The XXII World Congress of Philosophy (WCP 2008)
July 30 -August 5, 2008, Seoul National University, Seoul, Korea
Title: ''Philosophical Problems in Medicine: Core Concepts''
Session: The Philosophy of Medicine

Scientific Medicine That Reads Philosophy

Choi, Jongduck
Philosophy, Sangji University/Korea

1. The Story of a Teenager

A youth was detained as a suspect in an aggravated burglary case at a police station. His name is Nuhyun and his age is 17. The police were handling the case the same as any other burglary case. In this situation, even the detained young man's own relatives had turned their backs on him. A former teacher of his who was contacted responded that he had no interest in him anymore since the boy had dropped out of school three months prior. The media and the police treated him as if he was born with the "criminal gene" in his DNA. The detectives concerned themselves just with the burglary, asking only questions related to the crime and his motives, such as whether he had committed the crime because he needed money to buy alcohol, in order to take revenge on the owner of a convenience store, and so on. Those involved in the case didn't show much interest in the unfortunate upbringing and background of this 17-year-old boy. Can we hold only him as an individual responsible for his situation? If we want to have a deeper understanding, we must retrace his entire life history before this burglary. His life history includes several factors that formed his present personality, such as conflict with his parents, past mental pain from being ostracized at school, poor health, and so on. The point is that, if one wants to understand his abnormal personality and overabundant behavior, one has not to expose the direct causes presently but to seek the ultimate cause in his prior history by tracing his life story.

Thus, two causes are contributing to this problem. The first one is the direct cause at present; this is called the "proximate cause." The other one is to identify the real, actual reason that unavoidably generated the present problem by tracing the historic past; this is called the "ultimate cause." If Nuhyun is sent to juvenile prison as the person implicated in the proximate cause of the burglary, then he cannot be truly rehabilitated. Rather, his mental scars can be healed only when those involved look back with interest at the ultimate causes of his wounds, by these people understanding the painful past of Nuhyun, and tending to him.

2. Proximate Cause and Ultimate Cause

It's important to gauge the potentialities of modern biotechnology through such an allegory. Recently, there has been much controversy over the ethics of cloning embryonic stem cells. The larger issue is that, before addressing the bioethical debate, it is necessary to rethink objectively whether biotechnology can become a reality. In recent days, breakthroughs of genetic-engineering-related scientific-technological research are being released and mass communicated one after another in rapid succession. There has been a flood of successful research results and international patent applications pouring out from biotechnology companies, university laboratories, and research institutes. There are many cases in which the media, too, package biotechnology-related news in a sensational way that stimulates the public's curiosity, as if the media is reflecting the hopes of patients and those around them who long to reap the benefits of the latest medical technology. However, rarely, these published results are promptly and directly applied to medical technology in practice. Why is that?

Roughly speaking, it is due to the following two reasons. First, the spatial relativeness among units of biological functions which are the target of biotechnological research has not been discovered. The interactions among these units, such as pertinent parts of the human body involved in a given function, or among biological molecules, etc., are still unknown. The second cause is the temporal relativeness that results from the evolutionary branching process of species. In other words, when a biological unit or part is causing problems, it is not well understood what kinds of changes and adaptive processes the pertinent part have gone through, and what its past features might have been. For these very reasons, it is not so easy to apply dreamlike biotechnological developments released as research results to the practical medical treatments of patients hoping for actual rehabilitation. In other words, if one tries to solve problems only through indirect causes, overlooking the ultimate cause, then it is likely that the substantial gap between research theory and clinical practice will get wider.

Let's take some concrete examples. Not long ago, a research team at the University of Pittsburgh announced findings that showed a close relationship between mutations called TLR4 (Toll-like receptor 4) and placental inflammation or premature births. The pertinent gene is known to be the cause of immunity activity in leukocytes. In addition, according to a publication in an issue of Nature

Genetics, more than ten additional genetic markers were identified that are involved in prostate cancer, the second leading cause of death in men. Let's look at another example. At a January 2008 medical conference in London, a research team at Newcastle University in the United Kingdom presented breakthrough trial results for a method to eliminate a certain class of hereditary diseases passed on through mitochondria, by replacing the mitochondria in an artificially inseminated woman's embryo. First, an embryo was produced by artificially inseminating the sperm of a woman's spouse into her egg, which carried factors related to genetic disease due to defective mitochondrial genes. Then, the fertilized embryo's nucleus was transplanted to an ovum of an unrelated woman with healthy mitochondria. Ultimately a healthy embryonic cell was produced by combining the genes of two women and one man. Perhaps this could be regarded as a new epoch of medical welfare, as factors of mitochondrial genetic diseases carried by mothers can be prevented from being passed on to babies, but it seriously raises the bioethical issue of confusion over family genes. It is said that most genes are transmitted in the nucleus of a cell. Although mitochondria represent less than 1% of transmitting genes, their role is to serve as the cell's "energy factory," a function necessary for maintaining life, and the possibility of a fatal disease developing becomes greater when problems occur in that small 1% of genetic material.

There is an endless list of similar successful examples in biotechnology like those mentioned above. Numerous technological achievements have been heralded in the past, only to disappear afterward. Of course, I don't believe these technologies simply vanish, but rather contribute to subsequent, improved engineering technology of the future, even if they are not visible in the foreground. Nonetheless, there is a simple reason for the great gap between laboratory announcements of engineering technology and their practical application. It is because research publications highlight the results of studies that examine only proximate causes, overlooking the ultimate cause. The example presented above of mitochondrial research is a typical research case that involves proximate cause: it only highlights the present-day functional mechanism, without touching on the history of evolution. It is only natural not to be able to unravel the complex puzzle of life with just such results of studying proximate causes; thus it is unavoidable that there is a barrier between the research results of pilot experiments and their practical medical applications.

Industrial robots, which revolutionized the automotive production line by drastically reducing its costs, are built according to blueprints. However, as the blueprints suggest, robots made in that way are designed according to a proximate cause, involving specific actions and functions.

Yet if one wants to build a lifelike, humanoid robot, unlike purely physical robots, that can feel love and share the love with humans, like the ones seen in science fiction movies, then one has to trace how lifelike feeling or soul, so-called love, evolved from the lower life forms, which engage in mating activity, to Homo sapiens. True attainment of engineering technology springs from a greater effort to identify the ultimate cause; explicating only a proximate cause is not enough. Unfortunately, the fact is that researchers who study the ultimate cause find it difficult to produce immediate results. Nevertheless, it is essential to enable their ongoing research by providing the necessary tools and creating a social environment where the fundamental academic study is well regarded. The study of ultimate cause requires both a strong academic perspective on the history of evolution in its entirety and an understanding of society.

3. Beyond the Debate of Bioethics

Natural evolution has its own reasons; nothing is superfluous. If this simple law of nature is ignored, then no practical, concrete progress in clinical medicine can be made that applies and benefits from new technology. Natural selection occurs by and of its own accord (non-teleology); there is a reasonable ultimate cause for why phenotypes of biological traits exist as they do at present. Even so, humans tend to judge and interpret nature according to human values, ignoring this natural law. Let's say that a scientist discovers and thoroughly investigates 'gene X' which causes prostate cancer, as described in an earlier example. The moment that gene X is discovered by a scientist, it simply becomes re-conceptualized as a gene harmful to humans. However, in nature, there has never been a standard of right or wrong that applies to the human condition. In other words, in nature, even things harmful to humans have valid reasons to exist. If one understands this history of nature, then one realizes that eradicating harmful gene X doesn't lead directly to curing disease. Gene X potentially has a history of existence leading to the present time and has its own complexity of bio-network. The proximate cause approach by eliminating simple gene x is no more effective against the disease. We shall try to identify the complicated process of evolution by which gene X was generated and then evolved. While it may take time, this latter approach ultimately requires a great deal less time than would be spent resolving (unintended) side effects that may emerge later.

Some years ago, Dr. Craig Venter, who was instrumental in founding the human genome project and who said "I am creating artificial life," had the experience of making an artificial virus. Sometime later, he announced that he had created synthetic bacteria that had the function of Mycoplasma Genitalium, that is, the minimal genome. To create certain synthetic bacteria that can function according to humans' needs, the top priority must go to tracing the history of essential protein-coding genes, vital to the genome, from a life-evolutionary perspective. Rather than viewing protein-coding as a mere black box or database of biological information, it is better to view it as a unit of life in which evolutionary time is concentrated, and in which we can not know how to manifest a trait. So, in the final analysis, if synthetic bacteria are created in the absence of these bio-historical concerns, the desired capabilities cannot be realized. Venter's view, I think, is a representative Modell of the 'absence of bio-historical concerns'. S. J. Gould had taken precautions against the absence of bio-historical concerns. He criticized the genetic atomism as below.

There is no gene "for" such unambiguous bits of morphology as your left kneecap or your fingernail. Bodies cannot be atomized into parts, each constructed by an individual gene. Hundreds of genes contribute to the building of most body parts and their actions are channeled through a kaleidoscopic series of environmental influences: embryonic and postnatal, internal and external.

The atomism of absence of bio-historical concerns means, therefore "Beanbag genetics" that there is a one-to-one mapping between genes and phenotypes., Even if a successful result, based on the idea of beanbag genetics, is realized, it is obvious ever so much to occur the side effects and abnormal functions that accompany it. Of course, the consequential bioethical issues will be grave.

The study of the ultimate cause is the starting point for opening the “black box” of biological units of life, including protein research. The method of the ultimate cause approach has critical merit: it resolves bioethical problems. It is a matter of course that biotechnology research must be filtered through the principles of social ethics and moral humanism. The ethical controversies of today can largely be divided into the following two major categories. The first holds that, since the World and Nature were designed and created by a certain absolute Being, humans' artificial tampering with nature damages and undermines the authority of that absolute Being. The second is that life clones, created through human biotechnology, bring chaos and confusion to the biome (ecosystem), since such clones inevitably give rise to negative side effects.

The first point is constructed in an excessively proclamatory manner and is composed of absolute predicative propositions, so it conflicts with the direction of the future of science. The second point, on the other hand, can be resolved through the ultimate cause research methodology, as discussed in this paper. Considering the present rapid pace of scientific progress, the issue of bioethics is very urgent and important. I think however that bioethics and biotechnology are not mutually contradictory. Rather, the ultimate-cause approach method in biotechnology can harmonize with bioethics, as it can easily resolve bioethics problems naturally.

We don't even know the simple genome mechanism of the Rhinovirus that causes bronchial inflammation from the common cold. An anti-Rhinovirus immunity genome that occurs in humans and animals, with the same structure, shows completely different reactions. That is why we still cannot capture this simple virus at present.

This is because even that simple virus has an immensely long history of life. We must pay attention to that history of life, and the history of the origin of the ultimate cause. As a philosopher of science, I hope for that kind of scientific research, embracing the study of the ultimate cause rather than studying only the proximate cause. I look forward to the research that has practical applications furthermore. What I am suggesting is that we should try to broaden the width and depth of scientific research in medicine.

Prof. Jongduck Choi (philonatu.com)