Eugene Thacker on biomedia

As computer science and molecular biology intermingle, how does our view of the human body change?

The integration of molecular biology and computer science is a very interesting one. When we think about computers or the Internet or digital this and virtual that, we think about immaterial things, which are completely mutable and portable and exist in a strange non-space. It's an abstract notion, yet the reality of computers is that they need hardware, cables, and infrastructure. When we think about biology, we think about the "stuff" of life, material, and things that are physical. It's a tangible notion, yet there are whole strands of biological thinking that go beyond the physical.

When computing and biology come together, you get all sorts of strange hybrid artifacts, like an online genome database, or a DNA chip, or lab-grown tissues and organs.

In some instances, it means our notion of the body is becoming more immaterial or virtual. In other instances, it means the opposite: that, in fact, our notion of the biological and materiality is changing, and that biological materiality is being defined as informational. This means, rather than any kind of body anxiety or posthumanist fantasies of uploading your mind to a computer, there is an insistence that we can control and manipulate biological matter through the lens of informatics.

Is the body itself a biotechnology?

Yeah, sure. I would say that it is, but with the caveat that it has to be articulated as a technology. I wouldn't say that this view is so all encompassing that the body's mere existence means it's a machine or a technology. But once it's articulated or framed in such a way, then definitely it is a technology. That's what I would argue for a definition of biotechnology, that you enframe a "naturally occurring" biological process, and in doing that you make it amenable to

instrumentalization and to being used in all sorts of other contexts – and for ends that might not be biological at all, as with the field of DNA computing, which is a field of mathematics that uses DNA to perform computationally complex problems, whose application has nothing to do with biology; the application is mathematics.

How do you define biomedia?

Biomedia is a specific concept that's meant to describe the informatic reframing of biological components and processes. Packed in that are a couple of ideas. One is the framing or articulating of the biological, as I just mentioned. The other is the way that we articulate biology as a technology, through the lens of informatics, information, and information technologies. This is where we get our common notions now of genetic code or the code script of life. But it's really through the lens of informatics and information technology that you get this combination of the immaterial and material, or biology and technology. It's about the process of identifying the biological, but looking at it through the lens of the informatic.

So we know the linear code script of life, but do we understand its processes and emergent behaviors enough to actually design life?

You and I could go online right now and download the entire human genome and all we'd really have is a long string of As, Ts, Cs, and Gs. The hardest part is yet to come, and scientists are certainly the first to recognize this. There are many basic, fundamental processes that happen in the cell – gene expression, cellular metabolism, cellular signaling – basic processes that you cannot look at in a reductive way. You have to take into account multi-factorial, complex sorts of agencies in understanding them. It's not as if we have one gene that produces one protein and that one protein causes ours eyes to be blue or brown or green. There are proteins that are made by DNA that go back to DNA and act on DNA in a circular process. The majority of phenotypic factors are polygenic, which

means that there is more than one gene that's responsible for traits like eye color.

We should always be skeptical whenever we see a newspaper headline that boldly pronounces, "Scientists may have found the gene for X" – whatever X is. It's a very complex process and there's usually not just one gene that causes X to happen; there are usually multiple genes.

A number of researchers have been looking to different fields – complexity, self-organization, systems theory – in an effort to understand the genome in a more complex manner. Researchers like Stuart Kauffman have been saying this for decades and new fields like systems biology are trying to embrace this new approach. Whether this will translate into new drugs or therapy or maybe even a whole new paradigm in medicine is yet to be seen, but I think it's certainly an interesting step forward.

What are your thoughts on genetically modified foods and transgenics?

There's still a whole host of issues surrounding safety and regulation, but the thing that's interesting to me – and this is a logic that I think you can argue is in every biotech field – is the act of isolating some biological process and then reframing that process in a new context, in a context that's essentially like a factory. Transgenics is a great example. One of the most common uses of transgenics is for the production of particular molecules of compounds for drugs, which would then be used for human use. There are goats, for example, that are genetically engineered to produce human insulin in their milk. This is where biology becomes the factory, an aspect of biotech that has totally changed the notion of what Marx called "living labor." It has been transformed to the effect that we begin to wonder what is performing the labor. Of course there are people working in labs, but there's also labor that's performed by microorganisms, enzymes and genes, 24-7, around the clock.

Breeding new species is not a new agricultural concept, but the new tools seem to render it new and scary.

You're exactly right. What is biotechnology? Really, it's just the use of "life". If you accept a really broad definition, there's archaeological evidence that in ancient Mesopotamia fermentation was being used, and certainly the breeding of livestock. So the funnel can be at its biggest and biotechnology is almost concurrent with human civilization. Or, you can say biotechnology is a particular relationship between human beings and their natural environment. Alternatively, you can be very specific in your definition of biotech and talk about a biotech industry, which emerged in the late '70s with the first IPO's of the biotech companies, such as Cetus or Genentech, Inc. I think it's helpful to not limit oneself and to be mobile and travel between those two poles when talking about biotech, because it is a very big topic and very heterogeneous.

Do you think we'll be able to answer the question "What is life?" with microbiology?

Yes and no. When you talk about "life" to molecular biologists, it has traditionally meant biological life, "life" at the biological level. It hasn't necessarily meant social life, cultural life, psychological life. With molecular biologists, it has been a very specific question, but the question is also meant to evoke a sort of wonder at nature. This is why you see a lot of books with the title What is life? It implies this notion that the concept of "life" will answer the big questions, but it will do it through a very specific lens. On the larger scale, I don't think a scientist would presume to – just because he or she studies the genome – know the larger existential questions about life. Unfortunately, when that has happened, we've gotten into trouble, from the dark side of the eugenics movement in the early part of the twentieth century up to now, with genetic discrimination. It's a very tough bridge to construct, between the molecular biology definition of life and our larger social and political and cultural definition of life. I think that's what the people in

the humanities and social sciences can contribute, in trying to sort out the issues and making that bridge.

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