Jurassic Park and the "Gay Gene": The New Genetics Seen through the Distorting Lens of the Media

Two news stories that broke in July, each momentarily capturing the public's attention, were the opening of the film *Jurassic Park* and the report in *Science* that came to be designated in the news media as the discovery of the "gay gene." On the surface, these stories would seem to have little connection with one another, the first concerning an event in the worlds of entertainment and commerce, the second a piece of scientific research. Just below the surface, however, the connection becomes apparent: both news stories concern the power of the genetic material, DNA, and also the growing power of the new genetics to manipulate and analyze DNA. Although these stories exemplify and further the public interest in genetics, which in itself is to be welcomed—as is any public interest in science—they also illustrate and contribute to the growing public myths and misunderstandings about genetics. This brew of misinformation is stirred by the various forms of the media and, regrettably, sometimes by the scientists themselves. In the misconceptions that are now being perpetuated lies the potential for much trouble, both for society as a whole and for biological science.

The reporting on *Jurassic Park* and on the "gay gene" illustrate different, and indeed complementary, distortions in perceptions about the new genetics. The film, and the book of the same name by Michael Crichton, greatly exaggerate what molecular genetics can do, i.e., the power of science itself, whereas the "gay gene" story, as it was picked up by the press and television, conveys an exaggerated picture of what DNA itself does in the production of particular traits.

Jurassic Park, as few people other than contemporary Rip van Winkles can fail to be aware, concerns the resurrection of dinosaurs by cloning of DNA from dinosaur blood cells in amber-entombed ancient mosquitoes. In the story, the dinosaur genomes, which are not intact, are completed by "filling in" with DNA from living, ostensibly related species (frogs!!!), and then incubated happily in the cytoplasm of surrogate eggs, those from crocodiles. Presto, with a little bit of help from incubators and loving technicians, one has living, breathing, and, ultimately, rampaging dinosaurs.

This is fiction, of course, entertaining fiction at that, and if everyone regarded it in that light there would not be the slightest problem. The unfortunate reality is that this scenario is treated not as a virtual impossibility, which is precisely what it is, but as something that might be just around the corner. That it is an impossibility, for several reasons, should be stressed. First, as noted in a recent article by Stephen Jay Gould (1), only tiny fragments of DNA have been found so far from organisms millions of years old while the chemical nature of DNA makes it a certainty that no completely intact dinosaur genomes will ever be found. Reconstructing the huge missing segments is not possible—if the information is gone, it is gone forever (1). Second, a point not emphasized by any of the commentators so far is that even if one had a complete dinosaur genome in functional dinosaur chromosomes (another difficulty rather blithely overlooked), you would need dinosaur oocyte cytoplasm of the right species to get proper early development. It seems a certainty that not just any vaguely related oocyte cytoplasm would do, as a host of earlier experiments on mammals and amphibians, involving hybridization and reciprocal crosses, long ago made clear (2, 3).

Yet, what has been portrayed in most of the popular accounts is that the "Jurassic Park" scenario is only just short of present-day feasibility. This attitude has been furthered by unexpected sources. Thus, *Nature (London)*, a journal not known previously for its film reviews, commented on *Jurassic Park* that "the scientific theme is not completely outrageous; unless one looks too closely, there is nothing impossible about any of it in theory" (4). Although the qualification in mid-sentence half-negates the conclusion, this statement is a far cry from stating that the film's basic premise is false. And in a science education television series in Britain, *Equinox*, a program titled *The Real Jurassic Park* (screened on July 18) purported to show how the fiction was only just short of present-day capabilities. A number of well-known, respected scientists appeared on this program and played along with the game, though fortunately some at least looked a little embarrassed. The public perceptions of the realities have been shaped by material such as this.

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Although it may not matter in itself whether people believe that scientists can resurrect dinosaurs from small gene fragments, such beliefs can only fuel public paranoia about cloning of other organisms, in particular, that of human beings both living and dead, and the more general fears about the willful manipulation of human genetic material aimed at the genetic engineering of humanity. The Dr. Frankenstein image is not one that geneticists need or deserve at this time, yet it is clear from interviews that both Michael Crichton and Steven Spielberg (the director of the film) see *Jurassic Park* as an explicit warning against the Frankensteinian tendencies of genetic science. Inevitably, such warnings will have an effect on public attitudes, no matter how much people are willing to enjoy films such as this as straight entertainment.

The reporting of the "gay gene" work, though not the original report itself (5), conveys another set of misconceptions—those about the genetic determination of complex, human traits. While Hamer et al. (5) were careful to stipulate that a trait as complex as human sexual orientation can have multiple genetic and environmental causative factors, that what was mapped was a genetic predisposition and not a determinative factor, that more than one gene might be involved,

and that not all the male homosexual men in their sample carried the indicated X-chromosomal region, most of the press was content to report this as a finding of either "a gay gene" or "the gay gene." General discussions in the television, radio and newspaper reports were conspicuous for their absence of a discussion of the concept of heritability and the fact that all complex traits, both behavioral and physical, necessarily have both genetic and environmental components in their determination.

This work, which looks particularly solid in its statistical base, can nevertheless be seen as part of a long series of attempts to map the genetic bases of complex human traits, many of which have had to be retracted. While the mapping of quantitative traits in plants and animals bred for agriculture is of undoubted value, a question must hang over the usefulness, aims, and possible dangers of mapping complex human behavioral traits, especially when the traits are socially stigmatized to some degree or other. Just as important, this kind of work inevitably enforces a certain kind of simpleminded genetic determinism in the public eye, even when the authors disclaim such views. To some extent, the genome projects seem to be returning society to earlier views about genetic determinism that were at the heart of the eugenics movement in the first part of this century (6, 7). These public perceptions are reinforced by various public musings of genome researchers on the possible genetic basis of traits ranging from shyness to criminality.

As with dinosaur cloning, one might shrug and say: so what? Many people, for instance, believe in UFOs and that belief does not seem to have undermined society in any way. Yet genetics, unfortunately, *is* different—it is, in every sense, closer to home, affecting our view of our very own nature and our capacity for directing our own lives. While it is undoubtedly progress to have moved beyond the opposite extreme views about environmental determination of traits that tended to dominate discussions of human behavior from the 1950s through the 1970s, the survival of civil society in democracies is dependent on the recognition that neither form of extreme determinism—environmental or genetic—is valid. If, 12 years ago, a convicted murderer was able to obtain a reduced sentence on the grounds that he ate junk food—the so-called "Twinkie roll" defense—can one not imagine pleas in criminal cases, in the not too distant future, of "My genes made me do it"?

Ultimately, if the public is to have a more balanced view of genetics and of what the people who do it can and cannot achieve, the answer must lie in better public education. This must include fuller and more accurate portrayals of genetics in the public schools—teachers will have to go beyond Mendel's pea plants and deal with complex traits and the general concept of heritability, if not the mathematics. In addition, one may hope that serious television programs or series of the kind that Jacob Bronowski and Kenneth Clarke made in the 1970s may play a role in educating the adult public about genetics and its history. Such programs would, of course, only reach a small minority of the population, but an informed small minority in a democracy is better than an informed miniscule one. Last, and not least, scientists will have to strive for greater accuracy and simple truthfulness in discussing genetic ideas and findings in public settings. There is, ultimately, no need for hype or distortion in telling the public about genetics. The realities of genetic science are sufficiently exciting in themselves to attract the public's informed interest and understanding.

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