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THEORETICAL BIOLOGY IN BIOCENTRISM

This paper is the first comprehensive, though brief review (1-24) of the focal points (8) of the concept of Theoretical biology (TB) developed by the author since 1972 at TB seminars in Leningrad University. Some of the results have been reported and published fragmentarily and the whole picture was given in lectures (the Moscow Society of Naturalists, 1981).

Status of theoretical biology

TB is a phenomenon of culture and is of an interdisciplinary nature. TB advances new ideas concerning the nature of living matter (LM), knowledge, science and theory [12], mathematics and mathematization of cognition, interrelation between theory and philosophy, etc. TB is based on the concept of the nature of LM (6, 7, 10, 12-15, 18, 19) and the method of its reflection (3 - 11, 13, 16, 20-24) by a particular culture (biomorphic (5) or not).

In different cultures different categories of things are distinguished. As a rule, the inanimate, the LM and the psychological-social matter are distinguished. Yet, the boundaries and the attributes of LM, the norms of relations with it (cf. Reverence for life by A. Schweitzer), also the relations of man with other living beings (LB) differ considerably (works on biohistory by F. Verdoorn).

In different cultures only one of the categories of things is considered as the basic one, and this determines its image and its relation to the universe (Table 1). Thus, the domination (8) of certain principles makes the medieval European culture antropomorphic, the modern culture physicalistic, and that of India biocentric. Hylozoism (Aristotle, Paracelsus) is biocentrism in Europe, yet biocentric culture has not been formed here (cf. (22-24)).

The above cultural monism is related to reductivity – the tendency to the universality, the possibility to use signs (and not symbols) to describe classes instead of individual phenomena. The loss of specificity in classes due to reductivity is reductionism (rd.). Rd is a linear order of classes, a qualification of some of them (the inanimate, the methodology of physics) as simple and others (the psyche, the methodology of psychology) as complex and describing some classes in terms of others. This concerns classes of things (ontological rd: historic-generic or substrate reduction of LM to the inanimate) or basic research ideas (methodological rd: using the methodology of physics in biology). It can be a reduction of complex matter to simple (rd proper: a reduction of the LM to the inanimate) or vice versa (antireductionism: reduction of the inanimate to the psyche with a psychological interpretation of hidden variables in physics, cf. (5, 12, 24)). Rd carries the ideas beyond the boundaries of adequacy (diagonal arrows in Table 1) thus resulting in illnesses in extreme cases (e.g., sexopathology). The conceiving of life presupposes that the biologist who conceives is treated as living (5) and his life is preserved (7, 10); there should be no or little reduction.

Means of description (languages, different logics, mathematics, methodologies), whatever they are, mirror the universe, but the reflections are various depending on the presence of internal resolving structure (IRS) [3]. The category of gender in a language is an IRS for denoting sex. If it is absent in a language, external resolving structures (terms, descriptions) are used. But the category of gender produces inadequacies and ascribes differences to “sexless” nouns. Thus, a language is never precise, and the correct image is conveyed metaphorically. The means of description are adequate when they possess IRS isomorphic to LM (biomorphic). The difficulty of describing (physical description of LM) arises from the inadequacy of the means of description (IRS in physics are not biomorphic). The means of description are: reductive - only fragments are described, but IRS are not isomorphic even to them (anthropomorphism: conditions unusual for a modern European are extreme); systemic reductive (SR) - IRS are isomorphic to parts of the matter described and unity is achieved by the synthesis of these parts into a whole (16, 17; e. g. different types of extreme situations in biocoenosis for the patients, the violent and the explerents), organic - with united global IRS, biomorphic unity of LM, with the possibilities of metaphorization (the extreme situations as a condition for the degeneration of the biospheric umwelt in the physical world (15)). Dynamics of LM requires dynamic means of description and their reflexion (semiodynamics, cf. (12)).

Modern biology is a mixture of estranged physicalistic knowledge of the substrate of LM formulated as a science [12] and debatable antropomorphic ideas of unity, development and vital activity of LM (F. Schelling, L. Oken) presented in studies, coming from the past (12, 13, 21-23). Heuristic nature of reductionism, progress in physics, obviousness of mechanistism and a wide spreading of anthropomorphism make the outward appearance of biocentrism more complicated. But one should not overlook the existing ideas, since both substrate and semantics are important for LM (12), and the body and the wave of organism (14) act as semantophores - exponents, whose organization is of essential nature. Therefore a movement towards an organic approach to biology via SR approach (which combines the advantages of the two paradigms cf. (15, 16, 17)) and theoretical studies within it are justified. The inevitable expansion of biocentrism in this case (20, 22-24) is balanced off by the pressure of other pictures of the universe.

The creation of TB in the above situation assumes (cf. (1)) the existence of biology oriented at the specific nature of LM (cf. vitalism [5]) and biomorphic (5) logics (9), methodology (8, 10, 11, 16), mathematics (9, 14, 15, 18), types of theoretical

studies (11, 17, 18, 21) and organization of theoretical work (20) in biocentric culture (22-24). Biology and theoretical studies in biocentris

Finding an adequate methodology is the major difficulty in developing TB. Methodology of complex approach can be proposed as a possibility [14]. Its aim is to join discordant parts (5, 6, 9, 10, 13, 14, 16, 19) when interact with unity as supersystemity. It is based on using different means of description (5), abilities of people (the description of the rational (rt) aspect of LM produces nomogenesis; the emotional (em), the empathetic (et) and the actional (ac) ones produced bioesthetics (15), cf. E. Haeckel on the beauty of form in nature (12); P. A. Kropotkin's concept of mutual aid, concept of selection, respectively - Fig.1) each of these is associated with its types of expertise (similar to the taxonomic work) and substantiation (e.g., proof, demonstrations) so that the extent of substantiation of the results is determined by their coincidence when obtained, in various ways (common sense included). Theoretical study forms theoretical body in theoretical space with different principles predominant in its different parts. Locally this theoretical body is either amorphous or it structurizes into a deductive system or is conjoint with empirical reality (cf. (9)), while in focal points (cf. (4)) it fully reveals specific features of multifarious types of organization.

Reflexive logic [3] and mathematics which may be suitable for biology are based on the reflexive syllogism involving empirical reality (cf. [8]), its coalescence with theory (cf. its etymological meaning), and bringing causes and aims together by enlogical processuality [13], cf. (10, 15).

A sensible being (SB), i.e., an empirical biologist (cf. (11,23)) can conceive himself as a human being with all his organization (cf. (4); subject S possesses properties of object O), and LB (2) has an inner organization independent of environment (object O possesses subjective properties -S- but not necessarily in the form of intellect). The mutually active and mutually changing interactions of SB and LB, are an enlogue, where the organization of one being is projected into another (e.g., SB on LB, i.e., bringing sense to LB; cf. (17)). The enlogue (like a dialogue) is a unity of construction and cognition. As a result, one of the beings forms an image, an enlogy [13] of the other. The being loses the opposition of S to O and the completeness of its properties tends to approximate it to a thing (T) as part of existence (Fig. 1). The being which reveals part of its properties as a thing and is transformed by other beings, is an enlogy.

Biological experience is an enlogue of SB and LB, a biologist's performance in the theater of LB, a riddling to LM and a raising of the curtain. Every empirical biologist (as an expert) forms his own enlogy of LB (fact) according to his psychic organization (cf. orientation of tetrahedra in Fig. 1), and methodology (cf. (1, 8)) is necessary to coordinate the facts presented by different empiricists. This is a task for theorists (see also (17, 21)) who organize the dialogue with empiricists. A dialogue of several empiricists (so as to give a more comprehensive picture of LB due to differences in their psychics) with one (or several) theorist(s) is a reflexive biological experiment (cf. interviewing experts in engineering knowledge) as a theoretical method (cf. Galileo's experiment as a reflective reorganization the empirical reality depending on the task; work with invariants makes it possible for some theorist to work with one empiricist and facilitates their combination in one person).

In association with antireductionism (4), semantics appears in biology owing to ideas about: Languages of LM (genetic (4), immune - with double segmentation, grammar, synonyms and homonyms in the vocabulary, generation of correct senseless sentences - mutations, cancer growths), similar to language are hormones, pheromones, ecological code, animal behaviour; one can speak about the "written" - preformed (13) and "oral" - epigenetic - languages and an organism as a text in several languages [8]; Bioesthetics (A. A. Ljubischev [15]; cf. (8, 13, 15, 18)) which develops the ideas of secondary semiosis and hermeneutics of life (the role of minor and alkyl bases in the virus DNA, geographic styles of habitus - tailtenacity in American jungles, the variously caused blue colouring of butterflies in Ceylon); Anthropic principles in global ecology (V.I. Vernadsky, Teilhard de Chardin) and cosmogony (Carter's principle); Anthropomorphic approaches in physics [4]. At the same time, semiotic features become obvious in taxonomy, morphology (Baer's law is the result of inverse relation between the volume and the contents of the concept with the number of signs growing during embryogenesis). As a result, the old ideas concerning the language of nature, the Book of Life are being reinterpreted (cf. (21)).

Preformism, short range interrelation, primacy of substrate and study of body, which are similar in essence, oppose epigenesis, long range interrelation, focusing attention on organization and field interactions. The first paradigm, supreme during the mechanistic epoch (cf. (6)), has the means of description which are not always adequate for morphology and embryology [6]; the second paradigm is at present "speechless" (with the exception of synergetics, formative causality of R. Sheldrake) though it has got facts (e.g., no attention had been paid to divaricate bushes in New Zealand and their possible interpretation from the viewpoint of unity of style and genius - L. S. Berg (cf. (12, 15, 18)) - before the hypothesis of virus transduction had been advanced [15]; analogy, the appearance of skeleton in many groups during transition from Vendian to Cambrian) The LMs exist as individuals with a "body" and a formed "wave" of action [10]. The body and the wave are mutually affected during their interaction with the environment and are enlogies (10). The body's bounds are determined reflectively (the LB itself distinguishes between itself and non-self), they ensure contact with the universe due to breaks in the bounds (pores) and are described by a biomorphic non-Eudoxian geometry (15). The body is the result of interference between the waves of action, the locus [13] with their highest concentration. The "body" and "wave" are extreme states of an organism (in anabiosis the wave is reduced, bacteria practically have no body). Wave interactions predominate in unicellular populations while body interactions dominate in their colonies; for multicellular ones both types are important (cf. (6, 13)).

Umwelt (J. v. Uexkull [10; 13]) is the universe where LB live and which they react to (Trichoptera's larvae react to conditions inside their house which is an aggregate of nonliving particles transformed into a part of Umwelt by the action wave). It is a superposition of action waves, unity of a "physical" and a phase spaces. Umwelt is specific for different species (domination of sense of smell in perception distorts geometry) and involves many components. The Umwelt properties in some points approach the properties of a physical world (e.g., coincidence of body geometry of fishes, birds), which means that the physical and biological pictures of the world asymptotically coalesce ((3, 5); cf. the influence of the organisms on physical processes, A. N. Kozyrev). Umwelt is characterized by enological processuality ([13], cf. [2]) as an aspect of an individual's polymorphism (9, 18), thermodynamics (difference in the relation Ca/Mg in shells as standing waves of the organisms of the same biocoenosis indicates the difference of temperatures of their umwelts), harmony (cf. (12)) of organisms and Umwelt (cf. L. S. Berg's original expediency, A. A. Elenkin's principle of equivalentogenesis). Biosphere is a united Umwelt of the past, present and future of Earth.

Complex approach (8) surmises the use of interdisciplinary description pictures (DP) when the SR method (5) is employed (DP turn into enologies when organic ideas are used; cf. mesogies manifested in disharmony and unobservable in equilibrium) and search for configurators (V. A. Lefevr, [14]) which synthesize them in a way specific for the subject field (include taxa of different categories (18)). The type DP synthesis does not go beyond the limits of adequacy (which is an obstacle to reductionism (4)). These DP can be correlated with biological disciplines and Aristotle's causes (C (Table 2; cf. (23))).

TB in the SR biology represents a configurator synthesizing six DP for actualized body and wave (14) components of the organism (in substrate and semantic aspects these are two-side cube planes - Fig. 1, (6)). In the theoretical space (8) of postscience, and describes properties of this configurator and space. Particularly, it explicates the a priori components (frames) of biological knowledge projected upon the LB in an enlog (10). Application of the configurator results in a speculative generic being (GB, Fig. 1 [12]) which generalizes the empirical data in the enlog with LB, but is not so rigidly structured as in deductive theories. The GB is a product [12] of dialogue between theorists and empiricists, and the theorists' work (cf. (11, 20, 27, 24)) is an enlog with GB. Its value is independent of the empiricists' work.

The GB as a centaur of DP is heterogeneous, heterohierarchic and heterochronous (G. P. Tshedrovitzky). This corresponds to a populative existence of its empiric incarnations and requires a typological approach to its description [12; 13]. The aim of taxonomy as an extensional aspect of typology is to bring forth essential signs of LB which represent the form of LM and constitute (together with a fixed combination of facultative signs, i.e., styles [13, 15]; (8, 12, 15)) the subject matter of morphology [1, 4, 9, 13] (including meronomy) as an intentional aspect of typology. The unity of these aspects is related to type as a distinctive figure, an arithmology number (the higher plants as the triad of "root - stalk - leaf", Table 1; cf. ideas of mathematics of relations as relevant for biology [3, 7]). The central generalization of systematic reductive biology is the S. V. Meyen's idea of refrain (R) [13] - a set with a structure which corresponds to different types of changeability (onto-, phyla-, teratogenetic, cf. (????) dismembering leaf-like organs). The R members are incarnated in figures of different forms (forms of species, fratriae are built from a holomorph of semaphoronts (W. Hennig, see [13]) R, i.e., typological categories themselves are polymorphic). The R member can be expanded into a R and the R can be reduced to a member of the other R i.e., the R and its members, as unity and its parts, are related through automodel symmetry, which retains a semantic invariant [13], the result of which is the possibility to reconstruct the organism by its fragments (as in palaeontology).

Macroevolution of LM as a centaur-object is described by a cross-section of semaphyleses (cf. Empedocles) which are greatly preformed (13) as trajectories in the refrain. The stabilization of a new combination of properties in some population, i.e., the appearance of a new type (mammalization in different taxa and "assembly" of mammals from its result) due to epigenetic changes in Umwelt (15).

Self-organizing seminar-dialogue (cf. [1], 8) capable of self-reproduction is a type of biomorphic (7) organization of theoretical study (reflexive experiment as collective activity following personal experience) which is (similarly to the empiricists' enlog with LB) an aspect of the way of life. Therefore the results of work incarnated in multidimensional, inherently heterogeneous texts produced by different means (terms, metaphors, formulae, figures: but the given text would be rather compared with a fossil due to its laconicism) and recorded in charts, on Moblus's band, in tables. Thus such texts are centaurs of epos and the daily round and are formed as organons, organisms of ideas (Hegel). Their interpretations are adequate when the reader is correctly (by contact with a tradition bearer - cf. the role of types and standards in taxonomy as means of the centration (8, 18)) centred upon the focal points (8). When distorted, these texts become senseless, i.e., they are impervertible.

Methodological reflection of expertise which enables reduction to enologies (as centaurs of different organizations, cf. (6, 9, 10, 13 - 20)) and reinterpretation of general biology (cf. (11, 17) is the way to formal biology (23).

Biocentrism and culture

The idea of a man who lives in culture as his Umwelt (an enological type - cf. (21)) and describes it variously (8, 10, 11) is the last link in the biocentric picture of the Universe. The logical-epistemic approach [12] (by constructing invariants) carries out an extensional Umwelt reduction to a physical world and is oriented at mechanisms (cf. unity of construction of real numbers, Newtonian time and space, energy, money as an universal equivalent; cf. (3, 4, 6)). Umwelt corresponding

to such a culture is similar to the *umwelt* of the experients (5) and is reflected as a physical world which can be interpreted as a dead *umwelt*. The anthropomorphic approach oriented at personality and working with sense reduces the man's *umwelt* to his intentional aspect (the medieval *umwelt* is similar to the patient's *umwelt*; cf. (24)).

Formal biology (B) studies the form of the LM and interprets the descriptive biology (cf. (18)), supplements modern B (physical-chemical one) which studies matter, substrate (6) and presupposes the creation of 1) active B covering medicine (cf. Arabic, or homeopathic medicine, or the one aimed at correcting the form), agriculture (cf. biodynamic agriculture with its mixed crops and closed cycles; journals "Biodynamics", "Compost"), biotechnology which does not include LM into physico-chemical technologies (bioindication, organoleptic tests, chemical equipment for biosynthesis) but develops biomorphic technologies as a special *enlog* (account of *umwelt*'s specific features, use of biodevices - LB as means for *enlog* organization with cultivated beings) and 2) purposeful B (biosophy) forming values based on discovering the aim of LM development.

Biomorphic TB is possible (7) in a biocentric culture necessary to overcome the ecological crisis (cf. (23-1)) where, alongside with the four B there exists heterogeneous *hylozoism* (which takes account of life specifics in different classes contrary to the homogeneous, the Aristotelian one), i.e., *vitacentrism* which treats life as a continuing violation of regularities (a permanent miracle) and ensures reflection in conception of LM, finds adequate applications to results of this conception which are deprived of fatal side effect. Acknowledgements. The author thanks all those who contributed to this work and have made it possible all these years.