

DIMENSIONS OF BIOPOLITICS*

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The topic of this presentation is "Dimensions of Biopolitics". The word "biopolitics" (1) was created out of love for biology and the belief that "bios" is a link that unites all people. Our planet is only a small part of the universe. Our galaxy contains over one hundred billion stars, and there exist billions of other galaxies. From what we know up to the present "bios" is found only on our planet. Thus we possess the most precious gift of creation.

The study of life is a continuous source of joy for the biologist. In order to comprehend some of the dimensions of the microcosmos of biology, the following example, as calculated by Dr. Dintzis, may be used:

- one cubic mm of blood (that is just a few drops) contains an average of about 5 million red blood cells.
- two million five hundred thousand (2.500.000) red blood cells are produced and equal number are destroyed every second all through the day and night.
- there are about 265 million (265.000.000) molecules of hemoglobin in every cell and 650.000.000.000.000 molecules of hemoglobin are produced every second in the human body.
- every molecule of hemoglobin consists of C 3032, H 4816, O 872, N 780, S 8, Fe 4. These atoms combine to form 574 amino acids which make up the structure of every hemoglobin molecule in 90 seconds. The misplacement of one amino acid is enough to cause the difference between health and disease.
- in addition to hemoglobin, hundreds of thousand of other proteins are produced in every cell. This is just a small example of what is happening every second in every cell.

Additional examples of the new horizons provided by microtechnology, are:

- In fields such as farming, a fungus disease in the stomata of a leave may be prevented and thus save over a billion dollars a year.
- In order to help bone regrow models for artificial-joint implants are prepared at the nanometer size (billionth of a meter).
- It is already possible to glue a tube of one-fourth the width of a human hair and make probes for studying bloodcells with lasers the size of a grain of sand.

The tremendous flow of new information provides a need to reassess man's predicament in space. The pathway of technology unravels nature's secrets and improves the perception of the universe.

After studying the macrocosmos and the microsocosmos one wonders:

"Galaxy or galaxies
are small dimensions
not infinity

Neutrons are small
very small
not infinity

And what am I
a neutron to the galaxy
or a galaxy to the neutron?"

(Oscillations, 1983. Dr. Agni Vlavianos-Arvanitis)

Technological achievements seem almost unreal, as though rapid progress images mythology. Mythology has returned. Technology, today's Prometheus, with sensitivity and prophecy provides light and fire, crusades for the revelation of the seeds of truth, and makes possible the advent of a new era. In the drama of history, present technology closes the curtains on the scenes of the ancient world and introduces a panoramic view of the march of knowledge.

However, with accelerated progress and escalating technology scientists expedite discoveries but also the tendency to disorder increases through rapid exploitation of resources and an increase of pollution. In order to harness this trend, biology can provide a model for the improvement of the quality of life. A study of "bios" leads to a better grasp of the meaning of life. Dimensions of biology seem to reach a new perspective - "biopolitics". "Bios" is the most precious possession on earth. We cannot take risks which may result in the loss of this great gift due to small local problems that may quickly pass national boundaries and create global threats.

Biopolitics International Organisation now has legal status as a non-profit association in Greece and branches are being formed in other nations. Biopolitics International Organisation (B.I.O.) has the following objectives:

1. Biopolitics proposes international cooperation for the better understanding of "bios". Parallel to national problems, nations will have an international task. Advanced nations may undertake a world educational campaign through communication satellites to increase public awareness on issues such as health and the environment. A leadership arena will be required with an increased feeling of responsibility. New international legislation may provide a code of action in cases when "bios" is threatened. A group of accepted world leaders should be allowed to interfere.
2. Biopolitics proposes the dialectic approach in handling international problems by placing as its center the need for assessment of technology in all fields of human endeavor. The rapid growth of information opens new dimensions and expands human thought. Technological advances are shaking the foundations of our private and public existence. Ethical values, the social structure, national and international issues, as well as legislation have to be re-examined in view of the new perspectives provided by recent advances. In order to establish the dimensions of progress in relation to the improvement of "bios", the "bio-assessment" of technology has become an urgent need. Achievements of modern technology need to be used for the improvement of bios. Greece is proposed as the ideal meeting place for people from all specialties to meet and assess progress and values. Every corner of Greece, depending on its cultural contribution to mankind may serve as the meeting place for providing the needed new dimensions. For example, Patmos, the island of the Apostle John, may serve as the meeting place for theologians to examine the effects of technology on religion and propose future values for "bios". Icaria as a meeting place for aeronautical engineers. Mythology, history, tradition, as well as modern technology may combine to provide a future based on a perspective of hope, as well as respect for creation.
3. Biopolitics proposes the sensitization of public opinion, so that more people will realize that progress in the biological sciences relates to their own specific field of interest.

Human history can be traced back a few thousand years only. During this period, several political models have been developed. Tyranny and democracy are among the older ones; and now new terms like socialism, communism, capitalism are added as alternative models of human society. The history of life, however, extends several hundred million years. Life has been tested in unlimited varieties and the most viable species have survived through the powerful selection of evolution. It is for this reason that "bios" can become the model for attaining the desired dimensions and expanding strategies for future society.

Bio-Legislation

Intense efforts are under way to decipher the human genome. This enormous task of determining the sequence of three billion nucleotides and identifying over 100.000 individual genes will cost several hundred million dollars but will revolutionize completely our concept of health and disease. Over a thousand diseases will be identified in the fetus by comparing its DNA with normal sequences. This science fiction-like plan will be realized before the end of the century. Many ethical questions arise.

Biolawyers and biologists will be facing daily challenges such as:

- Should abortion be allowed in the case of lethal diseases, identified in the fetus? Presently Down's syndrome is identified and pregnancy is stopped. What will be done when close to 2000 diseases are identified?
- Does a potential human being possess rights as from the stage of the fertilized egg, the three-month embryo, the fetus, the new-born baby? And if so, should research on artificial insemination and other technological interferences to fertility be banned, or should further research be promoted, and thus improve our understanding of health and disease.
- Rumours already exist on third world women selling their fetuses. Transplant of fetal tissue removed during abortion provides hopes for Parkinson's and Alzheimer's disease, sickle cell anemia and diabetes.
- Sex-testing of embryos through amniocentesis or ultrasound examination have raised fears of abortions among certain cultures. Centrifuge separation of male producing or female producing sperm may induce additional problems.
- Are human tissues and cells our property or do they belong to the laboratory where they have been donated?
- Can patent law protect the discoverer of new biotechnology products?
- Is the human genome to be patented, or is scientific progress the revelation of natural truth and belongs to everyone?

In order to allow for the incorporation of new values with the perspective and vision required for the future enlightened bio-legislators will be required. Legislators with limited technological criteria will be inefficient. New ethical problems are created by the rapid advance of the biological sciences. It is an urgent need to include the study of biology in fields such as law, political, economic and social sciences. Without informed and educated vision it will be difficult to decide on new legislations and construct the framework of future societal system.

Bio-Economy

The participation of a country in the progress of the biological sciences may be considered as a barometer measuring the future social and economic development. The ramifications of the biological sciences have an immediate impact on the economy and may be named "bio-economy". This should not be considered as a theoretical idea but a need for competitiveness and progress.

In order to make the new technical, social and economic horizons opened by biopolitics more visible some ramifications of biology will be mentioned in areas such as health, agriculture, the arts, athletics, etc.

Bio-Agriculture

Knowledge of genetics and biotechnology leads to the improvement of agricultural products. Competition in the selling of wheat means "I give wheat and get gold in return; and thus I control the international economy". In relation to nutrition, we need to think of over forty thousand children who die daily from hunger.

Bio-agriculture has become a multi billion dollar a year market. Some examples are given in order to comprehend the new dimensions that are being provided:

- It is possible now to insert complete groups of genes into plants and animals.
- Green plants are being transformed to turn out such medicinal and industrial substances as insulin, oils, fragrances and flavors.
- Strawberry-flavor content has been vastly enhanced by inserted genes.
- An increased yield of natural vanillin has been realized.
- Sunflower seeds may be used to produce oil with a higher proportion of ingredients useful in lubricants and plastics.
- Disease-free potato seeds are used to plant an acre with no more than a pound of seed, instead of the ton of tubers that were needed up to the present. Seeds do not rot in storage and cut potato growers' costs.
- Plants could incorporate growth genes from trees to make them faster maturing and more productive.
- New plants are being developed - their leaves become assembly lines for producing high-value oil or flavors. Other plants can be made as nutritious as eggs without the cholesterol.
- Genes for natural electroluminescence from fireflies and deepwater bacteria have now been identified and will soon be transferred in plant cells.

Biotechnology will offer overabundant food. New plants resistant to disease and providing better crops are already being produced. Intense competition in obtaining better knowhow of biological mechanisms is leading to enormous profits in animal breeding, milk production, wine making and flower marketing.

Bio-economists need to analyze the significant contribution and impact of these new technologies.

Bio-Athletics

In the Olympics, athletes reach high levels of performance. It seems as though the full potential of the human body has been reached. However, with more information derived from brain research, great improvements have been obtained. Biofeedback can also be used for attention control and focusing power. Computers provide model performance by simultaneous analysis of brain waves and muscular coordination. Improved understanding in sport science can be used not only by Olympic athletes but also by the general public. Recent research in athletic science has led to overall health improvements.

Bio-Architecture

In fields such as architecture, the beehive, termite nests, cell membrane or other organelles could be structural models for "bio-architecture" in the future. Bio-materials have been tested and have survived the selection of several hundred million years. For civil engineers biomaterials such as collagen and cellulose could be useful in construction. Aeronautical engineers may design planes with mobile wings or hollow bone structure, and marine engineers boats with anti-rust skin protection.

A new biomaterial with adhesive properties extracted from some mollusks will soon be used for avoiding oxidation and for the repair of ships. It will also be used in surgery for the adhesion of bones or skin and in dentistry for the permanent placement of dentures. At present, 3 million mollusks are needed for the production of one kilogram of the material. But the genes responsible for the production of this material have already been isolated. They will be transferred to bacteria so as to produce this new material inexpensively in large quantities.

Bio-Arts

Like most other creators, artists seek a source of inspiration. Biology with its stunning features and hidden mysteries can surely serve that

purpose. Throughout the centuries art has reflected the study of nature. In this respect, "bio-art" is not an innovation. Already painters have peered down the microscope to discover a completely new world of existence. The recent opening of the microcosmos provides unlimited sources of inspiration for artistic expressions in the future. Artists with better understanding of biomolecular structures may provide new dimensions for artistic expression.

Photography and music are constantly drawing inspiration from nature. But up to the present, artistic expressions have been based mainly on visual and acoustic effects. The sense of smell has not been used as extensively. How would it be if one would admire the painting of a battle field and simultaneously hear battle cries or smell gunpowder?

Bio-Defense

The sense of smell could be investigated further in relation to defense. Radars and radios transmit information based on sight and sound. However, insects, by using their sense of smell, identify their mates or enemies from miles away. This "individualized" recognition system based on the sense of smell still remains unexploited. Cells also have this capability. In man at least one million different antibodies exist to distinguish the specific enemy and utilize "individualized" defense. This does not eliminate the parallel existence of a generalized response by lysosomes or white blood cells.

Bio-Energy

In the search for new sources of energy, we need to turn our attention to plants. We cannot sit in the sun and "synthesize a bun". Plants, however, convert solar energy directly into food and oxygen. Recently, some bacteria have been found to produce the most expensive fuel, hydrogen. Japanese scientists cultivate bacteria that feed on inexpensive cellulose and produce hydrogen.

Bio-Communications, Bio-Computers and Bio-Linguistics

In the future, biology can serve as a model for computer memory storage and processing of information. Another resource of thought could be provided by creating a "Bank of Ideas" where scientists, academicians and philosophers may bequeath their achievements.

By searching for the true function of brain cells, it may become possible to discover the mechanism by which cells store memory data in the form of abstract thoughts. Once this has been achieved, the same system of chemical storage of thought may be introduced into computers, thus widening the scope of analysis.

Every stimulation of sight, smell or hearing creates electric waves. These waves are transmitted through neurons to the synapses where they become converted to chemical secretions of neurotransmitters. Every neuron contains about 100,000 synapses, which constitute the bridge to other neurons. The number of neurons in the human brain is estimated to exceed 100 billion. There are more neurons in the brain than stars in our galaxy.

10 Billion calculations per second are required for every image to reach the optic nerve. With improved understanding of the mechanism of sight, robots are already being produced. These robots recognize the color of the ripe oranges and collect 300 oranges per minute. They will soon be used in many branches of agriculture and industry.

The study of hearing provides an improved understanding of animal communication. We learn about the songs of the whale and the language of dolphins. Acoustic waves are being analyzed by computers, so as to make possible automatic translation. Soon one will speak in the phone in French in Switzerland and Japanese in Japan. Acoustic waves will be analyzed and translated automatically by a "speaking computer".

Only a few months ago a study on the sense of smell was announced. Every individual has a specific genetically determined odour, like he has specific fingerprints. In a few years computers will analyze the odour and recognize the individual.

Presently immediate help may be provided to potential heartattack victims by Medphone, a "transtelephonic defibrillator" connecting the hospital to the home of a high-risk patient.

Bio-Medicine

Recent transplantation experiments transferring embryonic cells in the brain of aged mice suggest a rejuvenation in overall behavior that resembles the fountain of youth. These experiments, however, have only been done on mice and monkeys.

Various pharmaceutical products on the improvement of memory are already available in the market. Total sale of memory products is estimated to exceed 1 billion dollars per year.

When the wheel was discovered, it must have been difficult to predict the endless chains of cars found in the streets of modern cities. A

similar revolution is taking place today in biology and medicine. Until a few years ago, medicine was based on the study of symptoms, the diagnosis and the corresponding treatment. At present, genetic engineering provides a revolutionary approach to medicine due to the understanding of the biological mechanism of disease.

Genetic engineering opens the horizon for prenatal diagnosis. It provides the possibility for changing the genetic code and transferring human genes in bacteria. Bacteria are thus converted into factories for the production of human proteins. For example, insulin extracted from animal tissues had high cost and small effectiveness. Today bacteria are producing human insulin at low cost.

Silk-worms are used to turn out hepatitis B vaccine with improved efficiency. An appropriate gene was inserted into the worms, which produce the protein for the vaccine.

Genetic engineering is providing accelerated hopes for the cure of cancer. Only a few months ago, in addition to accepted treatments like surgery, radiation, chemotherapy and interferon new hopes have been added. These are:

- highly specific stains extracted from algae provide specific and fast diagnosis especially during the operation.
- interleucine 2 that strengthens the body's defense system.
- following the fractionation of genes in millions of parts, scientists have transferred these fractions to bacteria. They were able to produce a new protein called 'colony stimulating factor' that mobilizes the body's defense system and provides new hopes even in terminal cases.
- progress in the fight against AIDS is provided by the use of AZT which prolongs the life of patients.
- a new diagnostic method for early detection is now available. NMR machines are used in detecting specific lipoproteins in blood.

The Bio-Environment

Threats to the environment are endangering "bios". We can not take any more risks, because local problems cross national boundaries quickly. It is for this reason that Biopolitics International Organisation (B.I.O.) held its first conference on "Biopolitics and International Cooperation - the Bio-Environment". The term bio-environment is meant to increase awareness to the threats imposed on all forms of "bios" rather than on "oikos" (house), as used in ecology.

As long as people feel that the environment is detached from them and distant they do not relate it to their own life. The environment includes "bios". Every plant that is destroyed, every animal that becomes extinct, every micro-organism dying from pollution breaks the chain of the continuity of bios. It is for this reason that the bio-environment can contribute to a new perspective and places the responsibility in the hands of every one of us to promote the respect for bios. Only through international cooperation can this obligation be implemented.

Biopolitics International Organisation is proposing the "bios square"*. Youths of all nations are encouraged to construct a "bios square" in major city centers. By roping off one square meter in the center of a city and identifying food and oxygen production and representative organisms (plants, animals, bacteria, etc.), it is hoped that people's interest in the bio-environment would be stimulated. Related articles and discussions could increase public awareness and appreciation of "bios".

Conclusion

For the coming year B.I.O. has chosen "Bios in the Next Millenium" as the theme for all its meetings. The challenge of future dimensions relating to ethical values and philosophy, health, nutrition, the bio-environment, bio-arts, bio-architecture, bio-communication, bio-linguistics, bio-agriculture, bio-athletics, bio-economics, bio-legislation, will be examined.

"Bios" has evolved in hundreds of millions of years. If we consider the evolution of "bios" as a twentyfour hour day, the appearance of human beings is realized during the last few minutes. Let us hope that our presence will not lead to midnight, but to the dawn of hope, since technology offers the expansion of human potential. A new vision is required for the next millenium, which represents only a few seconds in terms of bios' evolution. We possess the knowledge to provide abundant nourishment to all the children of the world and heal our planet from the wounds to the bio-environment. We possess satellites that may be used for immediate information and education of the public on problems concerning "bios".

Biopolitics is not a romantic idea, but an urgent need for immediate action. It is hoped that B.I.O. may act as a lever to lift the spirit of people throughout the world.

In conclusion, one realizes that man possesses the option for alternative futures. The rapid rate of technological advancement provides the ascending ladder of knowledge and the linking bridge between the present and the future. Biopolitics may serve as an ideal pathway leading to the fulfilment of peace and the revelation of harmony.

References

1. "Biopolitics - Dimensions of Biology", paper presented at the European Philosophy Conference on "Man in the Age of Technology", Athens, Greece, June 24-28, 1985.
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* Copyright - B.I.O. The terms "biopolitics", "biolegislators", "biolawyers", "bio-economics", "bio-environment", "bio-architecture", "bio-art", "bio-assessment" are introduced for the first time in international literature.

Dr. Agni Vlavianos-Arvanitis founded B.I.O. in 1985, after having dedicated over 20 years to teaching and research in biology. In 1990, she launched the International University for the Bio-Environment and, in 1992, a campaign for Bios Prizes and cease-fire during the Olympics. A recipient of many high distinctions, she was elected, along with M. Gorbachev, N. Mandela and M. Strong, Honorary President for Life by the UNA of Sri Lanka, and is also an Abdi Ipekci Peace and Friendship Prize laureate. She is Vice President of the International Bioethics Society, Member of the *Journal of Cleaner Production* Advisory Board, Member of the Board of Trustees of the Uganda National Foundation for Research and Development, Vice President of the UNESCO-MAB Hellenic National Committee, Commissioner on the Global Commission to Fund the UN, Corresponding Member of the Pontifical Academy for Life, Member of the New York Academy of Sciences, the International Academy of Ecology, Human and Nature Safety Sciences, the Hellenic Philosophical Society and the National Society of Greek Writers. Author of poetry books, she is also Honorary Professor of St. Petersburg State University for Plant Polymers and *Doctor Honoris Causa* of Mendeleyev University. In 1995 she was nominated for the Nobel Peace Prize, a nomination renewed in 1997, 1998, 1999 and 2000.