

Bioethics science: is it?

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Abstract

Both western and eastern civilizations have linked moral teaching with theology followed by philosophy. New-knowledge-seekers about natural world, were called 'natural philosophers'. There was a paradigm shift during industrial revolution in western world which culminated in modern science. The word "scientist" was coined during the 19th century. The paper examines whether natural philosophers could be called 'scientists'? A short history of philosophical paradigm shift is given.

Although written moral and "ethical principles" were in vogue from the time of Hammurabi (1750-1795 BC), the phenomenon of bioethics is very recent. Bioethics is a bridge among different sciences and a bridge to the future. The question is: Is bioethics, by itself, science? The present paper is concerned with the quality of bioethics and about the nature of science during the next 30-50 years.

Science is value-free but bioethics is value-loaded. Science does not proclaim any value whereas bioethics underlines the moral life and its value to survive. The paper examines two issues: Can science be bioethics-friendly? and (ii) Can bioethics be science-friendly? It appears that both science and bioethics are incompatible. We need to develop a new system of knowledge to include/infuse the bioethical-notion of values in (into) science. Such a move may necessitate the development of an alternate but new model. Bioethics is not a science-discipline. A new term to replace science is needed. Elevating bioethics as an academic science may create job openings in India.

Keywords: *Science, Scientists, Bioethics, Immoral sciences, Evolutionary ethics, Morals.*

Introduction

The question "when did science originate?" is a difficult question to answer. Origin of science is linked with human civilization, seeking the acquisition of knowledge. Without writing, there could be no accumulation of knowledge, no historical record, no science etc (1). In other words "science" started with the development of written script. The present paper explores this question on

the origin of science and the coining of the word 'scientist'. Related information is analyzed in the context of job-generation, with special reference to India in particular and Asia in general.

Human mind has always sought after knowledge. Both in the East and West, such knowledge was concentrated in religious activities. Religion was the base for knowledge-based valued forma-

tion. In the eastern civilization health-related-knowledge was linked with cultural and religious practices (festivals). Similarly, society was equipped with extensive knowledge about food and hygiene. All these tenets formed the religious text of *Ayur* (life) *Veda* (knowledge or science). *Sushruta Samhita* and the *Charaka Samhita* are the ancient Indian science treatises which embody moral rules, food habits, culture, ethics and medical practices. Hence, the history of science from an eastern perspective dates back to time immemorial (2). Written moral and ethical principles were in vogue from the time of Hammurabi (1750-1795 BC) and also during the time of Greek philosophers like Hippocrates. Similarly, the medical science of the Arab world was well advanced. Avicenna alias Abu Ali al-Husain Ibn Abdallah Ibn Sina (980-1038, 11th century) of medieval Islamic era was a well-renowned medical philosopher, physician with an ethical concern and a healer. Islamic medicine flourished under the expertise of Avicenna who may be considered as the father of modern medicine. From then on, Amir Kabir of Qajar Dynasty founded the Dar-ol-Fonoon school in 1851 in Iran which played a key role in the development of modern medicine (undated publication of Tehran University of Medical Sciences and Health Services). In this paper, the progress of science is viewed from a western viewpoint in contrast with the eastern eco-theology. First, special emphasis is given to the circumstances associated with the coining of the word “scientist”. Secondly, this paper analyses the principle: Whether a word (scientist) which was coined in a given time period, can be used by modern writers to occasions much earlier in time, may be centuries earlier than the coinage of a given word.

Divide between East and West

Moral values and religious teachings were the societal fabrics. In western civilization, moral teaching began in monasteries while in the East, a learning system of “*Guru-Schiya*” (Guru = teacher; Schiya = disciple) empowered the society with values. In western educational system, “industrial revolution (IR)” played a key role in shaping the progress of science. Prior to IR, European science was not modern science. But there is no precise time by which we can identify the onset of IR (3) leading to the birth of modern science. In Europe, IR may have started around 1760 and extended to around 1830. Economic, social and technological changes that took place during this era very gradually assured in cultural changes. Hence, philosophical and cultural shifts which took place during pre- and post-industrial revolution are of importance.

Usage of the word “biology”

One is not sure who coined the word “biology”. But the earliest usage of the word can be traced. The following discussion is based on the personal email sent by Prof Jan Frings¹, of Educatiecentrum voor Biologie (May 24, 2000).

Frings, mentioned Prof. Zeiss (4), while tracing the history of biology, puts the date of usage of the word biology around 1802. He based his conclusion on information appearing in a book written by a German physician called Gottfried Reinhold Treviranus, who entitled his book (1802) as “*Biologie oder Philosophie der lebenden Natur für Naturforscher und Aerzte* (Biology or Philosophy of the Living Nature for Scientists and Physicians). The German word “*Naturforscher*” is translated as “scientists”. In this personal communication, Prof Frings wrote, quoting Jordanova (1984) in 1801, Lamarck made distinction (in physics of the earth) between meteorology (the theory of atmosphere), hydrogeology (theory of the earth crust) and biology (theory of the living organisms), according to Zeiss, who refers again to Jordanova, L.J. (1984) Lamarck, (Oxford University Press). Prof Frings endorses the above view of Jordanova. What is more interesting is that (i) there was uncertainty as to the use of the word “biology” or philosophy to describe knowledge dealing with living nature; (ii) they considered nature as a living entity; (iii) they used a German word that is translated in current English as “scientists”; and (iv) medical professionals were referred to as “physicians”. Prof. Frings writes “Apparently in that time the word ‘biology’ was used in discussions between scientists”. He uses the word “scientists” for the elite natural philosophers or the men of science.

When was the word “scientist” coined?

Religious endeavors gave way to philosophical thinking. During the centuries before Copernicus, men who gained new body of knowledge (science), in any field, were either known as “natural philosophers” or “men of science”. Later William Whewell (1794–1866) coined the new and the specific word “scientist” only in the 19th century. Whewell also invented new words like physicist, consilience, catastrophism, and uniformitarianism. He also suggested to Michael Faraday new terms like ‘anode’ and ‘cathode’. The question is: Whether a “natural philosopher” can be conferred with the title “scientist” when this specific term was not in vogue. Is it justified?

Scientific revolution

In the context of “scientific revolution”, two points need to be considered. Firstly, foundational work for the emergence of “scientific revolution”

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was laid down by the celestial work of Nicolaus Copernicus (*On the Revolutions of the Heavenly Spheres*, 1543) and Andreas Vesalius (1514-1564 - *On the Fabric of the Human Body* - 1543.). In line with such advancement, Galileo Galilei (1564 – 1642) developed a telescope in 1610 and by 1640 his contribution has changed our view of the universe. Second, such developments started the scientific revolution!

Was Galileo a scientist?

Currently Galileo Galilei (1564-1642) is considered as a world renowned ‘scientist’. Though he has contributed much to the growth of modern science of astrophysics and astronomy, his life-achievements covers a period before the coining of the word “scientist”. Are we justified in calling him a ‘scientist’? Was he then a scientist? Yes! he was a scientist *par excellence*. Rightly, modern writers identify Galileo as a “scientist” and write “Galileo Galilei was an Italian scientist who formulated the basic law of falling bodies, which he verified by careful measurements. He studied, with his telescope, lunar craters, and discovered four moons revolving around Jupiter and espoused the Copernican cause (5, 6). Galileo’s formulation agreed with the scientific findings of the modern science and hence it is justified to call him a “scientist”! When the church affirmed a geocentric planetary system, Galileo’s findings supported Copernican stand of heliocentric solar system. However, Copernican-Galileo’s contention fails to secure cosmic validity because our solar system is not at the centre of the Milky Way galaxy. Our sun is neither the biggest in the cosmos nor located at the centre of the galaxy. Our solar system is tucked only at a peripheral region of the galaxy. At the centre of the galaxy there is that massive black hole which is a death trap. If one scientific contribution, valid for one period, does not fit into a holistic concept developed at a later time period, then, is it scientific? Or is Copernicus/Galileo a “scientist”? Their findings were true to a subsystem but not valid in the total and a bigger holistic system; for our solar system is not in the center of the galaxy! Yet the Copernican-Galileo’s contribution is science and their findings are scientific.

Similarly, land mark advancements were made in medical and other fields.

For instance, the English physician, William Harvey (1578 – 1657) was the first western scientist who described correctly the systemic circulation and properties of blood. But, these distinguished people were not known in their life time as “scientists” since there was no such word in their day to day usage; the word “scientist” was coined later in time by William Whewell in the 19th century (1794 – 1866). Although the words “scientist” and “scientific” were not in vogue, later authors do recognize Copernicus and Galileo and

Harvey as “scientists” and their works as “scientific” (6).

Was Darwin a scientist?

Before the time of Darwin there were no separate disciplines of botany and zoology. Darwin studied the natural world for five long years and was known as a “natural philosopher” or “man of science”. Timings of the newly-coined word “scientist” of William Whewell coincide with the time period of Darwin’s study on the natural history of Galapagos Islands. Did any of his contemporary researchers refer to him as a ‘scientist’? In fact, was Darwin a scientist in the modern sense of the word? It is subject matter for further study. In 1831, William Buckland (theologian and a scientist) provided the first account of giant fossil reptiles - the *Megalosaurus* (Giant Lizards) for which the English paleontologist, Richard Owen, coined the word “dinosaur” in 1842. Can these eminent personalities be called scientists? Yes they can.

Going back in time and history

Ancient Indians were expert metallurgists. About 1600 ago, they developed a technology to produce rust-free-iron. Next to the famous *Qutub Minaret* in Delhi in India, there stands a 7 meter-high, 6 tonne iron pillar which has been rust-resistant for the past 1600 years even though it is exposed to rain and atmosphere. Analysis of the metal in the pillar has revealed that it contains a very high level of phosphorus which, on the surface of the pillar, reacts with air and water to produce a protective layer of a compound called iron hydrogen phosphate hydrate (7). But modern “material scientist” and metallurgy technology may not be able to produce such a corrosion resistant iron product. Were these ancient Indian iron smiths, who developed such a rust-free iron technology, scientists in the modern sense of the word? Yes they were.

Puranic (ancient) statements – are they scientific?

Going back in history and in time, one may recognize *Puranic* literature, which contains statements regarding the universe and creation. One such statement is “In the beginning God created the heavens and the earth.... (Bible - Genesis 1: 1). The contrast is that the phrase “the heavens” is in plural and “the earth” is in singular, which means that there are many heavens and only one earth. Science records (as far as we know) that there is only one biosphere (earth) which is habitable. What does science say regarding the number of universes? The string theory portrays the constituents of nature as tiny wriggling strings, an elegant idea that in principle explains all the forces of nature but in practice leads to at least 10^{500} potential universes

(8). It should be understood that the number 10^{500} is only a very rough estimate. It is about definite that there is more than one heaven (universe), multiverse. Our universe is just one tiny bubble in a large froth of universes. Ancient traditions also say that there are seven heavens. Modern science agrees with this ancient 'scientific' statement of Genesis. Hence, the statement recorded in Genesis 1: 1 (Bible) is scientific.

History of philosophical shift

Theological basis for knowledge explosion soon led to a shift towards philosophy and then finally to scientific revolution. Passing through an age of enlightenment it has now come to genomic era. In post genomic age many more new words will be coined such as bioethics which is also an offshoot of philosophy. Hence a short history of philosophical shift is provided. This shift was characterized into different ages of thought process like the crisis of European consciousness, age of enlightenment and romantic age and the age of scientific revolution.

Paul Hazard coined the phrase "crisis of European consciousness" to characterize the period (1680-1715) of consolidation of skeptical and rationalist thought, accomplished by Bayle and Fontenelle (among others) that was to provide the foundation of enlightenment philosophy (9). It is a period of transient values in terms of woman, marriage and sexual desires. Societal and family values were in ferment.

Philosophical paradigm shift

The French word "philosophe(s), philosophies" stands for the new intellectuals who advocated reason as the primary source and legitimacy for authority. They distinguished themselves from traditional philosophers who concerned with abstract theories; and they, as public intellectuals, dedicated themselves to solving the real problems of the world. (10). These distinguished intellectual enlightenment thinkers pervaded into key domains of the political and religious worlds like education, theocracy and aristocracy, and the divine right of kings. One of the outcomes of such a paradigm shift is that of "scientific revolution".

Paradigm shifts – various shades

Along with IR, similar knowledge-explosion in physics, astronomy, biology, human anatomy and chemistry brought in new ideas. Such a paradigm shift led to the rejection of doctrines that had prevailed from ancient Greece through the middle ages. Moreover, medical knowledge gained during Middle Ages was sidelined. Such paradigm shifts laid the foundation of modern science (6). However, such a rational view of life and the world did not satisfy human inner quest, and a group of

intellectuals who distinguished themselves as people of the romantic era emerged. Their aim was to return to nature and to belief in the goodness of humanity; the rediscovery of the artist as a supremely individual creator; the development of nationalistic pride; and the exaltation of the senses and emotions over reason and intellect. And also romanticism was considered as a philosophical revolt against rationalism (11). It is evident from the foregoing review that the progress of human thought in science had its own problems in holistic thinking.

The ethical movements of 1870s triggered the emergence of modern ethics and bioethics. These movements provided a nonreligious-ethical basis for virtuous behavior, without a need for supernatural concepts to bring out humanity's inherent goodness or suppress any inherent evil (12).

Growth of ecological philosophy

IR merged technological skill with economic growth. Mechanization and steam powered equipment made inroads into ecological stability. Western civilization, dominated by exploits of IR, is anthropocentric in its approach while the eastern civilization is cosmocentric, inclusive of approaches like (i) theocentric; (ii) biocentric; and (iii) ecocentric. IR made the soil unproductive which urged Ernest Haeckel (1869), the German biologist, to coin the word "ecology" (13). The word "OIKOS (Gr)" meaning house is the root word for the concept of housekeeping of energy and also the discipline of economics (eco = house; nomics = management), the housekeeping of currency. The word 'ecumenism', the integrity of humankind, also has the same root word. If a balance between the ecology and economics is to be maintained then much emphasis must be given to human beings. In earlier days, ecology failed to include human beings in its fold. Hence a new discipline of "environmental biology" emphasized the inclusion of human beings as part of the house of ecology and not apart from it. But it was not enough to bring about the ecological balance.

Foundation for environmental ethics

Ecology took deep roots during 1900-1930. Aldo Leopold extended the moral thinking into environmentalism in the context of damage caused to ecosystems as a consequence of economic growth. IR led to economic growth but degraded the biotic community. Leopold employed phrases like "conservation ethics" (1933), "land ethics" and right and wrong. He defined 'a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise' (14). A right approach leads to ecobalance while a wrong approach leads to pollution and depletion of natural resources. Such a paradigm shift created the necessity to launch a

new discipline of “environmental ethics” which is now a sub-discipline of the major subject of bioethics. Much of the environmental damage happened during the last quarter of the 20th century which created a milieu for damage to health, necessitating the development of bioethics and to address the ethical problems created by rapid growth of modern science and technology.

Modern science and its collateral bioethical problems

Modern science has the following components: (i) observation; (ii) hypothesis; (iii) experimental design; (iv) repeated experimental verification; and (v) formulation of theories. Such an approach is mainly characterized by objectivity. Subjectivity has no room. If objectivity plays a major role in scientific development then there is no room for values, virtues and morals; for science is value-free. But application of science in human lifestyle has values. Hence, technology is value-laden and it is not value-free.

This decade (2010-20) is a critical period. Earlier we were taught that science, on the basis of its objectivity is value-free. It describes scientific truths but does not prescribe any value system. Currently, many would argue that science is not value-free (value-neutral). Another difficult position is that of morals as opposed to ethics. Are morals different from ethics? The polarized position of “morals” vs. “ethics” is reinforced in the recent publication (15) of Jones, namely “Immoral advances: Is science out of control?” which is disturbing. By implication, one can ask “Can science/scientific knowledge be immoral?”

Jones wrote (15) “Leaving aside special-interest attitudes such as the fundamentalist Christian denial of evolution, many controversies over scientific advances are based on ethical concerns”. In the past, the main areas of contention have included nuclear weapons, eugenics and experiments on animals, but, in recent years, the list of “immoral” research areas has grown exponentially. In particular, reproductive biology and medicine have become ripe for moral outrage: think cloning, designer babies, stem-cell research, human-animal hybrids, and so on. Other troublesome areas include nanotechnology, synthetic biology, genomics and genetically modified organisms or so-called “Franken foods” (15, emphasis is mine). Challenge posed to bioethics is phenomenal! How could scientists who are engaged in the above disciplines with “immoral research areas” with a strong conviction in evolutionary ethics, with no built-in moral component, be fully conscious of their ethical obligations?

Can we call bioethics as a science discipline?

Dr. Van Renssler Potter II of the department of oncology, University of Wisconsin coined the

word “bioethics” by combining two words: “*Bios*=life” and “*Ethics*” (moral actions; right or wrong), borrowing the word from moral philosophy, applied philosophy and normative philosophy (16). Bioethics is a bridge between arts and sciences. It should also serve as a bridge to the future and a bridge between sciences. But it heavily leans towards philosophy to solve bioethical problems that are raised by science and technology. Potter did not mean to develop bioethics as another discipline of science. Therefore, the question comes back: Is bioethics, by itself, science? No, it is not! Science is value-free but bioethics is value-loaded.

Can science be bioethics friendly?

It is predicted that the global population may reach 9 billion in 2050. It is almost equal to adding one more China and India. This population will look for water and food. But the water resources are fixed. Water is not a renewable resource. Per capita consumption will naturally be reduced and some section of the population will go thirsty all the time (17). This is a greater risk-in-waiting. This is related to food production. During the current year -2009- about 246 districts in 10 major Indian states have received deficient rain (29% less) affecting the rice production by 10 million tones due a shortfall of 5.7 hectares in paddy sowing (18). India will face a severe food shortage in 2030-2050. When its population reaches 1.5 billion, it may face a shortage of about 45 million metric tones of food grains. These hungry billions will be needing food, water and other resources which will be in acute shortage. Whenever natural resources run short then distributive justice will be affected. Such a situation will necessitate the introduction of genetically-modified (GM) food crops namely “Franken foods”, which has an inherent risk of producing environmental mimic of the female reproductive hormone estrogen (17).

Innumerable number of environmental estrogen-mimics has brought forward the onset of early puberty in girls. When the natural or normal age of onset of puberty is between 13 and 15, is it moral to make a tender girl of seven years old to become sexually mature? A recent study of 17,000 girls in the USA indicated that 7 percent of white and 27 percent of black girls exhibited physical signs of puberty by age seven (17, 19, 20). These girls are “miniature-women” who can be made pregnant when they are still girls, before they reach the womanhood! What are the socio-bioethical impacts of such an early onset of puberty? Environmental-estrogen-mimics do have an impact on male reproductive capabilities. It subjects the society to a process of “feminization” of males. Infertility among males will be on the rise and the society may move towards a unisex situation (17).

Can bioethics be science-friendly?

Bioethics is not the ethics of biology but it is included in its scope. It is neither the philosophy of biological sciences, but it can't survive without it. Hence, it is only a bridge between disciplines. Science and bioethics are incompatible in terms of values. Currently, some would say that modern science is replete with values and most scientists are conscious of their ethical obligations. There are many point of coherence/agreement between science and bioethics, especially in the science of environmental ethics, bioscience ethics, medical ethics, psychology and all sciences full of values (Pollard, Irina 2009 personal communication). There is a need to further reinforce and develop a new system of knowledge to include/infuse the bioethical-notion of values in (into) science. It is imperative that we identify the confounding factors that go against our value systems.

Evolutionary ethics with no morals!

Jones briefly touches the issue of "Christian denial of evolution" (15). The foundational basis of evolution is natural selection (NS) which is blind, purposeless and non- directional (21). Both philosophers and scientists endorse that NS has neither intentionality nor planning since genes have no intentions to consider; genes are not conscious (22). It is absolutely clear that because NS does not distinguish between what is right and what is wrong or between good and bad, there is no room for a moral choice! The doctrine of evolutionary ethics stands on the following three pillars: (i) chance and necessity; (ii) selfish gene; and (iii) the law of "survival of the fittest" with no room for the weak and the needy.

Job generation in bioethics and India

The obstacle for job creation is that science is objective whereas bioethics is subjective and the fusion of both spheres appears difficult. Bioethics is not a science discipline! The barrier to elevate bioethics as an academic science discipline is fortified by the fact that if an Indian student qualifies for a degree in bioethics, then he/she will not find a job since there are no job-openings in bioethics, neither in universities nor in any of the Indian medical institutions. No Indian educational institution has the discipline of bioethics in its

regular academic curriculum leading to a terminal public written exam. In India, there is no "department of bioethics" or chair in any of the universities. Hence, if a student qualifies for PhD degree in bioethics, he/she will not find a job since none of the jobs is earmarked for bioethics. In India, the era of pursuing knowledge for knowledge sake is a thing of the past. Now it is knowledge for stomach (job) sake. During 1997, bioethics was introduced as an optional subjection in bachelors in zoology degree course of the University of Madras. But no student has opted for the course for the simple reason it does not lead to find a job.

If one takes the years 2030 or 2050 as future reference points, then will humanity be able to identify itself now, most if not all, the confounding factor that will go against all ethical norms? Do we know what type of jobs we need to generate to match the type of science that may need to sustain the society? Is it imperative to identify the confounding factors? What we know are the following three confounding areas: (i) immoral sciences as listed by Jones (15), may be replete in academic circles; (ii) educational climate may be saturated by evolutionary ethics which has absolutely no moral component; and (iii) there will be a shortage of natural resources like food and water. Hence, any job generation must be related and be linked to the above three areas. Traditional subjects may have to be abandoned.

Conclusion

Therefore, there is a need to develop a new system of knowledge to include/infuse the bioethical-notion of values in (into) science. Such a move may necessitate the development of an alternate but new model with a new definition of science and scientist, or a new term to replace the word "science" and a new phraseology; therefore, are needed. There are barriers and obstacles to make bioethics science-friendly or science bioethics-friendly. "The best time to plant a tree is 20 years ago. The next best time is today." What are the confounding factors that will go against all ethical norms during the years 2030/2050? In 20 years time, will the upkeep of social values and virtues be enhanced or deteriorated? If latter is true then what are the confounding factors? Any remedial effort may have to begin now.

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