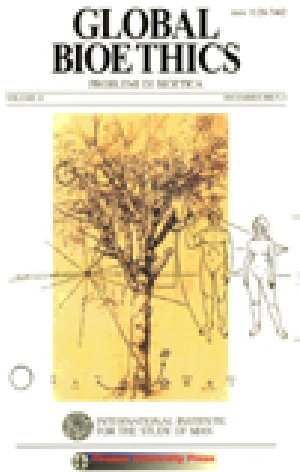


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## Biological and Evolutionist Foundations of Ethics

Chiarelli Brunetto<sup>a</sup>

<sup>a</sup> Laboratori di Antropologia, Dip. Biologia Animale e Genetica Università degli Studi di Firenze via del Proconsolo, 12 50122 Firenze, Italy Fax (0039) 055-283358

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Chiarelli Brunetto

## Biological and Evolutionist Foundations of Ethics

*Laboratori di Antropologia,  
Dip. Biologia Animale e Genetica  
Università degli Studi di Firenze  
via del Proconsolo, 12  
50122 Firenze, Italy  
Fax (0039) 055-283358  
antropos@unifi.it*

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What humanity is currently living is a critical moment of interaction between population increase and lack of energy and food resources that Mankind will have to overcome and control. But the overcoming of this crisis is referred to the solution of as many questions, ethical too, on biotechnologies and genetic engineering applications; questions that need quick decisions, brought about with innovative vision on individual consciences and traditional ideologies. The debates on genetically modified organisms (GMO) prove it.

Major reasons of the current reposing of a Global Bioethics, defined in a naturalistic way, are:

1) the ecological impact of Man on environment; it started with the industrial revolution of the XVIII century in the Western World, but emerged as a problem during and after the Second World War, with the fast and dramatic population growth, from 1 billion in 1835 to 6 billions in 160 years, with possible further increase.

2) the innovative impact of science in the last century; it started with atomic physics, which proposed the fission of the atom, conceptual basis of the matter, and continued with the crisis of individual concept due to the introduction of the organ transplantation technologies. It then became a concrete reality with the development of molecular biology and biotechnologies which lead to the decodification of genetic information and the interventions of the "genetic engineering", a menace to the very concept of species as natural entity.

Science, produced by human evolution, now imposes thinking of Nature as a living environment (Ecology) and as the matter of which Man himself is made, as are all other living organisms (Comparative Biology).

Global Bioethics was born in this context. The inventor of the word, V.R.Potter, defines it as "the science of equilibrium between Man and Nature, a bridge for the future of Humanity".

By definition and by historical and disciplinary context, therefore, Global Bioethics must focus upon problems connected with the better survival of Man, both as individual and as species, in the present situation as for the future generations. A science which unites in an interdisciplinary way information coming, other than traditional biological disciplines, from others as Ecology and Sociology, framing them in a philosophical definition that has Man as focal centre. A discipline, therefore, pre-eminently anthropological and naturalistic.

The definition of Global Bioethics is based on a strictly biological presupposition: *conservation and propagation of the specific DNA of the species and the maintaining of its intraspecific variability*. From this definition comes that all living entities, whether they be species, individuals or preliminary forms of individuals (spores, gametes, embryos) or products of clonation (cuttings) are worthy of respect and of ethical consideration.

Ethical consideration, nevertheless, has a hierarchical importance according to the different ontogenetic cycles that characterise the different biological entities.

A biological entity with a gene haploid lay-out, such as a bacterium, a gamete, a spore, or a haplophyte, will represent thus the **first** hierarchical level of bioethics interest because it has only one DNA filament, and so is subjected to casual alterations (mutations) which inevitably lead to its extinction.

The **second** hierarchical level in the evolutionary history of life on this planet is represented by the fusion of two diploids lay-out. It assumes sexual reproduction and then meiosis, which acts as a selective filter of casual mutations, most of which will lead to the extinction of the diploid entity which undergoes them.

In this level, nevertheless, different ethical consideration must be given to those biological entities which:

- a) are devoid of specific variability and are sexually reproduced (cuttings)
- b) are constituted by individuals whose existence is absolutely independent from the specific DNA transmission in the descents, as happens in the subordinate classes of the social insects
- c) do not have an autonomous prospect of survival, as an embryo or a seed
- d) have already completed their reproductive cycle

The **third** hierarchical level in the evolution of life on the earth is represented by the biological entities in which the concept of “individual” is present, defined as an entity characterised by “uniqueness, indivisibility and unrepeteability” for the entire ontogenetic cycle (*i.e.* individuals resultant from the fusion of gametes produced through the meiotic process of the parental generation); for them the germinal line is potentially active in all the individuals of the population.

In these organisms the maintaining of the specific DNA of the species and its intraspecific variability is guaranteed by the rules of socialisation. Behaviours and stimulus of socialisation which help in perpetuating the specific DNA of the species and its intraspecific variability are:

- A) parental care
- B) reproductive behaviour
- C) co-operation for food acquisition
- D) co-operation for group defence.

Among these stimuli, A and B are strictly dependent from the species biology, C and D are, instead, in relation with environmental conditions. Therefore it is necessary to introduce for both these last factors a constant  $K$  linked to environmental conditions in which the species or the population (or the individual) happen to live.

The four stimuli can be quantified in terms of energy consumption (Calories) and the amount of time invested (Time) in the completion of the bioethics imperative of the reproductive process or of the individual or group survival.

The quantitative transformation allows the organisation of these factors in an equation

whose result should give the minimum and maximum dimension ( $\Delta$ ) of the population of a certain species that can survive in that certain area:

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

The  $\Delta$  of this formula identifies itself and overlaps in fact, from the genetic point of view, with the concept of *Deme* in a local panmictic population it defines the minimum number of individuals necessary to guarantee the genetic variability essential for subsistence for an unlimited number of generations.

The maximum number of individuals of a population in a certain territory is therefore linked to the territory support capacity.

From this general formula, applicable to all vertebrate animals, it is easy to derive another one more concretely suitable to man and his cultural development, which gives profound transformation to the environment and thus to factors C and D and can generically be indicated with an exponential function of human capacities ( $e^1$ ) that can be written as:

$$[(A+B)+k(C+D)]e^1 = \Delta_H$$

The socio-intellective control of the environment on the natural system represents a qualitative bounce that leads to the fourth hierarchical level of the ethical norms in the history of life on earth; the ethical norms linked to Man, his culture and his interaction with the environment in which he lives (Tab. 1).

For these reasons the minimum and maximum number that constitutes the *deme* can be different accordingly to the different environments in which human populations live and the different historical context in which they happen to act.

Man's interaction with his environment has produced and produces norms that characterise his behaviour viewed in a historical perspective (ethics, habits, *mores*) and that characterise and condition his behaviour, facilitating survival.

Morals, thus, is that part of Bioethics dealing with the norms that according to the different historical and cultural environment and the different habits accumulated in a human population guarantee the best survival of individuals of our species in relation to the four stimuli aforementioned, *i.e.*: relationship between parents and children (A), relationship between spouses or anyway between individuals of opposite sexes during the fertile time (B), co-operation for research or for securing food (C), co-operation to guarantee the individual's defence (D), which obviously depend on the environment in which the individuals or the population happen to live.

The adaptive choices of human social structure and the moral choices (even biotechnologicals and biomedical) must be consequent upon this interaction between human population and environment in which they now live or once lived and with the traditions they accumulated.

In a time in which the world is worried because of economic, cultural identity and moral values crisis, by the actual population growth and by impressive biotechnological innovations, it is always more and more urgent to acquire conscience of this new phase of our species' life.

Global Bioethics wants to be an attempt to create an agreement between Man and Nature in order to let our species' existence be still possible on this Planet. A sophisticated but useful challenge which must be played and won in the next following years.

**Tab. 1 – Basic ethical principles in the history of Life (Bioethics)**

The definition of Bioethics: “*Preservation of the DNA typical of the species and maintenance of its intraspecific variability*”

Hierarchical order in the history of life and its ethical significance

**1<sup>st</sup> level Haploid (n):** microorganisms, gametes, spores, haplophytes

**2<sup>nd</sup> level Diploid (2n):** sexual reproduction, meiosis. In this 2<sup>nd</sup> hierarchical level peculiar ethical concerns must be reserved to the biological entities such as:

- a) cutting: they are identical copies of an original individual, they do not have variabilities, they are produced asexually. It mainly regards cultivated plants and lower animals, now also artificial cloning in animals and possibly man (nucleo-transfer).
- b) subsidiary class of social insects: they do not transmit the DNA of the species and they do not have reproductive potentialities.
- c) early stages of life as embryos and seeds: they have low levels of survival to reach the reproductive stage.
- d) final stages as they have lost reproductive potential.

**3<sup>rd</sup> level Diploid Biological Entities:** in which the concept of individuality as uniqueness, unrepeatability, and indivisibility for the entire biological cycle is present.

**4<sup>th</sup> level Vertebrates** in which the maintenance of the DNA variability typical of the species and its intraspecific variability is assured by socialization  
 $(A+B) + K(C+D) = \Delta$

**5<sup>th</sup> level Mankind** in which the maintenance of the DNA typical of the species and its intraspecific variability is also assured by the product of the brain activities (history, traditions, etc.). In this case Ethics can also become Moral Code as the four types of socialization input can be influenced by history