cartoon describing two elder scientists in the “autumn of their careers, reminiscing about old times. ‘One thing I’ll say for us, Meyer,’ says one to the other, ‘we never stooped to popularizing science.’”¹¹ The notion of science as priesthood, as something that only the cognoscenti can understand, is dying, to be sure, but is not dead yet. In my darker days, I think nothing has changed since the day long ago when the *New York Times*, in a 1919 sub headline announcing the experimental verification of Einstein’s theory of relativity, spoke of a “Theory for Ten Wise Men.”

The message is clear. The public, while generally supportive of science in general and genomics in particular, is nervous about it and does not know enough to allay those fears, nor to make a really informed judgement on the many policy issues which are here already. It is also clear that whatever issues are there today, there will be ten times more tomorrow, ten times that the day after tomorrow, and so forth. That is what being on an exponential curve is all about.

It is essential, therefore, that there be a marriage between the science and media communities to bring this deeper understanding about. It may need marriage counselors to avoid going to the divorce court, but the deep suspicion and antagonism that still exist in places must be overcome. Perhaps marriage is too strong a word. I wish to convey the notion of a strong bond and working relationship, one that emphasizes the skill of both parties – the scientist as the producer of new knowledge, and the journalist as the translator to the public whom they study – to bring about another revolution, the revolution in the understanding of this science. Scientist and journalist, both take note.

¹ Highlights of this session can be seen at www.genemedia.org, as can the transcript.

² Mimi Avins, “Genome Map Success: Much Yet to Discover,” *Los Angeles Times*, August 7, 2000, page E-1

³ Harris Poll, June 28, 2000

⁴ National Science Foundation, *Science Indicators*, Chapter 8, “Science and Technology: Public Attitudes and Public Understanding,” page 7 (available at www.nsf.gov/srs/scind00/c8/c8s2.htm)

⁵ Ibid, page 1

⁶ Ibid, page 1

⁷ Ibid, page 1-2

⁸ Ibid, “Public Attitudes toward Science and Technology,” page 6

⁹ Robert Kanigel, “The Perils of Popularizing Science,” *Science Writer*, Summer 2000, page 5 (edited from “The Perils of Popularizing Science,” the Seventh Alfred and Julia Hill Lecture on Science, Society and the Mass Media, delivered April 7, 1999, University of Tennessee, Knoxville)

¹⁰ Roger Highfield, “Science Writing From Across the Pond,” *Science Writer*, Summer 2000, page 9 (Originally appeared as “Selling Science to the Public (Essays on Science and Society), *Science*, Vol. 289. 7 July 2000)

¹¹ Kanigel, *op.cit*