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## Title: The Significance of Bioethics as an Ethical Inquiry into Science

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### Abstract

Bioethics is a relatively recent research field that blends the cognitive and the ethical within a unified framework, such that neither domain stands out from the other. Instead, bioethics is a bridge that connects advanced knowledge, science, and technology with values, principles, and moral considerations within the bounds of what is scientifically and technologically possible and ethically permissible. Bioethics emerged as a response to numerous ethically charged issues brought to light by scientific and technological progress, particularly in medicine and life. These include, for instance, dilemmas surrounding the beginning and end of human life, such as genetic engineering, artificial fertilisation, in vitro fertilisation, organ donation, and surrogate motherhood. Ethical concerns also extend to the periods before and after life, such as prenatal genetic screening and gene editing, as well as the grief and mourning processes following death, especially in cases involving assisted dying.

**Keywords:** Bioethics, ethics, science, technology, human dignity.

### Introduction

Philosophy is no longer a discipline detached from the reality and circumstances of human life or an idealistic thought elevated above lived experience. Although it may have once been so in antiquity, today, it persistently seeks to address the daily challenges individuals face. This is evident in its endeavour to engage with the fields of medicine and biology, imbuing them with an ethical dimension to confront the human dilemmas brought about by technological and biological advancements. This has given rise to what is now known as the field of bioethics, which lies at the intersection of two intertwined domains: the philosophy of ethics and the philosophy of science.

Notably, philosophy has never ceased to explore questions of knowledge since its inception. It has done so by posing inquiries into the nature of human knowledge, including its possibility, sources, essence, limits, value, methods, and types.

### 1. The Historical and Linguistic Foundations of Bioethics

The term *bioethics* is attributed to the American biologist and cancer specialist Van Rensselaer Potter (1911–2001), who offered preliminary conceptualisations of bioethics in his writings. He envisioned it, quite precisely, as grounded in the physician's primary concern with ensuring the continuity of the

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human species through an ongoing dialogue between medicine and ethics. Thus, bioethics involves communication between the medical sciences and moral philosophy.

Bioethics, or medical ethics, is a branch of applied ethics concerned with medical and biological issues that have provoked significant political and ethical debate within societies. In the wake of significant scientific advancements and the formulation of biological theories, ethical and political questioning of scientific progress in biology began to intensify. Accordingly, bioethics refers broadly to the dominant mode of thought over the past two decades across various subfields, which seeks to address the issues raised by biomedical progress.

Among the key indicators contributing to the emergence of bioethics are the problem of interpretation in biology and the opposition between the mechanistic school and the vitalist teleological school (Durand, 2015, p. 35).

Bioethics is now considered one of the fundamental subjects in contemporary educational fields. The serious transgressions that have characterised medicine and biology have compelled thinkers, philosophers, and researchers to confront and scrutinise these developments critically.

According to scholars, this can be achieved only through ethical principles that delve into medicine and biology via bioethics. The term first appeared in the United States in 1970, in an article published in English in 1971 entitled "*Bioethics: Bridge to the Future*" by the biologist Van Rensselaer Potter, as previously noted (Abderrazak, 2015, p. 120).

Among the motives that led him to coin this term was the significant progress in medical and biological fields, contrasted with a marked lag in ethical considerations within these domains. He thus sought to establish a solid relationship between biological science and human values to preserve humanity's survival under the banner of human dignity (Durand, 2005, p. 18).

Bioethics is also translated as *life ethics*; it is a compound word derived from *ethics* (*ethique*) and *bios*, meaning *life* in Greek. As such, it may refer to a mode of reflection on values governed by life or to a meta-ethics concerned with the stakes and consequences of life sciences and medicine. It is, therefore, an ambiguous and thought-provoking term, prompting the following question: is it the human being as an agent and person, or the human being as a living organism, who constitutes the subject of life ethics? Here, we are confronted with philosophical semantic duality. A closer examination of subsequent definitions reveals the depth of this duality (Jacqueline, 2001, pp. 110–111).

- **Pierre Des Champs (P. Des Champs):** Bioethics is the normative science of human behaviour that can be deemed acceptable in life and death.
- **David Roy (D. Roy):** Bioethics is the study of the interrelated conditions required for the responsible management of human life or the human person within the context of the rapid and complex advances in biomedical knowledge and technologies.
- **Guy Durand:** Bioethics is the search for the requirements necessary to respect human life and the person and to ensure their advancement within the biomedical field.

## 2. Concepts and Themes that Necessitated the Emergence of Bioethics

The field of values has evolved in response to the profound transformations brought about by heightened modernity in all its epistemological, social, political, and technological dimensions. As such, philosophers have played a significant role in the emergence and development of bioethics, attributing its scientific character and thus distancing it from classical medical ethics, which has been deeply rooted in Christian theology (Al-Waeli, A., 2019, p. 224).

Guy Durand classified bioethics into three main categories:

- **The first category** addresses topics such as abortion, human trafficking, early diagnosis, euthanasia, artificial fertilisation, sperm banks, in vitro fertilisation, surrogate mothers, cloning, genetic registries, sterilisation of persons with disabilities, organ transplantation, and genome research.

- **The second category** includes discussions on contraception and its methods, biological and chemical weapons, torture, and capital punishment.
- **The third category** takes on a more ethical than scientific dimension, particularly in its conceptualisation of health and illness; the relationship between ethics, law, and human rights; and the intersection of ethics with technology (Attia, 2013, p. 138).

To simplify the topic for the reader, we present a selection of diverse and widely debated examples currently circulating in the biomedical field, as follows:

### 2.1. Organ Transplantation

Organ transplantation is a therapeutic and medical procedure with historical roots that is initially prompted by the cultural conditions of specific communities. The deformities suffered by individuals involved in wars led to the exploration of surgical methods that could conceal congenital defects, thereby laying the foundations for organ transplantation. This procedure involves transferring an organ from one body to another from a terminally ill or deceased person to a patient whose condition permits recovery, thus representing a scientific breakthrough for humanity.

As with any scientific discovery or advancement, organ transplantation has positive and negative consequences for science and humanity. Of particular concern are the adverse effects associated with transplantation. Studies have shown that this process necessitates the suppression of specific immune responses within the body, which can result in harmful side effects for the recipient's physiological system. Consequently, physicians have recommended that organs be sourced from close relatives. Nonetheless, the uniqueness of an individual's biological cellular structure remains a significant challenge (Ben Doubah, 2016).

One of the most pressing ethical issues raised by organ transplantation, central to bioethics, is the commercial trade in organs and the emergence of institutions that facilitate such transactions. The practice of organ trafficking has sparked intense debate regarding its legality and moral legitimacy. Attempts to justify organ sales undermine the ethical standing of the practice; individuals who sell their organs knowingly and voluntarily often do so under socioeconomic conditions. Thus, deteriorating living and economic conditions compel some individuals to sell their organs.

In our view, sales conducted under such coercive conditions lack one of the fundamental pillars of any contract, namely, mutual consent. Consent to such an agreement holds no legitimate or logical justification, and it closely resembles the crimes addressed during the Nuremberg Trials, which subsequently led to the development of rules and regulations governing scientific research in biology. These rules emphasise that no experimental or research-based procedure may be carried out on a person without their voluntary consent. At that time, the objective was not the formulation of bioethics but rather the defence of human rights alone (Al-Waeli et al., 2015, p. 258).

This issue has been raised in several international forums, and after extensive discussions and research, scientists ultimately agreed to impose tighter restrictions on this type of scientific practice. Among the outcomes was the 1969 Perugia Conference, which concluded that the donation of organs from one living person to another or from a deceased person to a living recipient must not be driven by greed but by humanitarian motives and must be carried out on a voluntary and noncommercial basis (Ben Doubah, 2016).

### 2.2. Human Cloning

Cloning is an asexual reproductive process involving the extraction of a somatic cell from the human body, which contains all the individual's genetic information. This type of cell is implanted into an enucleated female ovum. This egg cell has its genetic material removed so that the resulting embryo is genetically identical to the original individual from whom the cell was taken. The fertilised egg is then placed into a woman's uterus, developing into a foetus identical to the somatic cell donor. This process is called *cloning* because the resulting embryo duplicates the original organism.

Cloning may be defined as creating an exact copy of any biological organ or living organism, whether plant, animal, or human. In particular, human cloning involves creating an identical replica of a person by extracting a somatic cell from their body, isolating the nucleus, and implanting it into an enucleated ovum. In this case, fertilisation results from the interaction of somatic cells rather than reproductive (sexual) cells.

This process raises serious social concerns, particularly regarding kinship: Is the cloned individual the child, sibling, or twin of the original person? Or is it simply another person who resembles them? Furthermore, if the clone is a genetic replica in physical form, will it also share the same intellectual, psychological, and emotional traits? These and other complex issues remain unresolved.

Cloning research initially began in the plant kingdom before it was extended to animals. The first successful animal cloning procedure was carried out in 1997, resulting in the production of *Dolly hatched sheep*. Research then progressed to human cloning, specifically the cloning of cells and embryos, for medical purposes (Bouhajla, 2020, p. 54).

### 2.3. Genetic Engineering

Genetics is the science concerned with transmitting traits from one generation of living organisms to the next and explaining the phenomena associated with how this transmission occurs.

The historical background and scientific context paved the way for the emergence of genetic engineering, which arose as a natural outcome of two major scientific revolutions: the discovery of the structure of genetic material (DNA) and the discovery of restriction enzymes. The first revolution began in 1953 with the discovery of the structure of the DNA molecule by American scientists Francis Crick (1916–2004) and James Watson (b. 1928). This was followed by a series of developments in the 1960s, which sought to understand the molecular basis of DNA replication and transcription, the precise structure of the gene, and the mechanisms of genetic and biochemical regulation. By the mid-1970s, genetic engineering was born, taking shape within a biological landscape rich in experimental research focused on gene manipulation, biological cloning, and the recombination of DNA.

Genetic engineering is therefore considered a branch of genetics. Owing to the field's novelty, a precise and unified definition remains elusive in dictionaries and specialised studies. However, they all concur that it is a biotechnological technique that allows for the transfer of a gene from a cell in which it naturally exists to another cell to modify it genetically and endow it with a desired trait. In essence, genetic engineering involves isolating, identifying, and recombining genetic material (DNA) into new configurations characterised by continuous innovation (Jouaidani, 2019, p. 9).

Genetics encompasses the foundations of molecular biology, a field that targets the source of genetic information. It includes all the techniques used to alter genetic traits, such as gene manipulation, gene cloning, and gene modification. In these processes, scientists work to induce gene changes to achieve new outcomes or control certain diseases. This progression has led from genetic engineering to gene therapy and the development of recombinant DNA technology.

All these now-common terms fall under what is currently referred to as *genetic engineering*, a field focused on several applied objectives: identifying the function and structure of genes and producing compounds for therapeutic purposes through biotechnological methods (Ben Doubah, 2016).

### 2.4. Artificial insemination

Artificial insemination is a medical procedure used to treat infertility in women by introducing the husband's sperm into the woman's reproductive system without sexual intercourse.

There are various definitions of artificial insemination or fertilisation. However, they all converge on the same essential meaning: it is a procedure conducted without sexual relations between the two parties (husband and wife) to achieve pregnancy. This method is typically employed for one of the following reasons:

1. Blockage of the woman's fallopian tubes.

2. The man's sperm is either too weak or unable to reach and fertilise the egg.
3. Cervical mucus obstructs the entry of sperm into the uterus, or the cervix itself is hostile to sperm, killing it upon contact. One of the most common causes preventing sperm from entering the uterus is the cervix itself.

Artificial insemination can be divided into two types: internal insemination and external insemination.

- **Internal insemination:** This procedure involves taking the husband's semen and directly introducing it into the wife's uterus to facilitate the meeting of sperm and eggs within the uterine environment. Upon successful fertilisation, the fertilised egg begins its developmental journey through the natural stages of pregnancy in a manner identical to that resulting from natural sexual intercourse (Messaoudi, 2016, p. 64). This method is employed particularly when the sperm cannot reach the uterus to fertilise the egg.

#### b. External insemination

For external insemination, several factors necessitate resorting to laboratory fertilisation, commonly known as *in vitro fertilisation (IVF)*, or *test-tube babies*. This refers to fertilisation outside the woman's body in a laboratory setting, where the egg is fertilised by sperm outside the uterus. This method is employed when natural fertilisation is not possible due to issues such as blocked fallopian tubes, as previously mentioned. The term *test-tube babies* refers, in French, to *fécondation in vitro*, meaning artificial fertilisation conducted outside the uterus between a woman's egg and a man's sperm (Msabah, 2018, p. 121).

The bypass of the natural marital relationship to achieve pregnancy raises profound questions about the limits of human intervention in the reproductive process and the legitimacy of controlling a natural, instinctive function for medical or social reasons. While some regard artificial insemination as a legitimate and hopeful solution for treating infertility and ensuring the continuity of lineage, others view it as a violation of human nature and a transgression of ethical and religious values. Thus, this practice remains the subject of ongoing debate, intersecting scientific, religious, medical, philosophical, private, and societal considerations.

Another pressing issue concerns the fate of surplus embryos and the rights of the child born through this technique. This calls for a balanced legal and ethical framework that upholds human dignity on the one hand and recognises the human desire for procreation and parenthood on the other hand.

### 2.5. Euterasia

Among the medical and scientific issues that have entered the domain of bioethics is the matter of euthanasia, which currently refers to medical intervention aimed at ending the life of a person suffering from a terminal illness, in a permanent state of coma, of advanced age with a body debilitated by numerous ailments, or a newborn (or unborn) child with severe congenital malformations or profound intellectual disabilities. The objective is to spare such individuals from prolonged suffering and excruciating pain.

Euthanasia corresponds to the French term *euthanasie*, which traces its origins to the Greek words *eu*, meaning *good*, and *thanatos*, meaning *death*. The term thus denotes a *good death* or a *painless death*. Some prefer to translate it using other expressions, such as *mercy killing*, *assisted death*, or *death by compassion*.

The issue of ending life raises another significant problem: how can we determine the precise moment when a person is truly dead? This is called *the determination of death (le constat de la mort)*. This raises two distinct questions: What is death? Moreover, when can it be confirmed? The first is metaphysical and philosophical, whereas the second is medical and scientific, further introducing an ethical dilemma (Ben Doubah, 2016).

Within this context, three distinct levels of death are typically identified: clinical death, defined as the complete and irreversible cessation of bodily functions; biological death, referring to the gradual cessation of activity in all cells and tissues, culminating in bodily decomposition; and ontological death,

understood as the separation of the vital principle from the body historically referred to as the separation of the soul from the body.

The ethical values embedded in human life are reflected in the various legal systems developed throughout history. This is evident, for instance, in the long-standing debate between the rationalist and positivist schools of thought regarding the legalisation of capital punishment. This debate underscores the profound importance of life in collective human consciousness. The right to take another's life remains a subject of profound ethical objection, as no legal system, regardless of its nature or origin, can genuinely justify the deprivation of this fundamental right: the right to life.

This philosophical divergence thus provides a foundational framework for the ethical debate on euthanasia. The issue's theoretical grounding can be traced to the German philosopher Immanuel Kant, who equated the principle of *autonomy of the will* with the *capacity for self-legislation*, a notion that grants a rational being the right to legislate for themselves and make autonomous decisions.

The core dilemma in choosing death conflicts with the absolutism of foundational ethical values. The well-known maxim attributed to Kant holds: *Even if the happiness of the entire world depended on the killing of an innocent child, the act would remain immoral*. In any form, killing remains regardless of the justifications constructed to support it. Therefore, deciding to end a patient's life on the basis that the individual has the right to do so is ethically indefensible, even if it may be deemed socially acceptable. Furthermore, regardless of their relationship with the patient, no other person holds the right to decide on their behalf because authority is inherently bound to the individual's personhood. The experience of life is subjective and shaped by one's encounter with existence. A well-known traditional saying captures the nuanced dynamic between parents and children: *"They are of you, but you are not of them."* The parent remains emotionally bound to the child, but the child's perspective differs. Accordingly, familial proximity does not justify the assumption of decision-making authority (Ben Doubah, 2016).

It is also evident that the nature of cases encountered by scientists and physicians varies considerably, and their engagement with these situations in practice is fundamentally different from theoretical engagement. Witnessing and hearing a patient's suffering firsthand is not the same as contemplating the issue from the comfort of an academic institution, seated before an air conditioner and consulting scholarly texts in search of moral justifications.

In his book *The Right to Die (Le Droit de Mourir)*, Hans Jonas presents various case studies, including those of a patient fully aware of the futility of treatment and the imminence of death. The patient explicitly consents to forego further medical intervention, thereby resolving, through their own decision, the ethical and legal ambiguities surrounding the issue (Jonas, 1996, p. 34).

## Conclusion

In the context of bioethics' critical interrogation of modern scientific developments, it becomes evident that the extraordinary progress witnessed in biology, genetic engineering, and medicine has exceeded all expectations, leaving scientists, philosophers, and legislators alike in astonishment. The achievement of plant and animal cloning and even attempts at human cloning has revealed a new reality in which life itself is threatened from within. This underscores the urgent need to regulate scientific advancement through ethical, legal, and religious frameworks that protect human dignity.

These scientific leaps have generated unprecedented social and legal challenges and have revived traditional philosophical and ethical questions that are no longer sufficient to keep pace with the transformations of science. Thus, a pressing need has emerged to establish new ethical frameworks tailored to each specific domain of human life. In this light, the reservations expressed by certain philosophical and legislative voices within the field of bioethics must be seen as legitimate positions, as they reflect profound concerns regarding the future of humanity and the potential infringement upon the human body, mind, psyche, and social relations.

Accordingly, bioethics, understood as a moral interrogation of science, affirms that protecting human dignity must take precedence over the ambitions of scientific research itself.

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