SUPRAORGANISMIC BIOLOGICAL STRUCTURES IN THE BIOPOLITICAL VIEWPOINT

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Recently, new important branches of science have emerged at the interface of biology and the humanities. Among these novel research directions of particular interest both for the scientific community and the lay people are bioethics and biopolitics, this science being the main subject of this contribution.

Despite its relative youth, Biopolitics is already recognized worldwide as a special field of research and at the same time, a direction of practical activities, such as international cooperation for the monitoring of the bio-environment, the bio-assessment of modern technologies, and the development of a system of biological education ranging from pre-school to post-graduate stage.

Research into the supraorganismic systems at different levels of biological evolution, investigation of the fundamental biological laws provide us with useful scientific data for making political predictions, plans and decisions.

It is generally accepted that human beings are qualitatively different from all the other living things on earth: articulated speech, intellect, culture and technology are unique properties of man. Nevertheless, there are a number of universal characteristics common to all supraorganismic systems.

- exchange of substance, energy and information between the system and the environment;
- functional specialization of the system components, presence of a higher article structure;
- spatial organization: The association of a fungus and an alga forms the structure of a lichen, population of bacteria forms colonies, certain spatial patterns are characteristic of the settlements of human populations;
- interactions between the components of biological supraorganismic structures; different variants of these interactions are possible:

    a. aggression, a behavior aimed at exterminating, disabling, starving or subduing another organism,
    b. isolation, an attempt to avoid interacting with another organism,
    c. cooperation, a behavior aimed at forming a union with another organism.

P. Corning and E. Jantsch point out the advantages of cooperation among individuals in a supraorganismic structure as a factor increasing the viability and fitness of the individuals. Therefore, natural selection should have favored the development of supraorganismic structures, which have finally evolved to biopolitical structures.

Supraorganismic structures can be subdivided into:

- populations, groups of individuals of the same species characterized by some degree of promiscuity,
- associations consisting of interacting populations of different species,
- ecosystems including, as a rule, a great number of associations and carrying out a partial or complete turnover of chemical compounds, i.e. closed or semiclosed systems.
  In the following, the supraorganismic structures at some of the levels of biological evolution will be briefly described.

Unicellular organisms. The cells in the population of the slime mold Dictyostellium discoideum belong either to the commanders giving orders (in the chemical language, using the substance cyclic adenosinemonophosphate) or to "subordinates" aggregating to form a multicellular fruit body in response to the chemical signal. No studies on hierarchical structures in other unicellular organisms have yet been conducted. However, existence of distinct social ranks in the population of bacteria, e.g. Escherichia coli is possible in the light of the data on the survival of bacterial populations in a medium devoid of nutrients. Part of the E. coli population continues to synthesize cell components, e.g., RNA and even to multiply at the expense of the nutrients released after the destruction (autolysis) of the other cells "starved to death". Hierarchical structures with distinct ranks of cells are likely to exist in plant and animal tissues as well.

The intensity of interactions of the organisms in a population or association is high enough to ensure its coordinated movements, which follow a unitary rhythm of pulsation. This leads to the formation of distinct spatial structures. e.g., the microbial association converting organic compounds to methane has a granular structure, and an association of unicellular phototrophic organisms forms multi-layer mats. Populations of E. coli and some other bacteria form structures consisting of concentric circles. Cells from different circles of the same colony apparently possess different biochemical properties. In some cases, such supraorganismic structures assimilate extraneous microflora (e.g., soil associations of microorganisms), while other structures expel or even destroy "outsiders".This is characteristic of the associations inhabitating the skin glands of mammals.

Multicellular organisms (animals). Hierarchical structures based on dominance-submission relations between the individuals are characteristic of the vertebrates (the term pecking order has been coined for such structure in the birds). An especially spectacular example is provided by primate population hierarchies. The following distinctive features are characteristic of the male on top of this hierarchy-the dominant male: he assumes a special erect posture, has preferential access to food, patrols the area occupied by the population, arrests fighting between the population members, etc.The dominant male is selected in the population by different criteria (aggressiveness, intellect, resistance of the nervous system to stress).

Certain mechanisms are at work in the population which mitigate the rigidity of its hierarchical structure. In some birds and mammals, the power is divided between the leader who actually leads the way of a flock or herd and the dominant male who is the last in the moving group of animals but who is the most privileged member of the group when it stops on the bank of a river to relax and quench thirst. In vervets, the population has not only a hierarchical structure, but also less rigid substructures composed of young vervets and based on mutual aid and cooperation, not dominance and submission. Interestingly, the representatives of these substructures sometimes attempt to stir up a revolt against the dominant male (typically, the revolt is easily put down). In gorillas, chimpanzees and gibbons, donation of food to one another, collective hunting and nursing of the young plays an important unifying role in their social life which, however, is also regulated to some extent by the dominancesubmission relations.

An animal population interacts with other components of natural associations and ecosystems. Of particular interest are the interactions of macro- and microorganisms: termites and the cellulose degrading microbes inhabitating their intestine, mammals and the bacteria of their skin glands. Interpopulation interactions have a part to play in regulating and normalizing the social organization of the animal population, which otherwise (in isolation) may become abnormally rigid.

A characteristic feature of many animal populations is the abundance of social ritual ceremonies accompanying, e.g., the "crowning" of the new dominant male. A delicate balance is maintained in the population between the aggressive, isolative and cooperative behavior of the individuals. In rodents, the area occupied by a population is subdivided into the habitats of individuals or families. Each habitat consists, in its turn, of (i) the contact zone where communication of the host with the neighbors is possible and (ii) the zone inaccessible to outsiders where the private food stock and refuge sites are located.

The differentiation of social roles in animals is associated with the development of the hierarchical structure as well as cooperative behavior such as collective hunting. Despite the internal role differentiation, an animal population as a whole is alloted a single role in the supraorganismic structure of a higher order, in the ecosystem: animals are either consumers or destructors of organic substances.

The biopolitical approach to Man. People demonstrate the main behavioral patterns common to most living things, in spite of the indisputable modifying influence of the human culture: human beings defend their habitats, form families, take care of the offsprings.

The biopolitical approach to human behavior sheds light on the mechanism of some elementary political actions. Complete submission of crowds of people to a (bio-) leader is obviously related to the biopolitical law of "behavior imitation" formulated by Masters. In accord with this law, a flock of birds imitates the behavior of the leader. Biopolitical factors underlay certain subconscious decisions of a person made in the absence of the necessary information. A classical example is the behavior of the electors if they are not informed well enough of the qualities of the candidates nominated.

Man as a creature endowed with reason can in many instances overcome the influence of the biopolitical tendencies of behavior. But this may cause tension and stress. Human populations can exceed the limits of population density typical of the populations of other living things. But the resulting overpopulation stress can be viewed as a biopolitical problem, because a similar stress would be caused by a too high population density in other forms of life.

At the initial stage of the history of mankind, the human population was an integral part of natural associations and ecosystems. But, in the course of history, the links between the human population and the bio-environments became considerably weaker, and this was in contradiction with the biopolitical principle of energy and information exchange between supraorganismic systems. If the mankind succeeds in reintegrating into the ecosystems of the planet, a great number of the problems of our civilization will be overcome. Human social structures will become more natural. In order to attain these goals, it is necessary to preserve the whole wealth of the diverse forms of terrestrial life. At this point, biopolitics regarded here as a conceptual science merges into biopolitics as a system of practical political activities aimed at the co-evolution of the biosphere and mankind considered by A. Vlavianos-Arvanitis.

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