**Power over Life: The Problem of Biotechnology:**

**Summer 2019 PLS Alumni Seminar**

**Sloan Section**

**DETAILED SYLLABUS**

**Here are the final reading assignments. I have kept these to a minimum and given page numbers. I have attached an introductory discussion that can situate these readings and discussions. If reading time is short, I have starred those that can be made optional.**

***DAY ONE: Life and Its Early Modern “Disenchantment”***

***Readings:***

***• Introductory Discussion: What is Technology? (attached, 9 pages)***

**•**Aristotle, Selection from *On the Soul* (any translation) Bk. II. chp. 1 412a1-413a10. (Online at <http://classics.mit.edu/Aristotle/soul.2.ii.html>) (***4 pages****)*

• Descartes, *Discourse on Method* (1637) Part V (any edition). (Online at <https://www.gutenberg.org/files/59/59-h/59-h.htm>) (***11 pages)***

\*\*Descartes, Selection from *Treatise on Man* (1664) (PLS Website) (***5 pages*)**

***DAY TWO: CONTEMPORARY “DISENCHANTMENT”: THE ENGINEERING IDEAL OF CONTROL***

***Readings:***

***• Introductory Discussion: Contemporary Disenchantment***

**•Nathanial Hawthorne, “The Birthmark”** Online at <https://www.sde.idaho.gov/academic/ela-literacy/files/exemplar/grade-07/masks/Extension-Opportunities/The-Birthmark-Nathaniel-Hawthorne/The-Birthmark-Nathaniel-Hawthorne.pdf> (be sure you use this long version) (***11 pages*)**

• Jacques Loeb, “The Mechanistic Conception of Life” (PLS Website) (***29 pages*)**

**\*\* (optional) pp. 6-14; 15-23**

**•Francis Fukuyama,** *Our Posthuman Future*“Preface, chps. 1, 4 (***34 pages*)**

***Evening Film: FIXED. This full-length film gives an overview of some of the main developments of modern biotechnology as applied to humans.***

***DAY THREE: THE BIOLOGICAL UTOPIA***

***Readings:***

***• Introductory Discussion: The Biological Utopia***

• **Francis Fukuyama,** *Our Posthuman Future*, Chps. 5,6. (***30 pages***)

• **Philip Kitcher, “**Utopian Eugenics” and reply by D. Paul (PLS Website)(***29 pages)***

**\*\*•** **C. Browkowski and M. Adli,**” “CRISPR Ethics: Considerations for Applications of a Powerful Tool,” *Journal of Molecular Biology 2018* (Online at **https://www.sciencedirect.com/science/article/pii/S0022283618305862)**

***DAY FOUR: REFLECTIONS ON BIOTECHNOLOGY***

***Readings:***

***• Introductory Discussion: Reflections on Biotechnology***

• **Francis Fukuyama,** *Our Posthuman Future*, Chps. 8-9 (***64 pages*)**

• **Leon Kass** (Sent by PLS Office) “Biotechnology and Our Human Future” (***20 pages*)**

**•** **Ronald M. Green** (Sent by PLS Office), “Bioethics and Human Betterment” (***17 pages*)**

**\*\* P. R. Sloan,** “A Tale of Three Francises: Toward a Franciscan Biotechnology.” (PLS Website) (***10 pages*)**

***Introductory Discussion: Problem Posing: What is Technology?***

The goal of the Sloan seminars throughout the week is to address some of the key issues in the biotechnological control of life by science. We will approach this complex issue within a larger framework of historical, philosophical, scientific, and ethical reflection that will interface discussions in some great classic texts with more contemporary readings. This mode of inquiry is premised on the claim that many of the issues under discussion today have deep historical roots that feed into the scientific, philosophical, theological, legal, socio-political, and ethical issues that surround modern biotechnology. This initial introductory discussion is intended to set out some of these questions and help us position our discussions.

*What is Technology? The Baconian Project*

To orient ourselves to the question of *BIO*-TECHNOLOGY, we can begin with the distinction between the long and ancient tradition of the *artes liberales—* the arts or “technics” that were assumed to be the liberating arts appropriate to a free citizen— and the more recent distinction of the “sciences” and “humanities” that dates from the nineteenth century. This more recent division of the intellectual landscape distinguished those inquiries concerned with the inner life of humans—ethics, history, poetry, literature, philosophy— the *Geisteswissenschaften*—from those that dealt with external nature—the natural sciences like physics, chemistry, biology, astronomy—the *Naturwissenschaften.*

The modern wedding of “science” and technical craft that we term “technology” does not neatly fall along these boundaries. Yet it raises for us an ever-changing set of new problems of ethical choice—I need only cite the use of nuclear power, the internet, stem-cell research, and genetic engineering as issue that form a source of conflict in the public forum. Our modern technology drives global economics; it is intricately linked with politics and the human-society relation. As philosopher Hans Jonas has developed in an important essay,[[1]](#footnote-1) it also presents us with issues that transcend our immediate concerns and forces us to consider the historical implications of our present actions for an unpredictable future. More generally, we see its ability to transform what has seemed to be the “natural” state of affairs through dynamic techniques that seem to bootstrap themselves continuously to the point that it makes the “natural” itself a problematic category. We see this issue captured in the title of the Fukuyama book, suggesting that biotechnology is leading us to a future “beyond” the human.

*Defining “Technology”*

There is no simple definition of “technology,” and the *Oxford English Dictionary* shows how in English the term originally revolved around the art of grammar or some use of language, and only later became more restricted to our more familiar meaning as having something to do with making artefacts and using machines.[[2]](#footnote-2)

As a classical source, we can find the combination of “techne” and “logos” in Aristotle’s *Ethics*, Book VI as follows:

Art [*techne*] is identical with a state or capacity to make, involving a true course of reasoning. All art is concerned with coming into being, i.e. with contriving and considering how something may come into being which is capable of either being or not being, and whose origin is in the maker and not in the thing made; for art is concerned neither with things that are, or come into being, by necessity, nor with things that do so in accordance with nature (since these have their origin in themselves). Making [*poeisis*] and acting [*praxis*] being different, art must be a matter of making, not of acting. And in a sense chance and art are concerned with the same objects.[[3]](#footnote-3)

In such Greek sources we also find the basis for a distinction between “pure” and “applied” inquiries. For example, the interlocutor in the Platonic dialogue *The Statesman*, obtains from the young Socrates the admission that the sciences are fundamentally divided into the “pure” and “applied,” one practical [*praktikon*] and the other theoretical [*noetikon*].[[4]](#footnote-4) and that the higher knowledge of the statesman is that he knows the true *theoretical* principles of political science, and can therefore advise the practical politician, who has only *applied* technical skill. The applied science is rendered inherently inferior to the pure in this arrangement.

Recent efforts at a definition of “technology” tend to restrict the focus to this latter, “artefactual” meaning of the term. One recent definition suggests that it designates the production of “an artificial, non-naturally occurring object,” but then goes on to give any number of reasons why this definition does not exactly work.[[5]](#footnote-5) A long tradition defines technology as “applied” science, as distinct from “pure” science, with these terms distinguishing what might today be called “basic research” from the use of science for a practical human goal or purpose—engineering.[[6]](#footnote-6) We also can apply the concept to “technological systems,” such as the Internet, that seem to form networks that link together humans, machines, electronics, social organizations, and communications theory in a form that requires attention to the whole system of relations rather than to any single component. This may be the most useful way to think of an area like “biotechnology” for example—not as a single set of practices, *but as an interrelated network of components*.

In an important collection of essays and articles edited by philosophers Carl Mitcham and Robert Mackey on the philosophy of technology they do not try to arrive at a single definition of the subject, but instead distinguish technology into three primary approaches to the problem: 1: epistemological: what is the intellectual status of technology?; 2: anthropological: how does it relate to the nature of man?; and 3: sociological: how is it related to modern society? Our topic is generally concerned with issue two: the anthropological meaning and it certainly leads us into issue three.

*Baconian Technology.*

We can begin our inquiry with a brief consideration of the views of Francis Bacon (1561-1626). Bacon was not himself an active participant in any branch of the new science as it had been developed by Galileo, Kepler, Harvey, Descartes, Gilbert or Copernicus. Unlike his fellow prophet of the new science, René Descartes (1596-1650), he made no immediate additions to the discussions that in any way approached Descartes’s contributions to analytic geometry, physics, or to optical and medical and physiological theory.

Nonetheless, if we read the literature of the century and a half following Bacon’s works, his inspiration on a broad set of inquiries seems immense. He became the prophet for the organization of scientific inquiry into a social body of cooperating members, represented particularly by the Royal Society of London, founded in 1660. Thomas Sprat’s history of that Society places Bacon alongside the royal patron of the society, Charles II in the frontispiece that opens his famous history of the Society.

Bacon is important for drawing together two activities related to the natural world that had previously been separated by the tradition of classical learning as we have seen outlined above. One of these is the investigation of theoretical science as it had been practiced since antiquity by mathematicians and astronomers, represented in his own day by Copernicus, Galileo and Kepler, whose concern was to find the rational order and harmony of the world through discernment of an underlying mathematical language by which the world was ordered and created. This we might term a “contemplative” ideal of science.

The inquiries which Bacon brings to the fore are instead those skills of *techne*  passed on by craftsmen, typically organized at the time into guilds in master-apprentice relationships. In Bacon’s era, it was not the mainstream intellectual tradition, represented by university learning, that had given such arts a higher status, but the undisciplined activities of alchemists, magicians, and radical medical thinkers who had drawn the manipulative and rational inquiries closer together. As illustrated in the Faust myth popularized by Christopher Marlowe in 1588, this search for an arcane knowledge that gave its possessor practical power over nature, could even be diabolical in character. We even have a strong suggestion of this tradition in Hawthorne’s short story, *The Birthmark* that we will read and discuss on Day Two. Prospero in Shakespeare’s *Tempest*, less suggestive of sorcery, has acquired these magical arts through his “secret studies” (Act 1.2 p. 9), and wears this power as a magic robe that allows him to control even the weather*.* But whereas Prospero puts away these powers at the close of the *Tempest*, Bacon picks them up, and gives the union of these inquiries a new kind of respectability, removing this combination from the domain of occult science and black magic.

In the prefatory discourse that preceded the publication of the *New Organon* in 1620, entitled the *Great Instauration*, Bacon sets forth the larger plan of his work of intellectual reform. There is a common theme that runs through his argumentation: ancient learning has led to no practical results, it simply has involved endless disputations, and it needs to be replaced by a new form of inquiry. The “wisdom” derived from the Greeks is only the “boyhood” of knowledge. It gives us only non-progressive knowledge.

For genuine learning that does “progress,” one must look to the “mechanical” rather than to the “theoretical” inquiries. It is the practical arts, originally “rude, clumsy, and shapeless” that in time have acquired new “arrangements and constructions” that do seem to produce practical fruit.[[7]](#footnote-7) Exemplary in illustrating this is the discovery of the arts of “printing, gunpowder and the magnet” which have literally transformed the “face and state of things throughout the world. ”[[8]](#footnote-8) It is Bacon’s intent to bring under rational purview these practical activities and their principles. This new beginning will bring about “a true and lawful marriage between the empirical and rational faculty, the unkind and ill-starred divorce and separation of which has thrown into confusion all the affairs of the human family.”[[9]](#footnote-9)

Bacon’s proposals were not simply presented on the level of rhetorical contrasts, as important as such presentation was for persuasive purposes at the time. He also makes practical proposals that subsequent generations were to take seriously, even if he did not see them realized in his own time. It is here we see emerge an important new meaning of “technology” that is relevant to our inquiry.

In the latter portion of the work entitled *The*  *Great Instauration*, Bacon sets out what he calls the “Foundation of a True Philosophy.” Here he is much more explicit about the way in which the practical arts of the craftsman and skilled artisan are to be brought within the purview of philosophical understanding. This is to be done by a kind of descriptive history of these practical skills. This proposed history will exhibit “things in motion, and [lead] more directly to practice. Moreover it takes off the mask and veil from natural objects, which are commonly concealed and obscured under the variety of shapes and external appearance. . . .Upon this history, therefore, mechanical and illiberal as it may seem (all fineness and daintiness set aside), the greatest diligence must be bestowed.”[[10]](#footnote-10)

Specifically, Bacon seeks with this proposed history to understand those arts “which exhibit, alter, and prepare natural bodies and materials of things, such as agriculture, cookery, chemistry, dyeing, the manufacture of glass, enamel, sugar, gunpowder, artificial fires, paper, and the like.”[[11]](#footnote-11) This new history is to receive “things most ordinary, such as it might be thought superfluous to record in writing”[[12]](#footnote-12) and also “things mean, illiberal, filthy,” It is also to include “things trifling and childish,” and also things that may initially seem to have no use.[[13]](#footnote-13)

This attempt to bring together craftsmanship and rational analysis, through what he calls a “history” of these activities, is a feature of Bacon’s project that is novel for two reasons. First, it assumes that it is a worthy inquiry to spend intellectual and material resources to find out more in detail about the nature of craft principles and manufactory skills. Second it requires some way of finding out the underlying forms and principles that underlie such crafts where we do not have this knowledge, a situation that in Bacon’s era meant the situation in most practical activities. Here we see a novel enterprise emerging, an intensive inquiry into practice itself. The principles of these crafts are to be discovered inductively, presumably, although he does not actually say this, by writing down and describing what artisans do when they make iron, tan leather, or blow glass. It is by recording, describing, and tabulating that we presumably can come to some understanding of these activities. From this experiential base the hidden “secrets of nature” will be eventually revealed.

There is another dimension of this “Baconian” inquiry that needs to be emphasized. The original project as conceived by Bacon is limited and restrained by ethical and theological limits. This is clearly stated in his argument that his goal was to restore “knowledge lost at the Fall” but that it was not to exceed this: “For it was from lust of power that the angels fell, from lust of knowledge that man fell.”[[14]](#footnote-14) But this dimension of the aims of Bacon were removed in the eighteenth century. It became at the hands of the French Enlightenment in particular a project with unlimited goals and with no restrictions beyond those of human interest. This has given us the modern project we deal with today—endless technological development typically freed from theological or humanistic control.

What I wish to emphasize is the deep complexity of the inquiry we are making into what has been termed in recent literature **“technoscience.”** We should not see Bacon’s project and its modern heirs in terms of the contrasting categories of “pure” and “applied” science, as if we necessarily first develop some kind of theoretical understanding of things which we then apply for practical ends. In strongly experimental sciences like so much of experimental and molecular biology that is at issue in our discussions, the process may seem to work the other way. That is, it may move from learned skills that may include learning a certain way of shaking a tube to get it to mix correctly, to experiments that seek to shed some light on what is going on in which accident itself may play an important role. From experiments this may lead to the development of instruments that might help us “see” better, such as microscopes. This then may supply new information that we can gain from other machines whose operating principles we may not fully understand but still can use (e.g. computers). Finally this may result in written texts or more powerfully, funded research projects, with the latter only emerging at the *end* of a long and complex process, rather than at the beginning. Here we see in the biological sphere new drugs, new techniques for manipulation, replacement of natural by mechanical parts, the use of artificial intelligence, and new instruments of control. We see today the marvelous fruits of this kind of intensive inquiry, and also the ethical and even theological issues that have arisen with such issues as IV fertilization, gene editing, and prolongation of natural life.

To situate our discussion, I would like to offer a definition of technology that covers these different facets of the problems we will be dealing with: *It is neither “applied” science, nor is it a completion or imitation of nature. It is human action that covers any kind of manipulation that can presumably alter the natural state of humanity for rational ends. Biotechnology is one form of this with the potential now to alter even our conception of what it is to be human.*

The goal of our discussion is to come to some deeper understanding of what this enterprise is, and how we are to respond to its challenges creatively.

A general framework for our two first days of discussions is constructed around two perspectives on the living state. One is a classical “non-reductionist” perspective, in some formulations representing what has been termed a “vitalist” position, but one that is more often articulated today less controversially as a “holistic” or “organismic” conception of life. This gives us a more “contemplative” view of biology that is generally non-manipulative.

This is to be contrasted with the outcome of a “mechanistic” view of life that opens it up to technological manipulation and control along the contours of the “Baconian” conception of “technoscience.”

*Day One: The “Disenchantment” of the Living:*

The classical origins of a “non-reductive” point of view are in Aristotle’s treatise on the soul, *De anima* in its Latin title. I will assume you all have some access to Aristotle’s text but I also give you an electronic link to an online text. This reading gives us one perspective on what it means to be “alive” in a discussion that has had a deep impact on Catholic perspectives. Our readings for Day One then follow with selections from René Descartes dating from the beginnings of modern science and philosophy. Along with Bacon, Descartes set out the ideal of a new “technological” control of life by science and placed this within a program dedicated to the mastery and control of nature, rather than simply a search for understanding and contemplation of the natural world that had been the inherited ideal of natural philosophy. I have used Descartes rather than Bacon here because his project, and the radical dualism he established between soul and body, along with his “machine” theory of life, opened living nature practically to mechanical and physical manipulation by taking it apart and seeing the whole as a synthesis of lesser mechanisms. The selections from René Descartes’ *Discourse on Method* and from his longer and posthumously-published (1662, 1664) *Treatise on Man*, give us an early presentation of a “mechanistic” conception of life on which this inquiry was to be built.

*Day Two: Contemporary “Disenchantment”: The Engineering Ideal of Control*

Our second set of selections jumps more than two centuries ahead in time to the discussion of the nineteenth and early twentieth centuries. We will begin with Nathaniel Hawthorne’s short story “The Birthmark,” an imaginative engagement with the ideal of mastery over life that we see picks up on some of the Renaissance themes and literature discussed above. This text formed the discussion text for the first meeting of the Presidential Commission on Bioethics under the leadership of Leon Kass, whose work we will sample in a selection at the end of the seminar. This gives us an interesting way to interface a more “contemplative” view of life with one based on manipulation and control.

We then jump to an influential address given in 1911 by the biologist and experimental embryologist Jacques Loeb (1859-1924). Loeb was trained in the strongly reductive biology of the German tradition of the late nineteenth century and then moved to the United States from Germany in 1890 and became an early member of the biology faculty at the new University of Chicago, where he inspired many students, one of them John B. Watson (1878-1958), founder of the school of behaviorism (Ph.D. 1903). Loeb was to become a leading figure in American life science in the 1910s and 20s with a leadership role in the Rockefeller Foundation. The Rockefeller Foundation was the major international financial supporter in the 1930s of projects devoted to advancing reductionist biology and the incorporation of physics and chemistry into biology and the development of new machines to study life at its most extreme levels (electron microscopes, ultra centrifuges, X-ray technology). This was an enterprise that for the first time termed itself “molecular” biology. We will examine in handouts some of the documents of the “Vital Processes” project of the Rockefeller to see in more detail the goals of this program. In many ways, the vision of Loeb, refracted through the project developed by the Rockefeller Foundation, became one of the primary motivations behind the modern project of biotechnology, which has been aptly termed the “engineering” ideal of biology.[[15]](#footnote-15) We will see some recent advances and developments in this world in our viewing of the film *Fixed*.

*Day Three: The Biological Utopia*

Our readings and discussion this day will focus particularly on the issues raised by the Francis Fukuyama book *Our Posthuman Future*. In some respects this book builds upon Aldous Huxley’s dystopian novel, *Brave New World*, published in 1932 in the “heyday” of the Eugenics Movement. Eugenics, a combined scientific and social project, was an international movement that received its worst manifestations in National Socialist Germany, but affected even the United States, and it was embraced by many leaders in the scientific establishment. It was also endorsed by many aspects of the “Vital Processes” program of the Rockefeller Foundation at the time. We will look at some of the issues surrounding a “new” eugenics by the reading of an articles by philosopher Philip Kitcher and a response

by historian Diane Paul.

Francis Fukuyama in his book is looking critically at the more general project of biotechnology as it had emerged by 2002. We can view this in an even more advanced stage as captured in the film *Fixed* and in new developments, such as the germ-line genetic engineering made possible by the development of the CRISPR-CAS9 technology. This scientific and technological development has created a great international controversy through its first application to human beings in China. We will read a recent article on CRISPR by Borokowski and Adli (2018) assessing some of these aspects.

*Day Four: Reflections on Biotechnology*

Our readings and discussion for this final session will focus on chapters of Fukuyama and three articles, one by Leon Kass taking a more conservative position on biotechnology, another a more optimistic position advocated by R. M. Green, and a final article by myself that draws on some Catholic insights provided by the inspiration of Pope Francis’s *Laudato Si.*  We will have a concluding discussion assessing this “power over life” and its positive and negative aspects.

1. H. Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (Chicago: University of Chicago Press, 1984). [↑](#footnote-ref-1)
2. OED gives a first usage in this grammatical sense in 1683. [↑](#footnote-ref-2)
3. Aristotle, *Nichomachean Ethics* VI.iv.1140a 11-20, trans. W.D. Ross (McKeon p. 1025).  [↑](#footnote-ref-3)
4. Plato, *Statesman*, 258e.1-5. [↑](#footnote-ref-4)
5. David Kaplan (ed), *Readings in the Philosophy of Technology* (Lanham, MD: Rowman and Littlefield, 2004), “Introduction,” p. xiv. [↑](#footnote-ref-5)
6. James K. Feibleman, “Pure Science, Applied Science, and Technology: An Attempt at Definitions,” in Mitcham and Mackey, pp. 33-41, This first appeared in *Technology and Culture* 2 (1961). [↑](#footnote-ref-6)
7. Bacon, *Great Instauration*, in R. Sargent , Francis Bacon. *Selected Philosophical Works* (Indianapolis: Hackett, 1999) pp. 69-70. [↑](#footnote-ref-7)
8. Bacon, *New Organon*, Book I, Aph. 129, Sargent *Works*, p. 146. [↑](#footnote-ref-8)
9. *Great Instauration*, “Preface,” Sargent *Works*, p. 74. [↑](#footnote-ref-9)
10. Bacon, *Great Instauration*, Preparative, in Sargent, *Works*, p. 195. [↑](#footnote-ref-10)
11. Ibid., p. 195. [↑](#footnote-ref-11)
12. Ibid., p. 196. [↑](#footnote-ref-12)
13. Ibid., p. 196. [↑](#footnote-ref-13)
14. Ibid. p. 74. [↑](#footnote-ref-14)
15. Philip Pauly, *Controlling Life: Jacques Loeb and the Engineering Ideal in Biology* (New York: Oxford U. Press, 1987) [↑](#footnote-ref-15)