Global Bioethics

ISSN: 1128-7462 (Print) 1591-7398 (Online) Journal homepage: https://www.tandfonline.com/loi/rgbe20

Man, Nature and Ethics: Global Bioethics

B. Chiarelli

To cite this article: B. Chiarelli (1992) Man, Nature and Ethics: Global Bioethics, Global Bioethics, 5:1, 13-20, DOI: 10.1080/11287462.1992.10800590

To link to this article: https://doi.org/10.1080/11287462.1992.10800590

B. Chiarelli
Institute of Anthropology
University of Florence
Via del Proconsolo 12
50123 - Firenze (Italy)

Man, Nature and Ethics: Global Bioethics

The survival of human society and the species *Homo sapiens* and the best outcome of the relationship between man and his environment is the essential aim of bioethics. The conservation of the DNA characteristics of a species and the preservation of its intraspecific variability are also objectives of bioethics.

Foreword

The earliest living forms on Earth originated more than five billion years ago: studies in geology and palaeontology are revealing this long evolutionary history with increasing clarity. It was only with the beginning of the Tertiary age, around seventy-five million years ago, that the first mammals developed, and only sixty-five million years ago that the first forms of Primates were differentiated.

The line that was to lead to the human species, through complex adaptation to particular environmental conditions, originated only around six million years ago (*Fig.1*).

The genus *Homo* appeared approximately 1.5 million years ago, while the species *Homo sapiens,* to which we have the honour to belong, appeared only 300 thousand years ago.

This long adaptive and evolutionary process led to human intelligence having an increasing impact on Nature.

However, Man began to be aware of Nature only around 12-10 thousand years ago. The ecological crisis that led to the cultural transition from the Paleolithic to the Neolithic age was certainly due to changes in climate, but it was also due to the intensive exploitation of the Earth's resources on the part of hunting and farming populations: this is shown by the development of art and the rise of magic in paleolithic age.

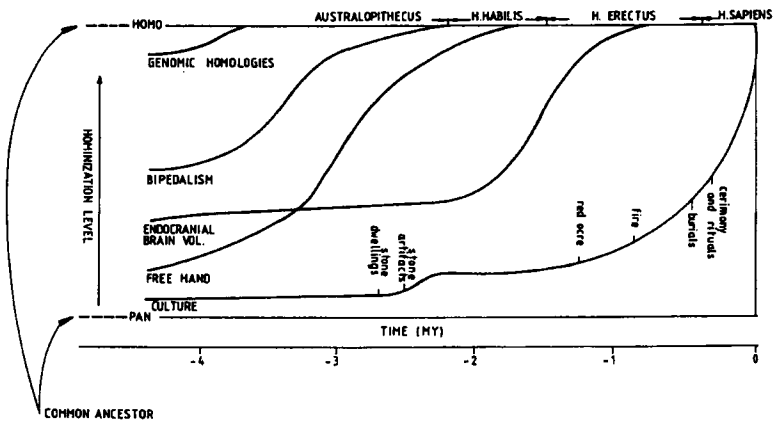


Fig.1 A synthetic scheme of the physical and cultural evolution of Man

The earliest forms of domestication and agriculture, and the discovery of the processes of fermentation, constituted a new stage in the domination of Nature by human intelligence. With selection processes for domestication Man acquired new power over other creatures, choosing their genome as he wished.

However, it was with the coming of the industrial age in the nineteenth century that Man imposed his presence on Nature in a more violent way.

In the western world the collapse of Thomistic theology, followed by the development of scientism, positivism and mechanicism of Nature, led to an unconditional faith in progress, with ideological crises that have also had social and political consequences (Marxism).

Two new factors have since been added to the ideological change in the first half of this century:

1. the *ecological impact of man* on his surroundings; this began with the industrial revolution in the nineteenth century and with the population increase, from one billion in 1835, to 6 billion human beings in little more than 150 years, creating a problem whose extent became clear during and after the Second World War

2. the *innovative impact of science*, first with atomic physics, which introduced the scission of the fundamental unit of matter, the atom, and then with molecular biology, which led to the decoding of genetic information and interventions of biological engineering that annihilate the concepts of the individual and the species as fundamental units in biology.

Man is now beginning to consider Nature both as an environment that is capable of supporting life (ecology) and as a matter out of which he himself is formed, as are all other living organisms (comparative biology).

Mind reflects on matter, yet mind is made of the same material as matter.

Man now also knows, or tries to know, the Nature of which he forms an integral part, so that it would then perhaps be better to say that Nature through Man thinks of Herself. Hence the anthropic interaction between Man's consciousness of himself and his knowledge of Nature, or, as in Teilhard de Chardin's words: *Matter is full of life, life rises towards consciousness and mind.*

This stage of fundamental rethinking is however overshadowed by the threats of ecological disaster and catastrophic population increase, which do not only impose limits on development, but undermine the very survival of the human species. The future survival of Mankind in fact depends on the interaction between its reproductive characteristics and the productivity of its territory, which, even if increased by the intellectual capacities of the human brain, has intrinsic limits. The adaptive choices of the human social structure and the ethical choices (which are also biotechnological and biomedical) follow from this interaction between human populations and the natural environment: an equilibrium that must be preserved for the survival of our species.

Bioethics: definition and aims

Bioethics originated in this context. V.R. Potter, who coined the term (1971), defined it as the science of the balance between Man and Nature, a bridge to the future of Humanity (*Bioethics: Bridge to the future*, Prentice-Hall Inc.), although its real inventor was Aldo Leopold with his book *A Sand County Almanac with other Essays on Conservation*, published in 1949.

Thus Bioethics, on account of its historical context and the nature of the subject, is concerned with defining clearly the problems connected with how Man, in the sense of both individual and species, can best survive, in his present state and in the future. The interest in the relationship between Man and the natural environment in which he lives also follows from this.

Thus it is an interdisciplinary Science that collects information not only from the traditional biological subjects but also from Ecology, Ethology and Sociology, and places it in a philosophical framework having Man as its focal point.

The approach of Medical Ethics is, on the other hand, different and partial, having to develop as a precise extension and updating of traditional Medical Deontology; this may eventually be considered as the area of Bioethics that deals specifically with the interaction between patient and doctor, and between patient and society.

I should also like to make it clear that the cultural space of Bioethics does not detract in any way from the traditional theological vision of Ethics, which in many respects I personally am in agreement with. In my opinion Theology (or better a particular historical theology) has, rather, everything to gain from this naturalistic, evolutionist and scientific vision of Ethics for life proposed by Bioethics, by becoming more up-to-date and alert to present-day issues.

A general theory for the evaluation of criteria for good and evil must in fact be first of all based on rational and naturalistic principles and must adopt the same criteria as Science, whose results some theologies propose to evaluate, control and codify.

Cardinal Ratzinger would seem to be of the same opinion when he states:

> «It is science that renders all real progress possible. But science may also become destructive of its own roots, as the ecological movement testifies. A science that no longer respects the fundamental elements of life and of creation becomes self-destruction. Thus it is the duty of ethics to set up a barrier against this. Science only knows its own method and does not accept any limitation from the outside. But today we must recognise that absolute autonomy in the scientific method, as the atomic and chemical bombs show, becomes a threat to human life. Thus the ethical dimension is not something imposed from outside, from the Church, for example, but is intrinsic to science itself, in so far as it is human action. This must be the great theme of the present-day dialogue between science, philosophy and theology»[1].

From the point of view of a scientist who is a biologist, as I am, a rational and naturalistic definition of ethical norms (Bioethics) must first of all stipulate the preservation of the DNA that is typical of the species and the maintenance of its intraspecific variability. Indeed, this aim of preserving the DNA of the species and preserving its intraspecific variability is the basic principle of Bioethics.

The applicability of ethical norms to all biological entities, whether they are species or preliminary forms of individuals (spores, gametes, embryos) or products of cloning (cuttings), derives from this bioethical principle.

All these forms, also according to the Hindu and the Schweitzerian traditions, are worthy of respect and of ethical consideration. However, the ethical consideration varies and has a different weight according to different biological groups in so far as the ontogenetic cycles that characterise them are different.

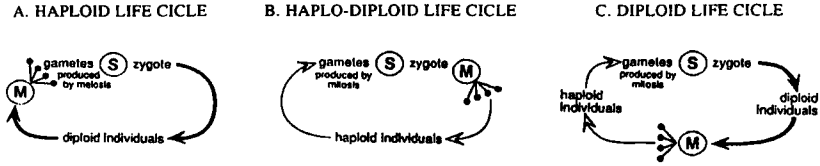
The value we must attribute to the specific DNA of a biological entity characterised by a haploid order of genes such as those of a bacterium, a gamete, a spore, or a haplofite, differs from the one we must attribute to a biological entity characterised by a diploid order of genes. The fusion of the two haploid DNA filaments presupposes meiosis, which functions as a selective filter of casual mutations, the majority of which lead to the extinction of the haploid entity. (*Fig.2*).

---

[1] Translated in English from an Italian test

FIG. 2 The three principal life cycles

Five different kinds of life cycle have been observed in eukaryotes: (A) haploid; (B) haplo-diploid; (C) diploid; with alternation of generations; (D) haplo-diploid with haploid males (arrhenotoky); and (E) haplo-dikaryotic (i.e. after syngamy - fusion of gametes - cells containing the two haploid nuclei undergo simultaneous mitosis; karyogamy - fusion of the nuclei - occurs just before meiosis). The last two life cycles are found in more restrictive taxonomic groups than the first three. Arrhenotoky occurs in one quarter of all arthropod species and in some rorifers. Haplo-dikaryotic life cycles are found among higher fungi (Basidiomycetes and Euascomycetes).



S = syngamy, M = mieosis, thin arrows = haploid phase, thick arrows = diploid phase.

A. When meiosis rapidly follows Syngamy, the life cycle is called a *haploid life cycle*. Gametes are produced by mitosis. For unicellular organisms in this category, this definition implies that there is no mitosis between syngamy and meiosis. In multicellular organisms, individuals are haploid, and only the zygote (and possibly the tissue around it) is diploid. This kind of life cycle is found in most green algae and in the Bryophytes where the sporophyte is small and heterotrophic.

B. When meiosis and syngamy are separated in time and space, the life cycle is called a *haplo-diploid life cycle*. Gametes are produced by mitosis in haploid individuals; meiosis occurs in diploid individuals. For unicellular organisms, this definition implies that mitosis occurs between syngamy and meiosis, and between meiosis and syngamy. For multicellular organisms, the life cycle shows an alternation of haploid and diploid autotrophic individuals. This kind of cycle is found in most red algae and foraminifera and in ferms in some club mosses and in horsetails.

C. When syngamy rapidly follows meiosis, the life cycle is called a *diploid life cycle*. Gametes are produced by meiosis. For unicellular organisms, this definition implies that there is no mitosis between meiosis and syngamy. For multicellular organisms, the definition is less restrictive; individuals are diploid, and only gametes (and possibly the tissues around them) are haploid. This kind of cycle is found in some Ciliates, in Diatoms in multicellular animals and in some higher plants, where the gametophyte is reduced to few cells.

The diploid entity represents a second hierarchical level leading to complexity in the history of life, which deserves some merit.

But the ethical concern is different if the diploid biological entity has no prospect of autonomous survival, as in the case of an embryo, or if its reproductive cycle has already been completed or if it is made up by individuals whose existence is thoroughly independent of the transmission of the specific DNA like in subordinate classes of social insects (CHIARELLI 1991).

In the first case the contribution of the biological entities to the preservation of the specific DNA and of its variability in the following generations has very few chances, because their existence and their reaching the level of individuals are conditioned by many heterogeneous environmental incidents which eliminate most of them, as happens for plant seeds and fertilized eggs in animals.

This situation of uncertainty perspective restrains bioethical evaluation.

In the case of the entities having completed their reproductive cycle, these are biologically useless, and therefore their existence has lost its biological significance.

In the third case, concerning the subordinate classes of social insects, their existential meaning is limited to their mere existence,and in life hierarchy these conditions are not considered as complete. In plants and in some lower animals there are then some diploid biological entities, like cuttings, to which it is not possible to attribute the concept of individual, since although they carry the specific DNA, they do not have any variability. They are all identical copies of their parent entities which perpetuate by subsequent fractionation without sexual reproduction.

These entities lack individuality and do not allow the perpetuation of the genetic variability of the species; they are living entities, but do not have the same characteristics as individuals.

We are interested here in considering the ethical norms of those animal species in which the concept of individual is present; individual being defined as a biological entity characterised by *uniqueness, unrepeatability, indivisibility* for the entire ontogenetic cycle (in other words, individuals resulting from the fusion of gametes produced by the meiotic process of parental generation) and in which the germinal line is potentially active in all individual members of the population (*Fig. 2*).

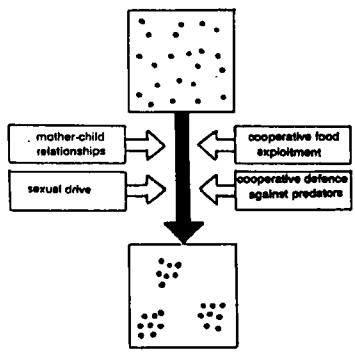


FIG.3 The biological and environmental factors for the social organization in higher vertebrates

This is the third hierarchical level of complexity in the history of life.

In these species the preservation of the characteristic DNA of the species and its intraspecific variability is ensured by precise rules of socialisation. Therefore the ethical norms of these species are conditioned by the biological stimuli of socialisation.

Socialisation thus means the group of behaviour patterns or stimuli that serves to perpetuate the characteristic DNA of the species and its intraspecific variability (*Fig. 3*) (CHIARELLI 1984).

These stimuli are:

A. parental care

B. reproductive behaviour

C. co-operation in the search for the acquisition of food

D. co-operation in defence of the group

These stimuli are the target of bioethical interest in social animals as in Man and they could be quantified.

While A and B are strictly dependent on the biology of the species, C and D are related to environmental conditions. It is thus necessary to introduce for both these last two factors a constant, *k*, related to the environmental conditions in which the species or the population happens to live (*Fig.3*)

So, these four factors, independently of one another, are the entities upon which are developed the ethical norms of the third hierarchical level in the natural system.

These four factors may be quantified in terms of consumption of necessary energy (Calories) and amount of time invested (Time) in the fulfillment of the ethical imperative of the reproductive process. This allows one to arrange them in an equation whose result ought to give the minimum and maximum size (Δ) of the population of a given species that can survive in a certain area.

$$(A+B) + k\,(C+D)=\Delta$$

From a genetical point of view, this formula identifies with the concept of Deme which in a local panmictic population determines the minimum number of individuals needed to guarantee genetic variability, which is essential for its subsistence for an unlimited number of generations.

In this definition of deme the essential presence of the genetic variability is stressed. In order for the frequency of genes in a population to be kept constant, four conditions are necessary: 1) absence of selection, 2) panmixia, 3) absence of mutations, 4) absence of differential migrations. The minimum number of individuals in a population must also take into consideration these four factors.

Also the maximum number of the individuals of a population in a given territory, beside depending on the supporting capacities of the territory shall also take into account the conditions mentioned above, therefore, a population could not be made up by individuals of one sex only and shall include different ages.

From this general formula, which may be applied to all vertebrate species (Mammals in particular), it is possible to derive one that is more specifically suited to Man for his cultural development, which can be generally indicated with an exponential function of human intelligence (e^I). For Mankind the formula will be written as such:

$$[(A+B) + k\,(C+D)]\; e^I = \Delta_H$$

This socio-intellectual control on the environment in the natural system can represent the quality rise leading to the fourth hierarchical level of ethical norms.

Also in this case is the minimum and maximum limits of Δ_H, where Δ_H represents the

number of individuals utilising a certain territory, that impose the ethical norms of behaviour for our species. For this reason the minimum or maximum number of individuals that constitute the deme may vary according to different environments in which various human populations live in the different historical contexts. In other words, it is the interaction between the biological characteristics of the species and the productivity of the territory (even if this may be increased by the intellectual ability of the human brain), that contributes to determine the ethical norms that characterise the historicised behaviour (morals) of the different human populations.

The adaptive choices of the human social structure and the ethical choices (including biotechnological and biomedical ones) must depend on this interaction between human populations and the natural environment in which they live.

This equilibrium must be maintained or sought after for the very survival of our species.

Bioethics: a historical interpretation

So far we have given an eco-ethological interpretation of Bioethics on a naturalistic basis. But we can also put forth a historical presentation of Bioethics as the outcome of western culture development.

In the historical tradition the first forms of ethics concern the relationship between individuals, the limitations of individual freedom with regard to one's own kind (defined as single persons of a specific social group: father and mother, son and daughter, husband and wife, servants, etc.) and the rights and duties that appertain to each of them. Mosaic law from the fourth commandment onwards is one of the most complete syntheses of these norms.

The ethics that subsequently developed in the western world concerned the relationship between single individuals and society, in the sense of an undefined group of known or unknown or even hypothetical individuals. The development of jurisprudence and its laws, together with the development of the concept of democracy, mark the later extension to society of the concept of ethics, which is characteristic of western culture and not characteristic of all human populations and cultures. In western culture, however, there is as yet no codification of the ethics that regulate the interaction between Man and Earth and the animals and plants that grow on it while these regulations exist in other cultures. The relationship between Man and the things of nature, as A. LEOPOLD (1949) writes, is still strictly economic. The Earth is considered only from the point of view of ownership, and all the norms that regulate the relationship between Man and the Earth imply only privileges and no obligations for Man. The extension of ethics to this third element, to the environment utilised by Man, is, as A. LEOPOLD (1949) maintains, an evolutionary progression and an ecological necessity. It is the third stage of a sequence of which the first two have already been passed through. In a time like the present one, when the world is going through a serious crisis that is not only economic, but involves cultural and moral values, and even identity, it is increasingly urgent to become aware of this new phase of our species' life..

The natural and humanistic sciences (zoology, palaeontology, archeology, ethnology, genetics, psychology, etc.) have for some time been providing valuable data showing how there is no contradiction between the affirmation of the animal nature of man and his unique quality as a cultural animal. It follows therefore that our very survival may depend on our achieving a more balanced and harmonious relationship with the other elements in the eco-system. To this end it is necessary to create a bridge between the humanistic disciplines and the naturalistic ones, in order to create a synthetic vision of the history of Man as natural history. In this new synthesis scientific knowledge, and not ideological imposition, shall form the basis of the relationship between men, and the relationship between Mankind and the rest of the natural world.

Since ancient times isolated thinkers from both the East and the West have reiterated the harm man suffers from a wrong use of the natural environment, but until now there has been no social awareness of this situation.

Nature may not be interested in the survival of Man. Present Man, *Homo sapiens*, is the product of evolution, as are other species of animals. However, as has already happened, and is continually happening, for these other species, if Man indulges in unlimited reproduction and undisciplined exploitation of the available resources, he may bring about his own destruction as well as the destruction of other species of animals and plants. In terms of geological time Man is an event lasting a few microseconds as compared with the more than 4 billion years' history of Life on this Earth.

The days are numbered. Demographic predictions indicate that the population of the earth will inexorably reach 10 billion by the year 2050. If all these people are to share, as would be just, in western benefits and living standards, disaster will ensue, and it is extremely unlikely that humanity as a species will survive to the end of the first century of the next millennium.

Bioethics is then an attempt to create a pact between Man and Nature to render our existence on this planet still possible. This complex challenge, essential for the survival of Humanity, must be discussed and faced in the 400 weeks that separate us from the beginning of the third millennium.

Bioethics must thus be understood as a biological and naturalistic science with ecological and ethological relevance. Its presence in the Schools of Medicine is only apparently a mistake. In the Schools of Medicine medical ethics should be developed in order to deepen our understanding of the problems arising from recent developments in biotechnology for the deontology of the medical profession.

As Potter has clearly demonstrated (Trento 1991), Bioethics is like a man who walks, but while a man needs two legs and sight in order to walk, Bioethics tries to walk with only one leg! For this reason Potter, with his long experience as an oncologist, re-launched the term Global Bioethics in 1988 with his book "*Global Bioethics*" Building on the Leopold Legacy. This also explains the title of this new journal.

Bibliography

CHIARELLI, B., 1984. *Origine della Socialità e della Cultura Umana.* Laterza Editore, Bari.

CHIARELLI, B., 1990. *Problemi di Bioetica nella transizione fra il II e III millennio.* Ed. Il Sedicesimo, Firenze.

CHIARELLI, B., 1991. *Dal concetto di entità biologica al concetto di persona.* Problemi di Bioetica. 11: 15-23.

LEOPOLD, A. S., 1949. *A Sand County Almanac, with other Essays on Conservation.* New York, Oxford University Press.

VAN RENSSELAER POTTER, 1971. *Bioethics: Bridge to the Future.* Englewood Cliffs, Prentice Hall.

VAN RENSSELAER POTTER, 1988. *Global Bio-ethics,* (Building on the Leopold Legacy), East Lansing Michigan State University Press.