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THE BODY-MIND DICHOTOMY A PROBLEM OR ARTIFACT?[1]

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Two Contradictory Premises

We are composed solely of atoms and molecules[2]. Is it really possible for us to rule over them or to feel and be independent of them? This is the essence of the Body-Mind Problem (BMP).

It arises from the apparent contradiction between our obvious (although not unlimited) freedom to change some properties of physical objects (I know that I can hit any key on a computer keyboard or move the „mouse" according to my wishes) on one hand, and the widely accepted principles of the *physical causal monism* on the other (all influences in the physical world are reducible to the interactions of passive inanimate bodies).

In other words there is a conflict between (A) the manifestly evident *immanent causal independence of some conscious activities* (a skillful artist, for instance, has practically complete control of the shapes he draws on paper – he is the true *author* of a specific design) and (B) the supposedly unchallenged *ultimate and total dependence of all of the mental processes from the purely physical causality* of the nonconscious chemical structures constituting the substance of the human body (and the brain in particular).

The validity of (B) seems strongly confirmed by another seemingly quite obvious piece of evidence, that is, a strong and apparent *asymmetric* dependence of our conscious activity upon our body. The physical status of the brain and the sense organs

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I am truly indebted to Dr A. Jarnuszkiewicz SJ for his remarks and comments on this paper, and to Sr Immaculata Palanes, SSCJ for the many improvements she suggested in the grammar and phraseology of the present text.

[2] „Surely, this is a great part of our dignity as man, that we can know, and that through us matter can know itself; that beginning with protons and electrons, out of the womb of time and the vastness of space, we can begin to understand; that organized as in us, the hydrogen, the carbon, the nitrogen, the oxygen, those sixteen to twenty elements, the water, the sunlight – all, having become us, can begin to understand what they are, and know they come to be." (G. Wald, 1965. *Scientific Endeavor*. Natl. Acad. Sci. USA, p. 134).

influences our consciousness, but our consciousness can hardly influence the status of these organs. One has to note, however, that although damage to the brain or to the sense organs does influence or restrict conscious activity, the properly functioning organs of the body strictly obey the orders formulated in our consciousness. This, consequently, seems to strengthen (A).

Because of (A) many tend to accept or to postulate a more or less *autonomous* agency of a Mind („a soul", „a spirit") capable of influencing the Body. On the other hand, because of the almost uncritical and almost general acceptance of (B), which puts physical bodies both at the top and at the bottom of all possible causal influences[3], we land in an apparent contradiction.

Almost all of the participants in the discussion on the BMP seem to believe that we cannot dismiss or doubt neither (A), nor (B), therefore, the only possible solution must consist in dissolving the contradiction between them. The well known views of Bertrand Russell[4], Hilary Putnam[5], or John R. Searle[6] provide excellent examples of such attempts. The „solvent" sometimes is distilled from a physiological theory of sensations, sometimes from a theory of language, a theory of information, or from all of them together. Brüntrup, in his meticulous analysis, has recently reviewed the most subtle elements of this discussion[7].

Two Arbitrary Speculative Steps

In this essay I am going to argue that the *„Body-Mind Problem" is a mental artifact*[8].

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[3] The few exemptions from the rule, as for instance T. Nagel's cautious opinion do not change this widespread pattern of thinking. Cfr Thomas Nagel (1986). „The View from Nowhere", chapter III: *Mind and Body*, Oxford UP, New York, pp. 28-53.

[4] „How [primitive forms of life] were first formed we do not know, but their origin is no more mysterious than that of helium atoms. There is no reason to suppose living matter subject to any laws other than those to which inanimate matter is subject, and considerable reason to think that everything in the behaviour of living matter is theoretically explicable in terms of physics and chemistry." (Bertrand Russell [1948]. *Human Knowledge. Its Scope and Limits.* Allen & Unwin Ltd. London, p. 50).

„If – as seems likely – there is an uninterrupted chain of purely physical causation throughout the process from sense-organ to muscle, it follows that human actions are determined in the degree to which physics is deterministic. Now physics is only deterministic as regards macroscopic occurrences, and even in regard to them it asserts only very high probability, not certainty. It might be that, without infringing the laws of physics, intelligence could make improbable things happen ... „ (ibid. p. 54-55).

[5] Cfr Putnam H. (1981) *Reason, Truth and History*, Cambridge UP, p. 75.

[6] Cfr for instance J. R. Searle (1984), BBC Reith's lectures „Minds, Brains and Science".

[7] G. Brüntrup, SJ (1995) *Mentale Verursachung und metaphysischer Realismus*. Theol. und Philos. vol.70, 203-223. He discusses the theories of „functionalism" (H. Putnam, 1975), „supervenience" (J. Kim, 1993), „type-identity" (D. Lewis, 1983), „tokenidentity" (D. Davidson, 1980).

[8] The term „artifact" is used by the experimentalists to denote a phenomenon which does not represent the original structure or quality of the object of study, but a modification of

This artifact was produced by several questionable conceptual decisions. Two main such decisions, which determine all the others are:

I. A departure from the common sense concept of the integrated „rational activity" characteristic to *Homo sapiens*, towards an artificial and chaotic concept of „mental activity".

II. A substitution of the concept of the „living body" with a concept of a disintegrated set of mineral „bodies".

Putting it in a different way, the meaning of the concepts which created the intriguing element of the story was tacitly changed into a set of concepts which provoke no such problem or a *different* problem. The original meaning of the „human living body" term and the „human mind" term seems to be absent in the concepts employed in the discussion of the BMP.

Now, I shall attempt to explain my point in detail.

I. The Substitution of Vague Mental Activity for Rational Dynamism

One might believe that the Mind-side of the BMP is stated in a sound manner. At the moment, however, the term „mental activity" seems to embrace instinctive, psychotic, artistic and quixotic forms of consciousness, but rationality is seldom mentioned as an empirical datum. This is strange, because the rationality of behavior constitutes a scientifically basic and unquestionable trait of mankind.

The Concept of „Rational Dynamism" in Paleoanthropology

In paleoanthropology, the notion of *rational behavior* is defined in an ostensive way. Some specific material objects (e.g. stone tools, the remains of ancient shelters, or cave paintings) are widely accepted as evident consequences of *rational dynamism*. For instance, let us look at the production of stone tools. It involves (a) the selection of the proper quality, appropriate shape and the correct dimension of a stone; (b) the selection of a stone suitable for a „hammer", (c) the selection of the proper plane, proper place, proper sequence and proper intensity of the individual strokes.

Now, let us reflect upon the discovery of man-made prehistoric shelters. The presence of a number of stones, carried from a distance, positioned in a regular shape of an ellipse over a determined area, filled with the traces of the selected kinds of wood, with a quantity of non-chaotic stone material demonstrating the production of tools, an assortment of the animal bones with a typical pattern of cuts left from the butchering process making the evidence of the food processing, the remains of the hearth, and so on ... creates a mental picture of different selective determinations which are treated as

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make it better visible in the microscope) may provoke a chemical or physical reaction within the cells, and result in the formation of subtle grains, clusters or lumps which do not exist in the intact body of a living cell. Those structures are artifacts and should be recognized as such on the basis of the proper control experiments. I guess that the use of the linguistic, mathematical or formal logic tools is not free from the artifact-producing capacity.

a „whole”[9].

Similarly, if one discovers the traces of different pigments arranged in the shape of running bisons high on the wall of a completely dark cave, it is necessary to postulate the selection and collection of the pigments in the vicinity, the selection of the material to construct a scaffolding to reach the top of the wall, the selective processing of several materials to ensure the proper illumination of the place, not to mention the perfect selection of the precise movements which put a particular pigment in the right place and produced the two-dimensional „copy” of a bison. Again, those different forms of selective activity are taken as a „whole”, although the minute analysis of each element of this „whole” is practicable and even commendable. If the awareness of the „unity” among all of these heterogeneous elements of matter and dynamism were somehow removed or discredited, the idea of the „rationality of behavior” would vanish altogether.

The Multitude of the Heterogeneous Selections and a „Constraining Agency”

The recognition of the *rational* pattern of dynamism involves the reconstruction of many different causal (physical) influences which, however, seem to be really interdependent, and somehow linked together. This idea usually leads to a postulate of a *single coordinating agent*. This agent is capable of *selecting* both the material and the kind of causal influences. Its dynamism is *irreducibly heterogeneous*, and yet it reveals a sort of unity, clearly transcending the physical variety of the elements. Because of this kind of selection, the original, „full” *physical potential* of both the material and the physical agents involved is dramatically *restricted*. This *constraining activity* does not introduce into the material objects any properties which were not there before. It just makes a *number of selections*.

A *reduction* of the „whole” rational dynamism back to its components does not make sense. It would mean going back to the full (unrestricted, unconstrained) potential of the elements. The relations of an interdependence between them would vanish. The *phenomenon of the heterogeneous selection* would disappear; the proper description of the object (a tool, a shelter, a painting) would be impossible.

The Data on Subhuman Rationality

The above described abstract concept of rational dynamism almost inevitably provokes a comparison to the instinctive behavior of animals, e.g. weaverbirds and beavers (see Fig. 1)[10].

The beaver digs out its burrow and then builds a dam which raises the level of the water in the stream above the entrance of the burrow. The dam is made from different materials arranged in a „right” proportion (ratio = proportion) to provide its „functionality”[11].

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[9] Cfr Lumley H. de (1969). *A paleolithic camp at Nice*. Scientific American, May 1969, 42-50; Lumley H. de (1970). *Une cabane de chasseurs acheuléens vieille de 130 000 ans dans une grotte de Nice*. Science, Progrès, Découverte, Mars 1970, p. 119-131.

[10] Collias E. C. and Collias N. E. (1964). *Evolution of nest building in weaverbirds (Ploiceidae)*. Univ. Calif. Publ. Zool. 73, 1-162.

[11] Cfr Richard P. B. (1955). *Bièvres, constructeurs de barrages*, Mammalia, 19, 293-301.

This „functionality" is clearly achieved by a long series of selective, elementary causal (physical) acts. This series of acts is inherently heterogeneous and it severely restricts the physical potential present both in the material and in the energy spent during this activity. A mental attempt to „reduce" the burrow and dam system to its elementary components would erase the complex, and *precisely determined* pattern of those successive selections. In this sense, the beaver's burrow and dam system is – in a way– indivisible. As an observer, a scientist might and ought to use various terms to describe – in an analytical way – the different stages and forms of the beaver's dam-building activity, but he is conscious that all of those stages and forms of the activity, and all of the different materials used, and all of the obviously selective decisions concerning the localization and the orientation of the parts, are dependent upon a single, complex, highly repetitive and highly integrated pattern.

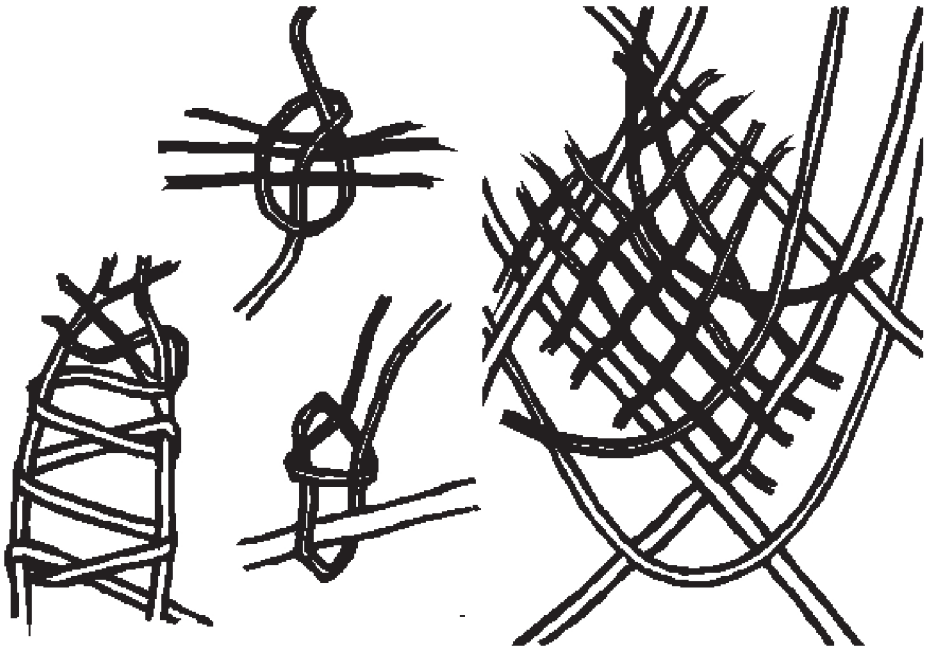

Fig. 1. Some common stiches and fastenings used by weaverbirds (after Collias and Collias, 1964).

We humans, of course, are able to mimic the beaver's pattern of activity, and we might invent a similar or analogous system of protection even without the beaver's good example. We are able to discover the inner possibilities of the materials and the dynamic properties of different forms of physical activity in the slow, difficult and tangled process of gaining knowledge. After a series of trials, we might even match the beaver in the precision and efficiency of its accomplishments. But the beaver somehow „knows" how to achieve this task without a long process of gaining the knowledge. He doesn't seem to know anything about the essential properties of the materials and the nature of the dynamic laws of matter – so we label the cause of his acti-

vity „the beaver's instinct", which is an ingenious way of saying something which, in fact, explains nothing.

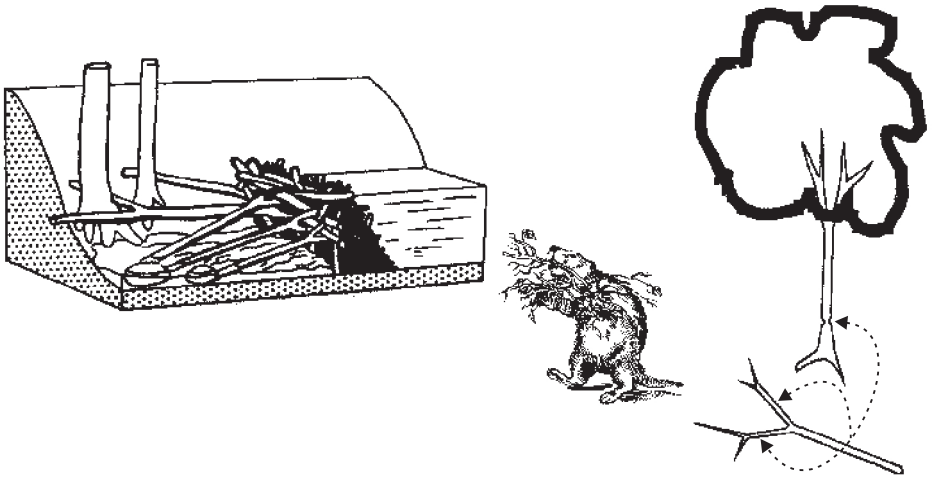

Fig. 2. A section of beaver dam (after Richards, 1955).

Two Different Forms of „Rationality"

It seems therefore, that there is an evident difference between the human and the sub-human forms of „rationality". The sub-human form is (a) more perfect in its results (the spider's web and the weaver's nest are close to the upper limit of perfection – the economy of the material used and the energy spent seems unequaled), (b) less adaptable, less changeable, (c) dependent solely upon the biological organs of the body, (d) strongly dependent upon the physical environment, (e) dependent upon the process of learning, (f) independent from the process of experimentation with material and energy.

The human form of rationality is (a) much more dependent on the experimentation with the material and the external sources of energy, i.e. upon the cognition of the inner properties of matter, (b) relatively independent from the influences of the external environment, (c) rather closely related to the production of the external means of activity (tools).

The above analysis does not pretend to be complete. It just turns attention to some aspects of human behavior which seem to me crucial in the discussion of the BMP problem.

The archeological definition of human culture reveals certain important links with the above idea of rationality. In a way, culture is *„the imposition of arbitrary form upon the environment"*[12]. My exegesis of this text is this: The term *environment* refers

[12] Holloway R. L. Jr. (1992). *Culture: a human domain*. Curr. Anthropol. 33, 47-64; first appeared in Curr. Anthropol. 10, (1969) no 4.

to purely physical reality, its structure and energy. The term *arbitrary* means a certain obvious independence from those structures and energies. The term *imposition of form* means a de-termination (de-limitation) of those structures and energies. Therefore, it means the introduction of limits, patterns, constraints ... i.e. a radical *reduction of potentiality* hidden in those entities. In this way, the „arbitrary form" of a statue or an engine is *educed* from the rich, but inert and passive, potentiality of matter. Here we are close to the Aristotelian idea of the „constraining agent".

Difficulties in Grasping the Idea of the „Mental Dynamism"

The incessant stream of fragmentary, predominantly unorganized and hardly organizable mental pictures and fancies is radically different from the „rational dynamism" described above. Of course, consciousness takes part in both the human and the subhuman forms of rational behavior, but running without control it resembles more the output of a badly tuned radio than a rational dynamism. When, on the other hand, it participates in the framework of „rational dynamism" it cannot be treated as a purely mental event, because this dynamism is inherently heterogeneous and the aspect of its consciousness has no definite meaning apart from, for instance, the activity of the muscles moving the eyeballs, the activity of the brain tissues, the activity of the heart, the activity of the respiratory musculature of the chest and so on.

The Wrong Simulation of „Rational Dynamism"

During the discussion on the BMP, strange concepts are created which, in my opinion, add nothing to the real progress of knowledge. Here – just to give an example – let us reflect upon the „functionale Praedikate der Dormitivitaet" proposed by D. Lewis and discussed by Brüntrup[13].

In an attempt to reduce the upsetting sense of contradiction between the bodily (supposedly physical) and the mental (supposedly non-physical) causality, the „function" of „dormitivity" is analyzed. This „function", obviously, is closely related to the activity of the „mind", but, on the other hand it causally resides in a sleeping pill (a valium tablet, for instance). „Dormitivity" is a purely physical result of a purely chemical reaction or a set of reactions (within the brain tissue). Using this kind of example, a reductionist tries to demonstrate that the changes in our conscious sphere can arise as a result of a typically physical causality. In this way, the principle of reduction of all mental phenomena to the sphere of purely physico-chemical causality is vindicated and the opposite view is proved vulnerable.

The persuasive value of this speculative trick is founded upon a misunderstanding. First, even natural drowsiness, not to mention the effects of a benzodiazepine medication induces a serious reduction of consciousness and functional activity. Blocking awareness, or the senses' activity, or brain function, certainly does not mean anything similar to the *„production"* of awareness, or the construction of the sense organs or the organization of the brain's dynamism. There is no logical, ontological, epistemological or whatsoever „symmetry" between the destruction of a watch and the production of the watch. I have to admit that drowsiness does not mean a complete annihilation of cog-

[13] G. Brüntrup, SJ (1995). *Mentale Verursachung und metaphysischer Realismus*. Theol. und Philos. vol.70, 203-223.

nitive power; yet it certainly is a manifestation of a deterioration, however limited it might be.

Next, the phenomenon of sleep is evidently common to many different forms of animals (so it supposedly belongs to the Body-side of the Problem). If this is so, Lewis either extends the meaning of the term „mind" without a proper warning, or his „function" has no significant connection with the Mind–Body Problem.

The selection of a good empirical illustration is a crucial methodological step in the process of genuine cognition. No serious student examines pollen, carried by the wind, in order to understand „locomotory function". To me, the „functionale Praedikate der Dormitivitaet" is an excellent example of a wrong example.

Consciousness and Causality

I think that we might distinguish between: (1) the unreflective, compulsory and *instinctive* rational-like forms of dynamisms, (2) the fully *cognitive and deliberate* rational capacity of humans and (3) the *mindless* dynamism observed frequently in the „looking glass" of our consciousness. The last dynamism is a superficial, accidental, fragmentary and epiphenomenal element of human activity, therefore it does not require any special kind of causality.

To explain this claim I shall argue that *changes* (and their respective causal aspects) have a double „reality", similar to that of static phenomena. The reductionist's thesis, therefore, is not without reason. A modern chemist knows – for instance – that the visible shape of crystals indicates some deeper – supposedly more essential – properties of invisible atoms, and that the color of a substance indicates –in a way – the nature of the interactions of its atoms with the quantums of light[14]. So, a scientist, recognizes and „sees" not one, but two layers of a physical entity at the same time, while a painter sees and depicts just the superficial one. Now, this two-fold (superficial/essential) reality of a physical structure has its counterpart – I think – in the sphere of the efficient causality. Here we come to the Parable of the Computer's Monitor.

The Parable of the Computer's Monitor

The monitor enables us to observe the inner processes of the computer device, but, what we actually see on the monitor is:

1) an encoded form of the basic, „binary", invisible physical processes,
2) a tiny fragment of those events,
3) an absolutely passive aspect of the computer's dynamism.

The luminous points on the screen seem to collide or to move in a regular way, but those movements are just an illusion of causality in the same sense in which the violent struggle of two criminals is an illusion created by the patches of colored light on the white surface of the cinema screen. This analogy indicates – I believe – how the flow of short-living mental impressions may constitute an accidental layer of more essential, directly invisible causal influences.

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[14] It is – in a way – a modern paraphrase of the long abandoned Aristotelian distinction between the accidental and the substantial layers of the changeable, material being.

The integration of different forms of purely physical dynamism is the basic, common and omnipresent trait of life (including the activity of the „human mind"). It is the only activity which really necessitates a new causal solution. *Cognitive activity and the freedom* of deliberate actions not seem to involve anything more than what was already required – that is an integrating agency (of a given kind), capable of selecting and exploiting a raw material, be it physical or cognitive (prepared by the sense organs).

Now we shall turn to the second arbitrary, speculative step, which produces the artifact of the BMP.

II. The Substitution of Inorganic Matter for the Living Body

The most widespread philosophical definition of the „Body" goes on like this: „the material, organized substance of man contrasted with the mind, soul or spirit, thus leading to the problem of the relation between body and mind, one of the most peristent problems of philosophy"[15].

Living Body means Developing Body

The term „body" is currently used in three, rather different meanings: (1) a physical body (a stone, fluid, a piece of wood); (2) a dead body (a cadaver, a decayed body) and (3) a „living" body. From the observational, purely empirical point of view this distinction is quite lucid and easy to practise. Yet the Aristotelian concept of the „living body" has to be made explicit. The „living body" is the „developing body". „Development" does not mean just the epigenesis – a chaotic increase of complexity, or even a repetitive, ordered increase in complexity. A parable of the recurrent setting of the different letters together – in a typographic workshop – to make a book, does not give adequate insight, and does not provide a good example to grasp the essence of the Aristotelian, biological idea of „development"[16]. True biological development refers to the process of the gradual integration of relatively simple inorganic particles into living body. During development, these particles (the relatively simple molecules) enter into different but strictly selective and functionally efficient relations. No such relation could be recognized between the letters or even the words of a book; therefore the Aristotelian *living* body means a process of gradual, selective, constraining dynamism during which new levels of complexity are reached and many different limiting constraints are evidently operating. During the consecutive stages of this development, a multiplicity of new, purely physical possibilities is formed, but mysterious constraints delimit those possibilities with hardly imaginable precision. The range of possible patho-

[15] Cfr J. J. Rolbiecki (1942). *Body*. In: *The Dictionary of Philosophy*, Runes D. D. (ed.), Philosophical Library, New York.

[16] Aristotle used the word „generation" to denote the ontogenesis (embryogenesis) of a single living body. Thus, the aristotelian science of the „genesis" is almost indistinguishable from the modern „developmental biology". Aristotle, however, could not have an intellectual glimpse of the greatest discovery of our times, that is the idea of an enciphered molecular message which is the blue-print of many molecular structures of the living body.

logical states is constantly and quickly increasing, but in spite of this, the developmental process is usually admirably successful, manifesting even a capacity to regenerate some accidental and chaotic damages of the already build structures.

The unity and integration of the organs in the *adult* body – however impressive might be – is just a *result* of the much more awe-inspiring process of its development. The awareness of the perfection of the adult body only helps to perceive the integrative process of development. Development in the sense explained above is the basic, most essential manifestation of biological causality. This is well known and firmly believed by the developmental and molecular biologists of our times. I don't think that too many of today's philosophers are aware of this fact.

A Priori Rejection of the Concept of the Whole

The modern philosopher's perspective is quite different (the subtitles to the Russell's text[17] – in the square brackets – are mine [PL] and were introduced for the sake of clarity):

[Scientific progress equals reduction to chemistry and physics]

> „There are some who hold that the fundamental concept in biology should be that of „organism", and that, on this account, biology can never be reduced to chemistry and physics. This view is derived from Aristotle /.../. It is, to my mind, an erroneous view, and one which , in so far as it prevails, is a barrier to scientific progress. /.../."

[The laws governing the parts are not necessarily in the whole]

> „Let us first try to state the logical essence of the theory. It holds that the body of an animal or plant is a unity, in the sense that the laws governing the behaviour of the parts can only be stated by considering the place of the parts in the whole. An amputated limb, or an eye removed from its socket, no longer serves the purposes that it served when joined to a body: the limb cannot walk and the eye cannot see. This, of course, is true, but is not a peculiarity of living things; your wireless cannot tell you the news when the current is switched off. And properly speaking it is not the eye that sees; it is the brain, or the mind. The eye is merely a transmitter and transformer of radiant energy. But the »organic« view would hold that the way in which the eye deals with radiant energy cannot be understood without taking account of the rest of the body, and the body as a single whole.
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> The opposite view, which I should regard as correct, would say that, to understand what an eye does, you need to know, in addition to its own structure, only the inflow and outflow of energy. /.../ The mechanistic view holds that, if an eye is separated from its body, but preserves its structure and chemical constitution, and is provided with artificial nerves to drain away the impulses received from incident light, it will behave as it would if it were still in its proper place. /.../ frog's hearts can be kept beating after being extracted from the frogs."

[Analysis and isolation seem to be sufficient tools of scientific progress in biology]

> „Speaking generally, scientific progress has been made by analysis and artificial isolation. /.../ It is therefore in any case prudent to adopt the mechanistic view as a working hypothesis, to be abandoned only where there is clear evidence against it. As regards biological phenomena, such evidence, so far, is entirely absent".

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[17] Bertrand Russell (1948). *Human Knowledge* ... p. 48-49.

From the view point of the modern philosophy of life – quite paradoxically – a dead body seems more distant from inanimate matter than the living body, which, supposedly, could be directly reduced to the body in the sense of the physical body. The corpse is, of course, also reducible to the inanimate matter, but never directly, without reference to the (once) living body.

The Aristotelian versus the „Holistic" Approach

In the Aristotelian, essentially biological classification of beings, the dynamism of the biological body was on the same side as the dynamism of consciousness – both were a manifestation of *„psyche"*. The difference between them was more in a degree than in quality. How is this possible? The reason is that the Aristotelian idea of the „whole" does not conform to the modern „holistic" concepts. The Aristotelian „living body" means a single cycle of the ontogenetic processes, that is the production of the complex and integrated bodily organs from almost homogeneous and disintegrated material. Modern „holism" superficially does the same, but only superficially. Ludvig von Bertallanffy, after rejecting both the mechanistic idea of a clock-like living body machine and the vitalistic idea of a body animated by a „supranatural agency", embraces a „third possibility", i.e. the „dynamic regulation within an integrated system"[18]. Now there is an immensurable gap between Bertallanffy's supposedly „natural" (read physico-chemical) „integrated system" and Aristotle's and Driesche's „integrative dynamism" which produces the „integrated system" of an adult body. Von Bertallanffy in fact, did not abandon the mechanistic idea of a self-regulating complex machinery. The „organismic" approach tries to ignore the crucial embriogenetic and morphogenetic evidence and to wipe out the very idea of the individual living body[19]. The „General System Theory" does in fact ignore the „organismic" approach[20].

At present the idea of the Body (in the Mind–Body pair) seems to be an empty shell with essentially inorganic filling. The original sense of the „living body" became conceptually diluted and replaced by the idea of the inorganic dynamism represented, roughly speaking, by the periodic system of the elements" (possibly in a quantum mechanical, and essentially statistical interpretation). Consequently, the Mind–Body pair almost imperceptibly changed into the chaotic, but „free" Mind and the inorganic Matter couple.

Three Myths

This substitution of ideas was rather easy because of the several modern pseudo-scientific myths efficiently propagated and deeply fixed in the mentality of „modern

[18] *Problems of Life*. Harper & Brothers, New York, 1960, p. 192193.

[19] Cfr Bertallanffy, op. cit. p. 48-50.

[20] „Holists give most emphasis to one level – that of the complete organism ... both reductionsts and the holists fail to recognize ... that the basis for explanation is the same at all levels within the system." (Yates F. E., Marsh D. J., Iberall A. S., 1972. *Integration of the Whole Organism – A Foundation for a Theoretical Biology.* In: *Challenging biological Problems – Directions Toward their Solutions*, ed. by J. A. Behnke. Oxford UP, New York, p. 112).

man". They are closely linked with reductionist's beliefs. These myths I shall call: (1) the Myth of Chemism, (2), the Myth of Brain the Ruler and (3) the Myth of the Totipotent DNA Molecule.

(1) The Myth of Chemism. This myth pretends that biological dynamism is just chemical dynamism[21]. This myth is uncritically accepted by philosophers who believe that it represents a final and irrevocable word of the Natural Sciences. The myth of chemism deeply damaged the chance of recognizing the nonarbitrary idea of biological *integration*.

Suppose a freshman memorized the whole alphabet and came to conclusion that all textbooks are just complex paraphrases of it. Suppose somebody claims the engine is just a rather complex mineral structure. He would miss the *dynamic interdependence* of its parts, which is essential to the structure of a functioning engine. Chemical properties reside in any chemical structure. Technical functionality does not reside in any arbitrarily shaped metal structure.

The absurdity of such a belief is evident. The myth of chemism seems to rescue men from the need to understand the very complex, hierarchical and dynamic idea of *biological function* (e.g. locomotory function, digestive function, ... etc.) and the even more complex idea of *biological development* (biosynthesis and embryogenesis of the locomotory system, digestive system, etc.).

The very essence of the myth, however, consists in the ignorance of the tremendous *physical reduction* of purely chemical or physical potential during the processes of development. This *reduction* is known as developmental, multilevel, heterogeneous and integrative *selection*. The ultimate principle of this selection remains to be discovered.

The nonsense of the myth of chemism is covered up by the dogma of an essentially statistical nature of physical laws[22] and is supported by the Myth of the Totipotent DNA Molecule.

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[21] „It is generally accepted that biological phenomena are ultimately explicable in biochemical terms. For example, it is known that differencies in species (whether animal, plant or microbe) are due to the presence of discrete enzymes, catalysing specific reactions. The mechanism whereby enzymes are synthesised is by the expression of genes, made up of DNA." (Pasternak C. A., 1970. *Biochemistry of differentiation. Preface*. Wiley-Interscience, New York).

„With good reasons it is nowadays a common practice in biology to speak of „molecular automata" , multi-subunit systems etc., characterizing the molecular elements, organisms are built of, as elements of autonomous, complex patterns of behaviour." (Pritz W. F., 1973. *The organization of organismic behaviour*. Currents in Modern Biology 5, 68).

„In biology, the most rapidly advancing field at present is molecular biology. This term refers to the postulate that biological processes should be described at the molecular level. The implication is that if a process has been completely described at the molecular level, there is nothing else to describe." (Caspari E., 1964. *On the Conceptual Basis of the Biological Sciences*. In: *Frontiers of Science and Philosophy*, ed. by Colodny R. G., Univ. of Pittsburgh Press, p. 143).

[22] There is nothing statistical in the stoichiometry or in the isomeric identity of the functional biological molecules and molecular complexes. „Statistics eliminate complexity ... it deliberately disregards the fact that the relative position of the elements in a structure may

(2) The Myth of Brain, the Ruler. The second myth replaces the problem of the rational mind with the idea of the neural tissue, or the neural network. Then it substitutes the effect for the cause, falsely turning the investigation from the search of an agent to the analysis of an *instrument*.

The origins of a myth are always difficult to trace, but it seems that the notorious disregard of the embryogenesis might have been the essential step in the creation of the false idea of the causal aspect of the brain's structures. Few philosophers, if any, ever contemplated the fast and exceedingly exact formation of the brain structures during the early stages of human pregnancy. Albert Szent-Györgyi (Nobel prize for medicine, 1937) wrote:

> „Of course, the egg cell must have contained ... all the information which is necessary to built such a wondrous organism as a cat. But all those excessively complex networks which make a brain could not have been inscribed into the egg cell"[23].

There are physico-chemical limits of miniaturization. A single codon in DNA is roughly ten times bigger than the aminoacid molecule it encodes. The *de novo* construction of the brain in every single life cycle has to be explained *before* any decisive, guiding role could be attributed to this organ[24]. This is no place to enter into the details of the developmental, functional, adaptive and regenerative plasticity of the brain complex. The better understanding of its activity, the more pronounced the enigma of its integrated origin during the life cycle. One can safely state that all of the rationality expressed in the technical achievements of *Homo sapiens* does not match the rationality of the brain's embryogenesis in an ape.

(3) Myth of the Totipotent DNA Molecule. The Aristotelian idea of the „principle of life" being deeply rooted in awareness of the integrative, embryonic development is very close, in a way, to the idea of the „genetic program" so popular among modern bio-

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matter ... the statistical method is therefore of use only where we either deliberately ignore or are ignorant of the relations between the individual elements with different attributes, i.e. where we ignore or are ignorant of any structure into which they are organized." (Hayek F. A., 1964. *The Theory of Complex Phenomena*. In: *The Critical Approach to Science and Philosophy*, ed. by Bunge M., Free Press, London p.339)

„Molecular biology is no more derivable from statistical or quantum mechanics, or nuclear physics, than is the function of the human brain provable from the principles of molecular biology... (Yates F. E., Marsh D. J., Iberall A. S., 1972. *Integration of the Whole Organism – A Foundation for a Theoretical Biology*. In: *Challenging biological Problems – Directions Toward their Solutions*, ed. by J. A. Behnke. Oxford UP, New York, p. 113).

[23] *„Fifty Years of Poaching in Science"*. In: *Biology and Physical Sciences*, ed. by S. Devons, Columbia UP, 1969, p. 22.

[24] More than fifteen years later the above Szent-Georgy's opinion was echoed during the „Brain Beyond Genes" meeting of the neuroscientists held in New York from 2-4 June 1986. For a long time „the overriding conviction was that the physical layout of the brain, the positioning of nerve cells and the routes over which their fibers project to make synaptic contacts with other neurons, was rigidly controlled by genetic instructions". This view is outdated. „The human brain probably contains more than 10^{14} synapses, and there are simply not enough genes to account for this complexity." Cfr Barnes Deborah M. (1986). *Brain Architecture: Beyond Genes*. Science 233, 155-156.

logists. However, quite important differences between the two concepts do exist. First, the idea of the „genetic program" became identified with the set of the enciphered messages residing in the inert carrier molecule of DNA. Consequently, the immanently active principle became reduced to one of the most inert structures of the body. Second, the unity of the Aristotelian principle is incompatible with the multiplicity of the identical DNA molecules which reside in every one of the millions of cells in the developed body. Third, the single level, purely chemical properties of the DNA molecule can hardly be compatible with the evident multilevel, multispatial, hierarchical, selective and irreducibly complex determinations which constitute „problem-raising" embryological evidence. These reasons are sufficient to undermine the optimistic claims of some molecular biologists.

Any single developing germ cell is evidently *totipotent*. This means that it contains a *dynamic capacity* to process a simple material selectively absorbed from the environment, and to produce the complex structure of the adult body from it. It is true that within this totipotent cell, a complex structure of the DNA polymer was found and that this polymer was discovered to carry the enciphered messages quite indispensable for the production of many other polymers of the cell. However, the discovery of a file of blue-prints in the basement of a building cannot prove that those blue-prints have any power to construct the building.

The third myth further weakens the necessity of a *dynamic integrating agency* which – for centuries – intrigued those who were fascinated by the obvious efficiency of the development of organs. DNA blueprints are proved to be as passive and fragmentary in respect to the structure and the dynamism of a biological entity, as the architect's blueprints are passive and fragmentary in respect to the actual structure of a building.

Contemporary molecular biology has sufficiently proved a passive and secondary role of DNA. DNA, carrier of the encoded, molecular information, is certainly necessary, but hardly sufficient to account for the fast, highly selective process of producing an immense variety of strictly determined materials, the hierarchy of integrated structures, and the rational dynamism of the whole. To identify the supreme integrative principle (constraining agent) of a developing organism with DNA means a strange refusal to see and accept the evident informational deficit of this molecule.

Progress in biochemistry supplies further evidence irreconciliable with the hypothesis which equates the DNA encoded messages with the causal principle of integration of living body.

(i) The posttranscriptional modifications of the mRNA[25]. The conclusion seems to be as follows: The early transcript from the DNA gene cannot be directly used by the ribosome to produce a functional copy of a protein. It has to be selectively

[25] Lamond A. I. (1988). *RNA editing and the mysterious undercover genes of trypanosomatid mitochondria*. TIBS 13, 283-284;
Grivell L. A. (1989). *Small, beautiful and essential*. Nature 341, 569-571;
Gualberto J. M., Lamattina, L., Bonnard Géraldine, Weil J.-H., Grienenberger J.-M. (1989). *MA editing in wheat mitochondria results in the conservation of protein sequences*. Nature 341, 660-662;
Covello P. S., Gray M. W. (1989). *DNA editing in plant mitochondria*. Nature 341, 662-666;

modified in many aspects. One of those aspects means a change or an enrichment of the original encrypted message. Any possible informational feed-back to another place in the DNA molecule necessarily does imply a highly selective, complex system of control in time, in space and in the quality of the editing process. So, such a feedback does not remove the problem raised by such a completely new and extremely integrated pattern of the molecular activity.

(ii) Posttranscriptional modifications of the tRNA. Each single one tRNA molecule originates as a transcript of a DNA gene. Such a transcript is a highly selective sequence of four „primary" ribonucleotides. For instance, in the case of the yeast $tRNA^{Tyr}$ the selection is at least $1:10^{64}$. This early transcript undergoes a complex, multistage processing. Parts of the transcript are removed, a several ribonucleotides are added, and many other nucleotides are modified in a highly selective way. This results in the production of a nucleotide sequence in which the selectivity is raised from $1:10^{64}$ to $1:10^{81}$. If one makes a crude, purely quantitative comparison of the selection made possible by the information provided during the process of the posttranscriptional modifications with the selection achieved by the transcription of the information directly from the DNA, the latter constitutes just $1/10^{17}$th „part" of the former. That means an enormous posttranscriptional increase in the complexity of the processed molecule of the tRNA[26]. Again, as in (i), any hypothesis of an additional informational influence of DNA has to be linked with the postulate of a proportionately integrated and selective activity of many molecular agencies capable to retrieve and to deliver this information in the right moment and at the right place.

Volloch V., Schweitzer B., Rits Sophia (1990). *Uncoupling of the synthesis of edited and unedited COIII RNA in Trypanosoma brucei*. Nature 343, 482-484;

Weissmann Ch., Cattaneo R., Billeter M. A. (1990). *Sometimes an editor makes sense*. Nature 343, 697-696.;

Simpson L., Shaw Janet (1989). *RNA editing and the mitochondrial cryptogenes of kinetoplastid protozoa*. Cell 57, 355-366.;

Simpson L. (1990). *RNA editing - a novel genetic phenomenon?* Science 250, 512-513.;

Echols H., Goodman Myron F. (1991). *Fidelity mechanisms in DNA replication*. Ann. Rev. Biochem. 60, 477-511;

Cattaneo R. (1992). *RNA editing: in chloroplast and brain*. TIBS 17, 4-5;

Benne R., van der Spek H. (1992). *L'editing des messages génétiques*. La Recherche 23, 846-854;

Alberts B., Bray D., Lewis J., Raff M., Roberts K., Watson J. D. (1994). *Molecular biology of the cell*. Garland Publ. Inc. New York, III ed., p. 453 ss.

See also K. Carr's (1994). report (*„Life after transcription"*, Nature, 369, 440-441) from the meeting devoted to the „Posttranscriptional Control of Gene Expression: The Central Role of RNA Structure", held in Aruba, The Dutch Antilles, 29 April – 3 May 1994.

[26] This fact is a standard textbook example of the posttranscriptional dynamism, although the causal problems raised by this fact have never – according to my knowledge – been clearly stated. Cfr e.g. Stryer L. (1981) *Biochemistry*, Freeman and Co., San Francisco, p. 707; Freifelder D. (1987). *Molecular Biology*. Jones and Bartlett Publ. Inc., Boston, p. 337-342. See also De Robertis E. M., Gurdon J. B. (1979). *Gene transplantation and the analysis of development*. Sci. Amer., 241, n. 6 (December) p. 60-68.

(iii) Posttranslational modifications of the primary structure of the nascent polypeptides may produce new, atypical aminoacid units. They arise as a result of the absolutely precise modifications of some aminoacid units *in situ*[27]. One has to mention the proof-reading mechanisms which ensure the utmost fidelity in the formation of the primary structure of the functional polypeptide. The first stage of this editing is effected in the aminoacyl tRNA synthetases, the next proofreading step operates within the ribosome unit and engages the activity of the so called „elongation factor"[28].

(iv) The unsolved problem of the origin of the proper secondary, tertiary and quartenary structure of the functional protein molecules[29]. An artificial complex method of producing any desired aminoacid sequence of polypeptide was discovered in sixties and rewarded – sixteen years later – by a Nobel Prize (R. Bruce Merrifield, 1984)[30]. Until now, however, despite the claims to the contrary[31], it is not even possible to produce a quite simple secondary structure of insulin molecules within the biologically acceptable range of precision. The gap between a statistical, say 95% success, and this level of accuracy which is essential to the survival of the living cells is still open.

(v) The extremely precise ways of repairing of the damaged or missing parts of the

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[27] Cfr. Uy Rosa, Wold F. (1977). *Posttranslational covalent modification of proteins*. Science 198, 890-896; Arfin S. M., Bradshaw R. A. (1988). *Cotranslational processing and protein turnover in eukaryotic cells*. Biochemistry 27, 7979-7984; Freifelder D. (1987). *Molecular Biology*. Jones and Bartlett Publ. Inc., Boston, p. 436-437.

[28] Cfr Alberts B., Bray D., Lewis J., Raff M., Roberts K., Watson J. D. (1994). *Molecular biology of the cell*. Garland Publ. Inc. New York, III ed., p. 239.

[29] Cfr. Tsou Chen-Lu (1988). *Folding of the Nascent Peptide Chin into a Biologically Active Protein*. Biochemistry 27, 1809-1812;
Wright P. E., Dyson H. Jane, Lemer R. A. (1988). *Conformation of Peptide Fragments of Proteins in Aqueous Solution: Implications for Initiation of Protein Folding*. Biochemistry 27, 7167-7175. **„The greatest challenge remains the folding of the nascent polypeptide chain in vivo"**.;
Rothman J. E. (1989). *Polypeptide chain binding proteins: catalysts of protein folding and related processes in cells*. Cell 59, 591-601;
Pain R. H. (1990). *Shuffling on this mortal coil*. Nature 344, 198-199.
Sander Ch. (1990) *Inverting the protein-folding problem*. Biochem. Soc. Symp. 57, 25-33, **„Today, the protein-folding problem as a structure prediction problem remains fundamentally unsolved.**" [The emphasis by PL]

[30] Cfr Merrifield R. B. (1968). *The automatic synthesis of proteins*. Sci. Amer., March 1968, p. 56 ss.; (1969). *Solidphase peptide synthesis*. Advan. Enzymol., 32, 221 ss.

[31] **„Most proteins** can fold spontaneously into their correct shape. By treatment with certain solvents, a protein can be unfolded, or denatured, to give a flexible polypeptide chain that has lost its native conformation. When the denaturing solvent is removed, the protein will usually refold spontaneously into its original conformation, indicating that **all the information necessary to specify the shape of a protein** is contained in the amino acid sequence itself." Alberts B., Bray D., Lewis J., Raff M., Roberts K., Watson J. D. (1994). *Molecular biology of the cell*. Garland Publ. Inc. New York, III ed., p. 111. [The emphasis by PL]

DNA molecule, descibed in every academic textbook of biochemistry.

(vi) The selective activity of the cell affected by DNA mutations[32].

(vii) The highly selective reorganization of the segments of DNA molecules during the cell life cycle[33].

(viii) The repair of the operon structures[34].

Paul Weiss has created a story of Martians who observed our Earth from a distance and who came to the conclusion that the only living entities here move with considerable speed along the highways. Those living entities were of different sizes, shapes and colours and, according to the Martian hypotheses, were susceptible to a dangerous infection caused by viruses of quite identical shapes, with a globe on one end and four long, flexible appendices protruding out from the center, filled with a red fluid. The four-wheeled living creatures usually died because of this infection. This was easily demonstrable because in every case of disintegration, which usually happened while moving along the highway, the ruined inside of a dead body was filled with the red-fluid-leaking viruses.

The parable of the Martian observers helps to illustrate how a too narrow, „analytical" field of observation can twist the results of rational thinking.

A special kind of causality

The rational-like dynamism of any known living body postulates a special kind of causality – integrating many different physico-chemical forms of influence[35]. It does not replace the inorganic forms of causality, it does not change their interactions and influ-

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[32] Cfr. Cairns J., Overbaugh Julie, Miller S. (1988). *The origin of mutants*. Nature 335, 142-145.; Parker J. (1989). *Errors and alternatives in reading the universal genetic code*. Microbiol. Revs, 53, 273-298.

[33] Soll D. R., Mitchell L., Kraft B., Alexander S., Finney R., Barbara Varnum-Finney. (1987). *Characterization of a timing mutant of Dictyostelium discoideum which exhibits „high frequency switching"*. Dev. Biol. 120, 25-37;

Stragier P., Kunkel Barbara, Kroos L., Losick R. (1989). *Chromosomal rearrangement generating a composite gene for a developmental transcription factor*. Science 243, 507-512;

Newman R. A. (1992). *Adaptive plasticity in amphibian metamorphosis*. BioScience 42, 671-678;

Prescott D. M. (1992) *Cutting, splicing, reordering, and elimination of DNA sequences in hypotrichous ciliates*. BioEssays 14, 317-324;

Ohta T. (1992). *The meaning of natural selection revisited at the molecular level*. Trends in Ecology & Evolution 7, 311-312.

[34] Cfr. Higgins N. P. (1992). *Death and transfiguration among bacteria*. TIBS 17, 207-211.

[35] This idea is developed in H. Driesche's *Philosophie des Organischen*. See in particular the chapters *Entelechie und das Prinzip der Erhaltung der Energie* (p. 294 ss.) and *Entelechie und der Satz des Geschehens* (p. 298 ss.). See also Caws P. (1965. *The philosophy of science. Princeton*, N. Jersey, p. 311) who doesn't seem to grasp the importance and the full meaning of the „negative" (restrictive, constraining) causality imposed by Driesche's „entelechia".

ences. It does not add its own „bagage" of the physical energy. It just acts as an *„integrating agent"* which is „lazy" and exploits inorganic dynamic potential to its own „satisfaction" . I am using these colloquial expressions quite deliberately. I don't want to pretend I know more than I really do. this special form of „causality" seems no more necessary upon the level of human rational behavior, than upon the level of the integrative activity of the beaver, the weaver, the spider or upon the level of the obviously integrative embryogenetic, cytogenetic, biosynthetic and regenerative dynamisms.

What might be the argument for a real existence of such an agent? My impression is that the proof is hidden in the very fact of *the essential identity of the rational pattern throughout the entire range of living beings*. This fact puts the problem of integration – not just a *complexity*, not just a *repetitiveness* (an order), not just a chaotic *„freedom" of indeterminacy*, but *integration* – in the center of philosophical attention, and it deserves a serious analysis.

The idea of the Aristotelian soul, or Driesche's „entelecheia", the constraining, selective agent, driving and controlling the synthesis of the organs and building the adult body, is rather unknown among philosophers and overshadowed by a simplistic and empirically unwarranted *axiom of the reduction* of all the dynamisms to inorganic, physico-chemical level.

In my opinion, the epistemological principle of reduction as practicised in the biological sciences by many philosophers of nature, is a mental procedure which runs right against the constantly growing evidence of data collected every year upon every possible level of biological complexity.

What is more dangerous – from the theoretical point of view – the idea of *rationality*, which was, and still is considered the essential trait of human species, seems disregarded or forgotten by the majority of contemporary philosophers.

Genuine biological data show a rational-like dynamism, quite evident in the entire biological sphere. This seems to be even more striking upon the *lower*, biosynthetic and cytological levels than on the *higher*, physiological and behavioral levels. Consequently – and this is important – the gap between inorganic nature and living nature is far from being narrower, or less explicit at the „bottom" than at the „top" of the dimensional ladder.

The main difference between us and the beaver, or a spider consists – in my opinion – not in the *consciousness* (the beaver uses its eyes and ears very much as we do), and not in the *efficiency* of the technical process (beavers, weaver birds, spiders, termites and bees work close to the upper limit of physical optimum). Nor does the difference consist in integration alone. The technological achievements of animals are clearly integrated.

Differentia specifica of Homo sapiens

The main difference between Homo sapiens and animals is man's capacity to discover more essential layers of the dynamisms of the physical world, and his capacity to exploit this knowledge in shaping the matter (inventive, artistic behavior) and his own future (ethical behavior) according to a *freely accepted* pattern.

It might be, that other psychological capacities are also distinctive of *Homo sapiens* species but my claim is that the two mentioned above, constitute an obvious, essential

and sufficient element of the truly human character of life.

III. The Epistemological Background of the BMP Artifact

Let us now briefly summarize the epistemological arbitrary decisions which – according to my opinion – produce the illusion of the Body–Mind Problem and turn our attention away from the real object of philosophical study.

The artifact of the Mind–Body Problem – I believe – is produced by a number of arbitrary cognitive decisions such as, for instance:

a. *A lack of the initial, most crude classification of data* – a philosopher may wrongly disregard common sense distinctions, obvious, elementary, and absolutely essential differences of objects. He often tends to create some „abstract", oversimplified, too general concepts – e.g. a concept of „change", „cause", „dependence". This act of premature lumping of the irreducible objects together must lead, sooner or later, to a theoretical blind alley.

b. *An arbitrary use of the abstractive power of the mind* – the fragments of the dynamic pattern of human concepts, language, emotions and desires, racing on the screen of our consciousness, can be treated as a substantial, quasi-physical entity, „the Mind".

c. *An unlimited extrapolation* – according to my knowledge, even such a relatively simple dynamism as a concrete enzyme's selective and efficient activity is – at present – too difficult to be described in terms of quantum mechanical mathematical formalism. Newton's case should dictate a prudent use of extrapolation.

   One is tempted to project the purely mental results of extrapolation upon the description of the physical world – the mathematical concept of the *„infinite"* seems not too different from the idea of the *„unfinished"*. The concept of an infinite reducibility is a clear example of the unwarranted extrapolation.

d. *An arbitrary selection of the evidence* – the strictly non stochastic processes of the cytodifferentiation and the organogenesis are too often „illustrated" by mentally isolated fragments which do not reveal the actual perfect integration of the developmental processes. The real problem, therefore, may be obliterated during the earliest, descriptive stage of the investigation.

   One may be tempted to use a selected part of the available evidence to corroborate the unselective application of this evidence – e.g. the model of the Brownian motion is widely used as a fundamental pattern of biosynthetic dynamisms.

e. *A deliberate restriction of the cognitive power* - one may pretend that a given part of reality is invisible – *„I see the patches, but I don't see the pattern", „I see the chemical dynamism of the beaver's muscles, I do not see the whole, integrated pattern of the dam-building activity", „I see the laws of the atoms, but I do not see the laws of a living cell", etc.*

f. *The uncritical acceptance of some explanations* – one is tempted to accept some glo-

bal explanations as an undisputable truth – e.g. „the random destruction or modification of the DNA molecule + the haphazard influence of the external environment gives a global and essentially correct causal explanation of both the origin and the evolution of „living beings".

The set of explanations displayed in the Box 1 might be the best available at the moment – in the same sense in which the theory of the four elements (Water, Air, Fire and the Earth) seemed to be the best available in the Middle Ages. In this set however, many premises are hidden, which – taken seriously – would prevent a child from coping with the tasks of elementary education. Evidently they are inadequate to constitute a serious constraint for an investigation of philosophical problems, or to determine *a priori* a conceptual framework of these investigations. Their roots and their origins should be carefully reconsidered. Certainly one should not treat them as a conclusive result or something more than a temporary attempt of human cognitive efforts.

The Main Problems of the Cosmos	**The Proposed Solutions**
The NATURE of life The ORIGIN of life	The statistical theory of physico-chemical laws
The ORIGIN of species	The theory of random mutations The theory of random „natural selection"
The NATURE of instinctive behavior the (*The Mini Body-Mind Problem*)	The sociobiological theory; a set of the passive, superenciphered messages of the DNA molecule carries „essence of the biological and psychological dynamism"
The ORIGIN of conscious and instinctive behavior	Random mutations and „natural selection"
The NATURE of the intellectual, voluntary dynamism (*The Maxi Body–Mind Problem*) The ORIGIN of the intellectual, free dynamism	The „ontological interpretations" of the subatomic „indeterminancy principle"

Box 1. The problems and their „solutions".

IV. Conclusions

In my opinion the Mind–Body Problem is a mental artifact. The presumably crucial contrast between the (living) Body and the (human) Mind seems to be a misconception. The truly important, factual split remains between:

(a) the *non-integrative* laws of self-organization – *physical* matter

and

(b) the *integrative* laws of self-organization – *living* bodies.

The principles of the physical patterns of self-organization are numerous, different upon various levels of the scale of complexity (subatomic, molecular, geological, astrophysical). The integrated pattern of the changes going on in a living body indicates an integrated nature of its principle – whatever it might happen to be. Aristotle called this kind of principle „psyché", H. Driesch called it „entelecheia", sociobiologists believe that DNA is the right name for it. The fundamental problem consists in *seeing* – not just *deciding a priori* – if the empirical data do require – in a living organism – a single, integrating agency. If such a requirement originates in an illusion, the whole problem is fictitious. If this requirement is well founded, then we must to search for such an agent.

The main source of the difficulties exposed in the Brüntrup's paper come from a set of strange, methodological and epistemological decisions, consisting mainly in the refusal to see what is evident, the arbitrary selection of data and the arbitrary classification of data. To this list of accusations I would like to add the uncritical acceptance of an assortment of embarrassingly simplistic „solutions".

Two Kinds of the Efficient Causality

Reductionists clearly distinguish between two levels of reality – one superficial, accessible to common sense, and the more essential level, supposedly accessible only to scientists. This distinction ought to be applied to the causal aspect as well. What we see in our consciousness might be compared to the messages visible on the computer monitor. The causality of those messages is practically null. The true, physical causality resides in the invisible sphere of the hardware, the invisible program and the input from the keyboard. Only fragmentary, symbolic and physically passive aspects of the complex dynamism of the computer appear on the monitor. Similarly, it seems, the true causality determining our capacity to act and to select a rational way of behavior is hidden deeper than the level of consciousness, and it is closely related to the development (ontogenesis) of our „material body".

The origin of the Body-Mind Artifact

Reductionists substitute the genuine sense of the „living body" with the idea of the inorganic dynamism represented, roughly speaking, by the periodic system of the elements (possibly in a quantum mechanical, and essentially statistical interpretation). Instead of the pair Mind–Body we have to deal, *de facto*, with the Mind–Inorganic Matter couple.

The problem of the *whole* now enters into our discussion. How could our consciousness be seriously separated from our adult anatomy? Of course, one can disregard the

obvious links between the former and the latter, but did anybody ever observe a rational activity in a specimen with a seriously damaged activity of circulatory system, respiratory system or central nervous system? Now all of these activities are essentially dependent upon the anatomy, cytoanatomy and biochemistry of extremely complex hierarchical structures. Those structures in turn are moulded from relatively simple physical elements during the embryonic (ontological) development of the human body. This process starts in the fertilized human ovum and embraces a broad and irreducibly intricate set of selective determinations occurring upon a ladder of hierarchically interdependent levels of structure. The rapid and practically flawless construction of molecular functional structures – in contrast with the unwarranted claims of the physical reductionist – is not less impressive than the higher (e.g. cytological or anatomical) levels of embryogenetic activity. Any conceptual separation of a fragment of this multilevel, extremely elaborate dynamism (not just structure but dynamism) is a mental artifact. A refusal to see the essential link between this extraordinarily integrated dynamism and the rational activity of man produces the artifact of the Body–Mind problem.

The Aristotelian View of the Problem

So what might constitute a proper, non arbitrary solution? First, the double standards of „rationality" must be abandoned. Either we stick to the chaotic idea of the „typically human mind", or – at the very start of our analysis – we acknowledge the evident and essential similarity between the course of the embryonic development and the stages of the rational activity of man. If the first option is selected, a bottomless precipice between the „mind" of a philosopher and the „rationality" of a technician or an economist appears. The lawless and arbitrary acts of the former have no kinship with the activity of the latter. The Body–Mind problem of the former cannot be translated into the idea of „rationality" in the latter. If the second option is to be selected, then how and where might a split between the living human body and the „human mind" be demonstrated?

According to the Aristotelian (and Thomist) philosophy there is just one, single principle of activity responsible for the whole dynamism of the human body. This immanently active constraining agent determines all the integrative processes of a concrete human person, from the very start in mother's womb to the adulthood and death. The term „soul" is misleading, because it became closely tied with the platonic and cartesian idea of a „substance separated from an animal body". The whole dynamism of the living body reveals the strict, precise rule of the „psyche" constraining the broad potentiality of the purely physical elements of the living body. In the living body this immanent dynamism of „psyche" is much more evident than the dynamism of its material substratum. Only *in vitro* or in the dead, decaying body of an animal or a plant, does the dynamism of the material substratum is liberated from the constraining rule of „psyche". But that is quite another story.

PROBLEM „PSYCHOFIZYCZNY”: ZAGADKA CZY ARTEFAKT?

Streszczenie

Tzw. problem psychofizyczny bierze się z opozycji pomiędzy pewnym *szczególnym* pojęciem „ciała” i *szczególnym* pojęciem „umysłu”. Pierwsze z nich zakłada, że ciało człowieka jest zbiorem atomów i cząsteczek, podlegających „powszechnie obowiązującym prawom fizyczno-chemicznym”. Drugie pojęcie opisuje wewnętrzne doświadczenie pewnej swobody i dowolności w manewrowaniu naszym ciałem. Te dwa pojęcia wydają się prowadzić do sprzeczności. Z punktu widzenia fizyki i chemii dynamika atomów i cząsteczek jest bądź bez reszty zdeterminowana poprzednimi stanami materii, bądź częściowo „niezdeterminowana” (w sensie używanym przez „szkołę kopenhaską”). Obie te alternatywy kłócą się z wewnętrznym przekonaniem człowieka, który „czuje”, że to on sam decyduje o pewnych ruchach ciała i że te ruchy są przewidywalne (artysta przenosi na rysunek elementy, które sam wybrał z przedmiotu oglądu i wie, że jego doświadczona ręka jest mu całkowicie posłuszna).

Sprzeczność między pojęciem „ciała” a pojęciem „umysłu” wydaje się jednak *artefaktem*, czyli strukturą myślową wytworzoną nie przez wierny opis rzeczywistości, lecz przez fragmentaryczne i dość dowolnie skonstruowane pojęcia „ciała” i „umysłu”.

W tym eseju zamierzam ukazać, w wielkim skrócie, jak doszło do wytworzenia owych zniekształconych pojęć rzeczywistości. Doszło bowiem do:

(1) podmiany charakterystycznej dla *Homo sapiens* dynamiki rozumnej na epifenomenalną, kapryśną i niezbyt skoordynowaną dynamikę ludzkiej świadomości, oraz do:

(2) podmiany „dynamiki *żywego* ciała” na dynamikę bliżej nieokreślonego zespołu ciał *mineralnych*. Zamiana dynamiki rozumnej na bliżej nieokreśloną dynamikę ludzkiej świadomości prowadzi do dwóch ważnych konsekwencji, mianowicie:

a) do zamazania uderzających podobieństw pomiędzy procesami biologicznymi oraz instynktownymi z jednej strony, a dynamiką charakterystyczną i diagnostyczną dla *Homo sapiens* z drugiej, oraz

b) do usunięcia z pola widzenia pewnej formy przyczynowości znacznie głębszej, niż epifenomenalna „quasi-przyczynowość” obrazów pojawiających się w strumieniu świadomości. Rozważmy dokładniej te dwie konsekwencje.

Ad a) W paleoantropologii obecność istoty rozumnej jest rozpoznawana dzięki pewnym czysto materialnym, czysto fizyczno-chemicznym, ale nie byle jakim zjawiskom. Mogą to być np. naczynia gliniane, malowidła naskalne, narzędzia wykonane z różnorodnych materiałów, ślady ogrzewanych paleniskami szałasów itp. To, co je łączy, to nie ich fizyczno-chemiczna forma (narzędzie kamienne nie jest podobne do malowidła naskalnego), lecz proces ich powstawania. Z jednej strony ten proces charakteryzuje się selektywnością. Selekcja materiału, selekcja przedmiotu używanego do obróbki materiału, selekcja wielorakich manipulacji, decydujących o kształcie oraz skali ostatecznego produktu jest tu oczywista. Z drugiej strony racjonalność dostrzegana jest w *jedności zespołu różnorodnych selektywnych działań* prowadzących do wytworzenia produktu. Sama powtarzalność produktu jest czymś drugorzędnym, choć

znacznie ułatwia rekonstrukcję procesu produkcji (odnalezienie w jednym miejscu dużej liczby narzędzi posiadających ten sam kształt i te same rozmiary wyklucza hipotezę przypadkowego zespołu dynamizmów sprawczych).

Zatem rozpoznawanie racjonalnej działalności *Homo sapiens* jest sprzeczne z redukcjonistyczną metodą dowolnej fragmentaryzacji materiału empirycznego. Redukcja pola widzenia, lub redukcja aspektów obserwacji może i musi uniemożliwić rozpoznanie produktu diagnostycznego dla rozumnej działalności człowieka. Innymi słowy wykrycie racjonalności wymaga podporządkowania procesu poznawczego całościowości przedmiotu poznania.

Uznanie tej konieczności otwiera drogę do dostrzeżenia wielu innych zespołów dynamizmów, cechujących się *różnorodnością* działań selektywnych z jednej strony, a ich *integracją* z drugiej. Mam tu na myśli procesy embriogenezy, prowadzące do wykształcenia zespołu organów ciała tkankowca (jak człowiek lub roślina) albo jednokomórkowca (jak pierwotniak lub bakteria).

Co więcej, przy tego typu podejściu do przedmiotu trudno uzasadnić przeprowadzenie jakiejś niearbitralnej granicy pomiędzy procesem *budowania* organów ciała a procesem *działania* tych organów. W podejściu redukcjonistycznym, bez którego problem psychofizyczny w ogóle by nie powstał, zaznacza się dziwna i niewytłumaczalna niekonsekwencja. Z jednej strony redukcjonizm słusznie podkreśla wielkie znaczenie mózgu dla zachodzenia procesów intelektualnych a z drugiej wydaje się ignorować zarówno proces powstawania mózgu, jak i oczywistą zależność procesów intelektualnych od stanu organów współdecydujących o pracy mózgu (krążenie, oddychanie itd.). Pojęcie „umysłu" jest tu dość cudacznie odcedzone od dynamiki ciała. Dzieje się to wbrew wszelkim oczywistościom tak potocznym (zdroworozsądkowym), jak i przyrodniczym (naukowym). W rzeczywistości i refleksyjnie odczuwana „świadomość" i jej procesy poznawcze, w których biorą udział organy zmysłów, są nie do pomyślenia bez pełnej i generalnie nienaruszonej dynamiki *całego* „ciała".

Jeśli jednak pojęcie „racjonalności" zostanie zamienione na chaotyczny potok wewnętrznych „wrażeń", pozbawionych koniecznego związku z poznawaniem otoczenia i całościowymi formami ingerowania w to otoczenie, wtedy trudno będzie wykazać jakąś ścisłą zależność pomiędzy tymi „wrażeniami" a konkretnym stanem „ciała". Tak właśnie dzieje się w stanach patologicznych, gdzie dezintegracja okazuje się charakterystyczną cechą dynamiki chorego umysłowo.

Ad b) W wyniku redukcjonistycznej, fałszywej oceny relacji między „ciałem" (rzekomo tylko fizyczno-chemicznym) a „umysłem" (rzekomo luźnych, tylko „atomowych" doznań wewnętrznych) dochodzi też do zupełnie nieuzasadnionej fascynacji dosyć powierzchownym aspektem życia psychicznego. Ze złożonej struktury dynamizmu życiowego zostaje wyabstrahowany aspekt „obrazu myślowego" i dochodzi do próby rozważania ewentualnej „mocy sprawczej" tego aspektu. Aby ukazać powierzchowność tego typu rozważań posłużmy się analogią wewnętrznej dynamiki komputera oraz dynamiki obrazu ukazującego się na monitorze. Na wstępie przyjmijmy pewne oczywistości.

i. Monitor komputera służy jako element kontaktu między komputerem a korzystającym z niego „komputerowcem".
ii. Klawiatura komputera służy jako inny element tego kontaktu.

iii. Kontakt człowieka z komputerem dokonuje się przy pomocy ciała (np. ruchy palców, lub gałki ocznej są oczywiście koniecznym elementem dynamiki pracy zespołu Komputer/Komputerowiec).

iv. Dynamika zmian, obserwowanych na powierzchni monitora, nie ma – w zasadzie – przyczynowego znaczenia dla operacji dokonujących się w jednostce centralnej oraz w pamięci komputera.

Analogicznie, proces rozumienia znaków (polskich, angielskich, lub zero-jedynkowych) pojawiających się na monitorze nie trafia na ekran naszej świadomości, mimo, że to on decyduje o zachowaniu się naszego „ciała" wobec klawiatury a pośrednio o całym procesie sterowania pracą komputera.

Powyższe, elementarne i niewątpliwe, jak się zdaje, fakty dowodzą, że przyczynowy aspekt działania tak komputera, jak i ciała ludzkiego, pozostają poza „epifenomenalnym" i fragmentarycznym wyrazem tych działań na monitorze, bądź na „ekranie" świadomości. Podobnie jak świadomość poznająca poprzez stosunkowo powierzchowne aspekty przedmiotu, rejestrowane przez zmysły, może sięgnąć do istotniejszej sfery bytu, tak i dane świadomości mogą pomagać człowiekowi w sterowaniu narzędziem, lub własnym ciałem. Nie oznacza to jednak, że świadomość jest identyczna z przyczyną sprawczą ludzkiego działania poznawczego, wolitywnego, racjonalnego, lub po prostu życiowego. Przyczyną sprawczą działań racjonalnych jest – jak za chwilę wyjaśnimy – czynnik znacznie głębszy, odpowiedzialny za całość dynamiki racjonalnej, a nie tylko za jeden jej poziom lub aspekt.

Przejdźmy teraz do drugiego błędu redukcjonistów, czyli do nieuzasadnionej zamiany pojęcia „dynamiki żywego ciała" na pojęcie dynamiki nieokreślonego bliżej zespołu ciał mineralnych.

Termin „ciało" jest wieloznaczny. Może odnosić się do dowolnie wybranego wycinka świata materialnego (kamień, płyn, drewno), do „żywego ciała" (rośliny, zwierzęcia lub człowieka), wreszcie do „ciała martwego" (zwłok, padliny, szkieletu, fragmentu szczęki neandertalczyka). W arystotelesowsko-tomistycznym (AT) podejściu do poznawania przyrody „ciało żywe" oznacza „ciało rozwijające się ku formie wyposażonej w organy". Zatem – jak już mówiliśmy – „dynamika życiowa" ukazuje się *przede wszystkim* w procesie embriogenezy. „Życie biologiczne" jest – w ujęciu AT – *integrującym wzrostem złożoności*. Nie jest to tylko proces, ani tylko proces epigenezy, ani nawet ten, lub inny proces *funkcjonalny*, lecz wewnętrznie zróżnicowany a mimo to niepodzielny, wieloetapowy proces budowania wielopoziomowych struktur organów ciała. Jak widać koncepcja „żywego ciała" jest w AT czymś *dynamicznym* a zarazem *niepodzielnym*. Nie jest tu możliwa żadna redukcja opisu do jednego tylko aspektu, lub jednego tylko poziomu złożoności, lub jednej tylko formy dynamiki. Integracja w embriogenezie należy do *wstępnego*, fundamentalnego opisu zjawiska – nie jest li tylko *interpretacją* opisu. Praktykowana w naukach przyrodniczych izolacja i analiza poszczególnych struktur i dynamizmów obserwowanych podczas embriogenezy jest u człowieka poznawczo konieczna, ale stanowi jedynie *narzędzie do pełniejszego i głębszego opisu całości*.

Tu dochodzimy do pojęcia „czynnika integrującego". Proces embriogenezy jest zespołem ogromnej liczby różnorodnych, elementarnych przemian fizyczno-chemicznych, które są etapami postępującej integracji, osiągającej swój kres w postaci doj-

rzałych organów ciała. Same fizyczno-chemiczne prawa materii nieożywionej tej integracji nie determinują, choć jej nie wykluczają, podobnie jak nie determinują struktury silnika, mimo, ze tej struktury nie wykluczają. Skąd się zatem bierze owa integracja, tak wyraźnie zachodząca w rozwoju żywego ciała? Wynika ona ze skrajnie precyzyjnej selekcji, dokonującej się w różnych formach, w ściśle określonych rejonach przestrzeni zarodka i ściśle określonych momentach czasu. Akty selekcji można traktować jako akty „de-*terminacji*", czyli akty *ograniczające*. Ich zbiór musi być traktowany jako całość, bo powstająca dzięki nim struktura postaci dojrzałej jest oczywistą całością.

Analogicznie, mimo, że proces budowania zegara wymaga wielu bardzo różnorodnych działań, to zbiór tych działań traktujemy jako *obiektywną całość*. To z kolei narzuca hipotezę *jednego* (jedynego) czynnika koordynującego wszystkie te poszczególne akty selekcji. Nie jest on przyczyną sprawczą na poziomie bezpośredniego kształtowania materiału, ale przyczyną sprawczą selekcji potencjału ukrytego w materiale. Akty selekcji, koordynowane poprzez ten hipotetyczny czynnik niczego *nowego* nie stwarzają; przeciwnie, *ograniczają* wewnętrzną potencjalność materiału. Hipotetyczny czynnik integrujący, niczego do własności materiału nie dodaje – ani nowych właściwości ani nowych energii. On je tylko zawęża, ogranicza i w ten sposób w organizmie żywym dochodzi do ogromnej *redukcji* wyjściowego potencjału materii nieorganicznej. Ta redukcja, jej kierunek i rezultat jest – jeśli bierzemy za punkt wyjścia sam materiał – nieprzewidywalna, podobnie, jak potencjał form zawartych w surowej glinie, w energii suchego drewna i energii mięśni, nie zawiera dostatecznych podstaw do aktualizacji glinianego, wypalonego w ogniu garnuszka ze szlaczkiem-zygzaczkiem. Próba „redukcji" żywego ciała do fizyczno-chemicznych właściwości materiału jest *wymazywaniem* poznanej już przez umysł determinacji (ograniczenia) powstałego w wyniku wielorakich selekcji. Jest też *negacją całości* ujawniającej się w zbiorze tych elementarnych determinacji. Taka redukcja nie ma nic wspólnego z procesem poznawania przyrody. Jest zaprzeczeniem tego procesu.

Im dokładniejszy jest opis wieloetapowych i wielopoziomowych dynamizmów selektywnych rozwijającego się ciała, tym bardziej konieczny wydaje się postulat *jednego i niepodzielnego czynnika integrującego*. Arystoteles, wychodząc z obserwacji embriologicznych, postulował istnienie takiego czynnika wszędzie tam, gdzie dało się zauważyć dynamikę integrującą. Nazwał ten czynnik duszą (*psychè*). Pojęcie duszy arystotelesowskiej nie ma, oczywiście, wiele wspólnego z pojęciem duszy platońskim lub kartezjańskim.

W ostatnich czasach rolę duszy arystotelesowskiej (czynnika koordynującego rozwój) zaczęła odgrywać koncepcja cząsteczki DNA, zawierającej zaszyfrowany zapis pewnych fragmentarycznych – jak dziś dobrze wiemy – informacji koniecznych do prawidłowego rozwoju komórki. Im dokładniej poznaje się treść owych szyfrów molekularnych, tym wyraźniej widać, że żadna cząsteczka DNA nie może być uznana za nadrzędny czynnik integracji dynamizmu ciała – obojętne czy jest to ciało człowieka, czy ciało bakterii. Cząsteczka DNA jest pomocniczym narzędziem embriogenezy, podobnie jak papierowa dokumentacja techniczna jest pomocniczym narzędziem w procesie budowania fabryki.

„Problem psychofizyczny" polega więc na sztucznym przeciwstawianiu jednej dynamiki ciała innej dynamice tego samego ciała. Główne przyczyny tego myślowego artefaktu to:

a) zacieranie wstępnych, zdroworozsądkowych, przednaukowych rozróżnień pomiędzy rozmaitymi kategoriami danych – zbytnia generalizacja pojęć;
b) dowolność we fragmentaryzowaniu opisu zjawiska, co uniemożliwia dostrzeżenie zjawisk niepodzielnych, całościowych;
c) dowolność w korzystaniu z władz poznawczych – odmowa dostrzegania oczywistych zjawisk selektywnych i powtarzalnych wzorów dynamiki w obrębie „ciała żywego”;
d) bezkrytyczna akceptacja „uniwersalnych”, ale niezwykle powierzchownych form wyjaśniania, polegających na nieograniczonej i nie uzasadnionej ekstrapolacji opisu zupełnie martwych zjawisk subatomowych lub chemicznych.