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ACTIO IMMANENS – A FUNDAMENTAL CONCEPT OF BIOLOGICAL INVESTIGATION

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Actio immanens – as many other terms, coined by the Aristotelian-Thomist philosophical (A-T) tradition – is a biological concept *par excellence*. It was formed as a mental result of biological observation, on the strength of studies on living beings and so, refers to them first and foremost.

During the last century, the term *actio immanens* gradually disappeared from philosophical encyclopedias[1] and has totally vanished from the biological and philosophical language used to describe the dynamism of life. Moreover, if this term does appear at all, its meaning is rather vague.

However, *actio immanens* belongs to the group of key concepts, without which it would seem not possible to properly describe, nor to properly understand biological phenomena.

In textbooks, encyclopedias and dictionaries, covering concepts of Aristotelian-Thomist philosophy, the term *„actio immanens"* is defined as an activity, action coming from a given subject and which remains in it, without any influence from the outside (cf. Podsiad 2000/778, Thamiry 1910) Thus, both the „source" or „principle" (*principium*) of action, and the „*terminus*", meaning the result of the said action, are to be found in the subject (cf. Abbagnano 1977/466, Guthrie 1942/4, Krąpiec 1995/31, Siwek 1965/45, Wuellner 1966/7).

Immanent activity (*actio immanens*), or self-activity, is opposed to transitive activity (*actio transiens*), whose „*terminus*" (result) is to be found outside of the operating subject. In other words – as expressed, amongst others, by Podsiad, – *„the object* [of an activity] *is found outside the active subject itself"*. If, to the contrary, *„the object* [of an activity] *is found within the subject, we have to do with actio immanens"* (cf Podsiad 2000/202-203; 778, cf also Krąpiec 1996/22, Wuellner 1966/7, Baldwin 1901/521, Guthrie 1942/4).

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[1] The terms *actio immanens* and *actio transiens* are missing in: Edwards P. (1967) *The Encyclopedia of Philosophy*. The Macmillan Company and The Free Press, New York; *Encyclopedia Britannica* (1962) William Benton, Publisher, Chicago; *Lexicon Universal Encyclopedia* (1991) Lexicon Publications, Inc., New York; *The World Book Encyclopedia* (1991) World Book, Inc., Chicago.

From these statements, it would seem that the fundamental criteria for distinguishing between *a. immanens* and *a. transiens* are: the spatial setting of the „source" of action of a subject under study, as well as the spatial setting of the „*terminus*" of the action of the subject. Taking these two spatial criteria into account, we obtain the result, represented in tabular form as follows:

Table 1.

	Location of the „source" of the subject's action	**Location of the „*terminus*" of the subject's action**	**Type of *actio***
1	inside of the subject	inside of the subject	*actio immanens*
2	inside of the subject	outside of the subject	*actio transiens*

Disregarding for a moment the matter of terminology, it should be stressed that the distinction between the two types of action is of fundamental importance, especially when the term „subject" refers to a living being. Observing living organisms, we notice that their actions are autonomic, meaning that their coming into existence results from their inner dynamism. Furthermore, there is no doubt that certain actions of living entities affect objects which are present in their environment – e.g. when a bird gathers branches and blades of grass, and then builds a nest with them, or when a person uses rushes to weave a basket for shopping. In both cases, the result (*terminus*) is found outside the subject. Some actions, however, do not come „out of" the subject – e.g. when a bird builds up its body's cells from the food it assimilates, or when a human forms the concept of a plant in his mind.

At this point, it is worth mentioning that the examples most frequently given to illustrate the *immanent activities,* are intellectual activities - e.g. analyzing concepts, solving theoretical problems, contemplating truth, etc. On the other hand, the activities of an organism on the molecular level are not considered „fully immanent", despite the fact that their *terminus* obviously does not go outside of the subject. According to Krąpiec *„the living organism is a great laboratory, where chemical processes take place as well"* and these, supposedly, are not immanent activities (Krąpiec 1996/23).

The issue of immanent and transitive activities is further complicated, since many users of the A-T conceptual framework expand the meaning of the word „subject". Consequently, almost any object under study (electromagnetic radiation, the Moon or a combustion engine and so on) may be regarded as a „subject". The term „action", therefore, no longer refers solely to the actions of living organisms[2]. Hence, it is important to take into consideration the fact that the „subject's action" can be either *autonomic* or *heteronomic*. If we accept this distinction, not two, but *four* situations appear in our table. As many as *three* of them are commonly labeled as *actio transiens*.

[2] In A-T, *„actio"* (action) is *a manifestation of a substance's existence.* In any given action, the substance is the causing agent of the change. Yet, the term „manifestation" can mean two different things: (1) A variable, accidental characteristic of the substance's existence, which *does not stem from the substance's dynamism.* E.g. a lizard can have a higher or lower body temperature, depending on whether it was lying in the sun, or in the shade. The lizard's body temperature is its *accidental characteristic*, though, the very nature of the lizard determines the extent (physical limits) of that characteristic. (2) In any living substance

Table 2.

	Location of the „source" of the subject's action	**Location of the „*terminus*" of the subject's action**	**Type of *actio***
1	inside	inside	*actio immanens*
2	inside	outside	*actio transiens*
3	outside	outside	*actio transiens*
4	outside	inside	*actio transiens*

The examples given most often for the third situation are all occurrences related to interactions of non-living physical bodies on each other (meaning mutual influences) - atoms, chemical compounds, the mass of air, astronomical objects, etc.[3] (It seems that nobody has pondered the fourth situation, but we can assume that authors who contemplated the issue of immanent and transitive activities, would consider it to be *actio transiens*).

Accordingly, we might expect that the rinsing of gold nuggets by a river's current is the same type of *action* as the rinsing of gold nuggets by a human being. If we add to this the widespread belief in the supposedly „purely chemical" dynamism of an organism on the molecular level, then the concept of *immanent activity* „shrinks" considerably. The distinction between immanent and transitive activity becomes insignificant.

The concept of *actio immanens* has thus become rather vague and has lost its original meaning, which St. Thomas expressed in his terse assertion: *Actio immanens est tantum viventium* (Thomas Aquinas *De potentia*, q. 10, a 1).

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we also observe some variable characteristics which are not accidental but *essential.* The *substance produces them by its own active potential*. These characteristics are called *properties* (*attributes*) of the substance's existence. The lizard's locomotion or feeding habits, are examples of its *properties or attributes* (cf. the terms *Accident* and *Attribute* in Lenartowicz, Koszteyn 2000b/154-155; 156-157).

From Podsiad's (2000/202-203) definition of *actio transiens,* and Krąpiec's description of the concept of „action" it would seem that it is clearly a question of (causal) *actions* and of *properties* (*attributes*) of living entities: *„The substance /.../ cannot directly act alone by itself, it acts only owing to its properties, called faculties. /.../ the human being acts owing to his hands"* (Krąpiec 1995/387).

The heating of the Earth's surface by the Sun or the attraction of iron particles by a magnet, are not *actio* in the strict, A-T meaning of the term. Neither the Sun, nor a magnet are substantial beings. They are, at most, a blend of different mineral substances. Moreover, solar energy or the force of magnetic fields cannot be identified as „causal actions". As Ziemiański correctly observes (1995/62-63), such types of *„force /.../ do not overlap with causal actions /.../we cannot call /.../ kinetic energy an action /.../ kinetic energy is a certain accidental state"* of a physical object, which lasts as long as it does not come into contact with another object.

[3] *„The activities of physical science are almost entirely of the transeunt sort: one body, molecule, atom, or system acts upon some other"* (Baldwin 1910/521).

The origins of descriptive terminology in science

For many, or perhaps, most *key* concepts, formed within the framework of Aristotelian-Thomist philosophy, the primary and principal model used was that of human dynamism, as well as that of other living entities[4]. The integration (both dynamic and structural) of a living being imposed itself with such obviousness, that there seemed to be no other more „enticing" and suitable natural object for ontological contemplation. The terminological and conceptual structure in A-T was shaped predominantly for the needs of proper cognition of living forms.

Thus, we may risk asserting that the terminological and conceptual apparatus of A-T is „biocentric". This is not a criticism, but a stated fact. The person, who lay the foundations for this apparatus – Aristotle – was, above all, a biologist. He was an empiricist as well as a theorist, hence, a philosopher. St. Thomas Aquinas, together with his teacher and friend, St. Albert the Great, were well aware of this. For this reason, St. Thomas verified, defined more precisely and enriched Aristotle's conceptual system, as the perfect tool for the investigation of *living beings* – people, angels and Living God. Thanks to these people, biologists and philosophers gained a wonderful, intellectual instrument, that enables them to describe and understand the dynamics of living entities.

Physicists, chemists, cosmologists and philosophers of inanimate nature did not have such luck. Aristotle did not create a distinct – „parallel" – terminological and conceptual system adapted to specify the properties of the mineral world[5]. Neither medieval nor more contemporary philosophers created such a system. With time, concepts tailored to describe living beings were simply applied – *per analogiam* – to inanimate entities. This created a real danger of falling into animism, should somebody forget about the limits of analogy, i.e. endowing inanimate objects with the properties of a living being[6] (cf. Koszteyn, Lenartowicz 1999).

The opinion that the Aristotelian conceptual system does not apply to objects and phenomena of the mineral world is, therefore, quite justified. However, it is not fair to depreciate A-T simply because it causes difficulties in describing the inanimate world[7]. It would rather be more appropriate to complete it, in such a way that it would embrace the nature and peculiarities of mineral phenomena.

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[4] This was pointed out by J. K. Dorda SJ, although the author puts the main stress on man's intellectual activity: *„Aristotle's opinion on the structure of beings is rooted in the analogy with mental cognitive results, including the effects of intentional tendencies"* (Dorda 2001/174). Cf Życiński 1987/79.

[5] The Aristotelian interpretation of a falling stone gives evidence to this. Stagiryte had no idea about the gravitational field, or the universal law of mass interaction. He tried to explain this phenomenon with the help of concepts, which referred to the world of living entities. Thus, he explained the movement of a falling stone in terms of an „inner tendency" *„**a passion** to find itself in a natural place, meaning, on the ground"* (cf. Ziemiański 1995/80; bold type – JK).

[6] R. Gérard, for example, in *De l'Univers de champ à l'Univers de mouvement* (1966), meditating upon the „essence" of the world, comes to the conclusion that it is just a movement *„The world should be understood only through the aspect of movement. Unity is the **desire** of another object or even the **desire** in general – the **desire** to double oneself"* (quoted from Ziemiański 1995/86-87; bold type – JK).

[7] Józef Życiński, among others, gives this attention by writing: *„while, many authors categorically postulate the necessity of dismissing Aristotle's rudimentary metaphysical theses, their*

Undoubtedly, the creation of this type of concepts is the aim of physical and chemical research. It is closely tied in with the progress of physical sciences. Unfortunately, the „basic" descriptive language in these sciences has remained dependent on the above-mentioned „illegitimate" biological sources. At times, the supposedly physical terms, used to describe the world of inanimate objects, have *de facto* no straightforward meaning, but just a vague „analogous" connotation. Whether or not the audience will perceive and properly interpret this analogy, largely depends on its deeper awareness of the speaker's peculiar language. If we were to acknowledge that the *breaking* of a branch by the *wind* or the *rinsing* of a gold nugget by *a river's* current are *activities* (Latin *actio*) in the same sense, as the *breaking* of a branch or the *rinsing* of a gold nugget by a *human being*, it would lead to a real „intellectual catastrophe." Luckily, in our everyday experience, such mistakes do not generally take place[8].

Nonetheless, in areas inaccessible to prescientific, common-sense cognition, as well as in „gray" zones of ignorance, most people have to accept uncritically the descriptive language of specialists, who rarely speak explicitly of this analogousness (even if they are fully aware of it)[9]. For this reason, amongst others, the differences between the dynamics

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opponents consider [this] /.../ only a case of an easy cognitive surrender. /.../ In my opinion, these difficulties do not justify the total dismissal of substantialism, as the contemporary state of theoretic physics' evolution appears to be considerably closer to metaphysical texts /.../ than Hume's or Mill's antisubstantialism. /.../ I personally believe that /.../ the possibility, in which the explanatory value of the substantialist doctrine is acknowledged, should be allowed for /.../ in reference to certain types of existence, e.g. entities appearing in animate nature, which was the field best known to Aristotle. The exploitation of this doctrine on all real existences is just the consequence of inductive generalization. Its legitimacy /.../ is yet to be proved" (Życiński 1987/76, 79).

[8] For this reason, we may hope that nobody will take Feynman's words literally, when (in his popular lectures in physics) he states: *„If a piece of iron or a grain of salt, composed of tightly packed atoms, has so many interesting properties, if water, which is also solely composed of such molecules, identical in rivers and oceans on the whole globe, can create waves and foam, murmur and spill in puzzling patterns, if the whole* ***life of running water*** *is only the collection of atoms, then how many other possibilities are there? [...] Is it possible that 'this something', which walks in front of you and speaks to you, is simply a conglomeration of an immense amount of atoms arranged in such a complicated way, that fails the imagination, when we want to be aware of all its possibilities?"* (Feynman 1998/54-55; bold type – JK)

[9] As an example we can take the description of a reputedly „self-replicating" virus, which Manfred Eigen presents in his book *Steps towards life* (1992). What follows are some fragments of this text: *„First of all, the virus* ***needs*** *materials, in which it can* ***store*** *and protect its genetic information. Secondly, it* ***needs resources to introduce*** *this information to the host's cell. Thirdly, it* ***needs*** *the mechanism to replicate its own information /.../ Finally, it* ***must ensure*** *the reproduction of its own information /.../ The virus is even capable of* ***forcing*** *this cell to be responsible for its own replication; its only input is a certain type of protein /.../ This enzyme becomes active only when a 'password' appears in the virus' DNA. When the enzyme* ***sees*** *this password, it begins to productively copy the DNA of the virus,* ***ignoring*** *the much bigger amount of DNA molecules of the host cell"* (quoted from Dennett 1997/33; bold type – JK). A layman might take this text at its face value and believe that the virus is a living entity (and a thinking one at that). Meanwhile, the majority of contemporary biologists has serious doubts as to whether the virus should be considered as a living organism – because they are not able to multiply themselves. Viruses do not reproduce themselves, nor duplicate their DNA –

of the inanimate and animate worlds is wiped out. This constitutes a real threat of misunderstanding, not only to laymen, but also to the scientists themselves[10]. The unwarranted analogies favor the equally unwarranted reductionism in biology – be it ontological, methodological, or theoretical[11] (cf Koszteyn, Lenartowicz 1999, 2000).

Actio immanens vs. biological dynamism

Vivere idem est ac immanenter operari. The question over *actio immanens* is *de facto,* still a current[12] question about *life* – about *biological dynamism*. It is not possible to answer it, without examining concrete *living forms*. An oak, a cat, a frog, a bacterium is a *concrete living form*[13].

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it is the infected living organism, which is able to multiply viruses and replicate the DNA contained in them, thanks to the „molecular machinery" it possesses. The statements that viruses *must ensure* (their own reproduction), that they *need* something (e.g. materials or resources) suggest that in the case of viruses, we are dealing with a biological dynamism proper. To ascribe to the protein molecules (enzymes) the ability to *see* the „password" or *ignore* certain molecules, is a sheer absurdity. The reader who possesses a certain knowledge of molecular biology, can easily identify this type of false analogy, but would a layman detect this *licentia poetica*?

[10] A good illustration of the danger is a fragment from a book, written by contemporary American biochemists: *„/.../ certain structures are evidently animate, for example dogs, flowers or the cells of yeasts, while others are undeniably inanimate, such as the molecules of salt, urea or aminoacids. Between these two extremes, lies a gray area of uncertainty, full of drops of coacervates, pieces of nucleic acids, viruses, or biochemists' artifacts, such as isolated mitochondria or cell nuclei. There is no clear boundary allowing for quickly determining whether something is animated or not /.../ It is the same as asking where lies the boundary between a soft-boiled egg and a hard-boiled one"* (Rose, Bullock 1993/287).

[11] Despite some attempts to move away from it, reductionism still dominates modern biology and significantly influences the shaping of the concept of life by naturalists and philosophers. In his introduction to „Studies in the philosophy of biology," (1974/VIII) Ayala notes that when speaking of reductionism in biology, it is necessary to distinguish three of its types: *ontological*, *methodological* and *theoretical* (which he labels *epistemological*).

The first refers to the conviction which Dobzhanksky expressed, on behalf of most biologists, with the following words: *„Most biologists are reductionists to the extent that we see life as a highly complex, highly special and highly improbable pattern of physical and chemical processes"* (Dobzhansky 1974/1). In this case, ontological reductionism is equivalent to materialistic monism.

On the grounds of methodology, reductionism stands for the belief that the explanations of animate dynamism can be found *„by investigating the underlying processes at lower levels of complexity, and ultimately at the level of atoms and molecules"* (Ayala 1974/VII).

Finally, theoretical (epistemological) reductionism is based on the belief that theories, together with the terminological and conceptual structures operative in physics and chemistry, are sufficient to describe the dynamism of life. In consequence, as Ernst Mayr writes *„some authors consider biology merely a 'province' of physics and reducible to physics"* (Mayr 1996/97).

[12] Daniel Koshland's article *„The seven pillars of life"* (*Science,* March 22, 2002) bears witness to this. The author's inspiration to write this article was a symposium, dedicated to an attempt to define *life*.

[13] As Weiner aptly put it notices *„When we contemplate upon what, in fact, is life, a single, living organism comes foremost to mind: an animal, plant, bacterium"* (Weiner 1999/29). To fo-

Living form

Clearly, the expression *concrete living form* does not imply something „frozen in time", a segment isolated from its environment, an *organic structure*, which we see *here and now*.

When we stand on the bank of a pond in springtime, we see frog spawn. A few days later, we see tadpoles swimming briskly, equipped with gills and a long tail. After a while, we notice frogs jumping around in the grass, which no longer have a tail nor gills, but which now have long hind legs and lungs. Even when a frog reaches maturity, its heart will not be the same as a few days earlier. It will be converted into a „new one", owing to the ceaseless *metabolic turn-over*.

The frog's complex chemical structure changes minute by minute, but the frog keeps its identity as its developmental dynamism goes on. This dynamism „marks out" the non-arbitrary boundaries of the actual and fundamental object of biologist's research. The „boundaries" of a living form are not delineated by its structure, nor by its envelope of skin, nor by its cellular walls, but by its *developmental cycle* (cf. Lenartowicz 1986/45-48, Lenartowicz, Koszteyn 2002a, Koszteyn, Lenartowicz 2005, Koshland 2002).

However, this does not mean that the living form is solely a *developmental dynamism*. Nevertheless, *this* fundamental biological dynamism determines the perception of the living form *as a whole.*

Furthermore, this also does not mean that we can „narrow down" the study of the dynamics of life to a single specimen. The fact that organisms reproduce themselves, directs our attention to the dynamic of *transmitting life* „down" the genealogical line of individuals. The dynamism of a concrete specimen is essentially subordinated to the genealogical line of the given living form (cf. Lenartowicz, Koszteyn 2000a, 2002a).

These comments are crucial, because since the times of Descartes living organisms were identified with anatomical or chemical structures and the biological dynamism was reduced to a purely mechanical movement of parts[14]. Such ontological reductionism still permeates fundamental concepts of modern biology and philosophy of animate nature.

The facets of reductionism

Reductionism in biology has two „sides". Indeed, it would be better to say that the above-mentioned ontological reduction goes through two distinct stages.

In the first stage, a living being is reduced to an extremely complicated machine or a fully automated workshop (in which, of course, there is no human supervision). In other words this is:

(1) the reduction of a *biological dynamism* to a *technical dynamism* (e.g. a machine, a contrivance).

In the second stage, the reduction of the technical mechanical system into a purely physico-chemical system is carried out. Strictly speaking, this is:

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cus our attention on the issue of „object" in the debate about *life*, may seem trivial, even ridiculous. However, in the light of some biologists' questions (in discussing the definition of life), such as: *„Is an enzyme alive? Is a virus alive?"* (Koshland 2002), the issue is not as trivial as it would seem on the surface. Cf. also Lenartowicz, Koszteyn 2002a.

[14] Mechanicism originates from ancient Greece. It is quite manifest in the writings of Thales from Miletus, Democritus from Abdera, Leucippus or Epicurus.

(2) the reduction of the *technical dynamism* to a *mineral dynamism* (i.e. the dynamism which takes place in inanimate nature).

The consequences of these intellectual procedures are:

(a) the suggestion of a (supposedly) possible „smooth" and „spontaneous**"** transformation of a mineral dynamism to a technical dynamism (as in Hoyle's – and before him, Dawkins' belief that a wind blowing over a pile of garbage is capable of building a Boeing[15]),

(b) the complete elimination of the concept of animate (biological) dynamism – since it would (supposedly) be nothing more than a complicated technical process.

Three types of dynamism

The dynamism of living beings is commonly discussed within the context of some „generalized" abiotic (nonliving) dynamism. However, taking into consideration the said two „faces" of reductionism, this discussion ought to be conducted within a comparison with *technical dynamism* as well as with *mineral dynamism*.

Though it is true that biology (or the philosophy of animate nature) is interested first and foremost in biological dynamism, it cannot lose sight of the remaining types of dynamism, this being even more the case when they remain in clear, though specific, relations with the dynamism of living beings.

As an introductory illustration showing the specifics of these relations – while at the same time revealing the singularity of biological dynamism – an example taken from the life of a bird called a wheatear will be used[16].

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[15] This kind of opinion is well rooted in the past. See for instance René Descartes (1677) *Le Monde, Traité de la lumière,* F. Schuyl, Paris, *p. 431-432. „Car Dieu a si merveilleusement etably ces Loix [de la Nature], que'encore que nous supposions ... qu'il en compose un Cahos, le plus confus & le plus embroüillé que le Poëtes puissent décrire: elles sont suffisantes pour faire que les parties de ce Cahos se démélent d'elles-mesmes, & se disposent en si bon ordre, que'elles auront la forme d'un Monde tres-parfait, & dans lequel on pourra voir non seulement de la Lumiere, mais aussi toutes les autres choses, tant generales que particulieres, qui paroissent dans ce vray Monde."* (cf. Descartes (1909) *Oeuvres.* L. Cerf, Paris. Vol. XI, p. 33-34; see also Hall 1969/261-263, Lenartowicz 1980/226; Miller 1998). We can find a good illustration of this in the writings of David Hume: *„If we survey a ship, what an exalted idea must we form of the ingenuity of the carpenter who framed so complicated, useful, and beautiful a machine? And what surprize must we feel, when we find him a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving? Many worlds might have been botched and bungled, throughout an eternity, ere this system was struck out; much labour lost, many fruitless trials made; and a slow, but continued improvement carried on during infinite ages in the art of world-making. In such subjects, who can determine, where the truth; nay, who can conjecture where the probability lies, amidst the great number of hypotheses which may be proposed, and a still greater which may be imagined?"* (Hume 1854/167).

[16] Wheatears (*Oenanthe*) are small birds (of between 20-40 grams in weight) of the thrush family (Turdidae). They inhabit open areas – commonly rocky or stony – throughout almost the whole of Europe (including Poland), America, and Northern Africa (cf. Hansell 1984/101, Wasilewski 1998/332-333). Aristotle also wrote about the wheatears (Zoology, Book IX, 633a 15).

The building of nests by white-crowned black wheatear

White-crowned black wheatears (*Oenanthe leucopyga* – Fig. 1) – the subject of the discussion here – inhabit areas at the edges of the Sahara[17]. It is not difficult to imagine that the conditions for life there are far from easy. In the course of the day there prevails unmerciful heat, while at night it becomes cold. There is no vegetation to create a microclimate which would lessen the drastic differences in temperature. Adult birds are able to take shelter in the shade of rocks or the rock shelf, and besides, the layers of feathers effectively protect them both from the heat of the day as from the cold of the night. The eggs of these birds do not have, for obvious reasons, these possibilities. The protection of their offspring, developing under the cover of a thin shell, lies firmly with the parents.

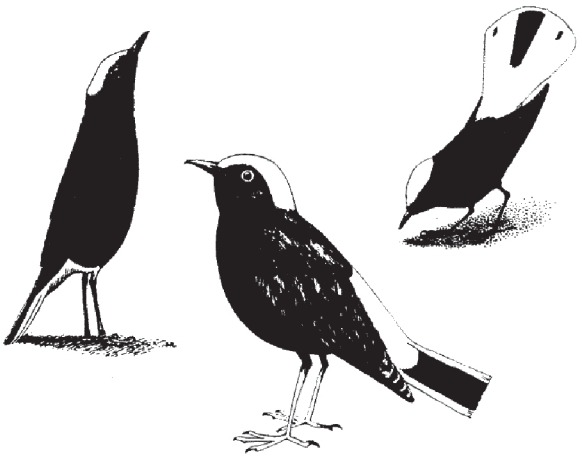

Fig.1. White-crowned Black Wheatear *(Oenanthe leucopyga)*. Adapted from George (1978/144) and from E. K. Dunn (1988/880). The bar = 15 cm.

An important element in this protection is the building of an appropriate nest. The nests of the wheatears are not large (about 15-16 cm high) and are stark in their build, having the shape of a pyramid or pile constructed from several dozen, or even several hundred, small stones. At the top there is a bowl-shaped depression. This hollow is often lined with stubby bits of wood.

The choice of an appropriate, i.e. a relatively shaded place is a matter of immense importance. When the wheatears find such a place they start to search and transport appropriate stones. „Appropriate stones" are exclusively fragments of porous sandstone

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The brief mention of the *oinantem*, as Aristotle called these birds, presumably concerns the most widely spread species in Europe *Oenanthe oenanthe*.

[17] *Oenanthe leucopyga* (17-19 cm, 23-32 g) breeds throughout Atlas of Morocco, over much of Algeria, discontinuously in Libya and in the Tibesti region of Chad. In Egypt it breeds at scattered oases in the west, in the Nile Valley and on the Red Sea coast. Also breeds in Sinai, Israel and adjacent west Jordan and parts of northern Saudi Arabia. A true Saharan species *O. leucopyga* is characteristic of desert with less than 100 mm annual precipitation (cf. Dunn 1988/876-884, Glutz von Blotzheim, Bauer 1988/645-653)

(of a size that allows the birds to carry them[18]). Despite the fact that a large variety of pieces of rock is available, the wheatears select only porous sandstone. Why? The porosity of the sandstone means that during the course of the cold night – when water vapour condenses – the rock takes in moisture. However, during the day the water „trapped" in the numerous micropores that run through the whole rock, gradually and slowly evaporates, cooling the eggs (and subsequently the chicks) that are in the nest. During the night in turn the rocks slowly give off warmth, warming the wheatears and their offspring. The wheatear nest is therefore „an air washer" ensuring a circulation of air as well as thermal conditions suited for the development of their progeny. The building of such a nest is both a time consuming and energy consuming process. Therefore, in order to complete the task before the period for laying eggs begins, the wheatears undertake the process of collecting the building materials well in advance (cf. Dunn 1988/876-884, Dröscher 1993/194-195, George 1978/144-148, Glutz von Blotzheim, Bauer 1988/645-653).

Let us examine this empirical illustration from the point of view of the three types of dynamism which were mentioned earlier.

Mineral dynamism. The creation of the sandstone and its disintegration, the absorption of water, the condensation of water vapour and its subsequent evaporation, the warming of the earth's surface by the sun's rays, the rising of warm and the falling of cooled air are all mineral phenomena. They are examples of varied mineral dynamisms within the formation of which the wheatear has played no part whatsoever. This type of dynamism are the results of a mutual influence upon each other of the objects and of various forms of mineral energy. At the „base" of these dynamisms lie the properties of so-called matter, as discovered by physicists and chemists.

Our attention is also drawn to another easily observable fact, namely that the mineral phenomena mentioned occur over the entire area of this part of the desert inhabited by the wheatears. The sun's rays, for example, equally reaches rock formations, stones, rocks, as they do the nests of the wheatears. The places it reaches are determined by, among other things, the lie of the land, the Earth's movement in relation to the Sun, as well as the phenomena which lead to the creation of electromagnetic waves in this star. The sun's rays do not differentiate – they do not select a single place upon the earth's surface. Its dynamism is *homogeneous*, *non-selecting*, and *it is unable to modify itself*. Solar rays are unable to *self determine* either the place they fall upon or the direction in which they fall, or equally their intensity. All modifications of this nature are *determined* by other physical phenomena – the movement of the Earth, the clouds obscuring the Sun's disc, the mountainous massif that is situated upon the route of the sun's rays etc.

The phenomena with which we come into contact in a certain fragment of nonliving nature are collections of varied, mutually determining, homogeneous and non-selecting mineral dynamisms, or the results of these dynamisms.

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[18] The nest consists of pebbles of 2-10 g (sometimes, however, the wheatear is carrying pebbles weighting as much as 20 g). *„One female brought 15-20 stones in 20-30 min, rested for 30-60 min, then continued construction. Carrying continues throughout daylight hours, with longer rest around midday"* (Dunn 1988/880). The combined weight of the stones from which the nest is built fluctuates from 1 to almost 2 kilos which, in comparison to the bird's body weight, is no mean feat.

The size, quantity, distribution and chemical composition of rock pieces in the desert is the result of varied mutually determining mineral dynamisms.

Biological dynamism. The searching for pieces of sandstone of an appropriate size, their transfer of them to the shaded spot, the gradual arrangement of the stones in such a way so as to create the appropriate dimensions of a pyramid, is the activity of the bird – this is *biological dynamism*. Of course the development – *embryogenesis* of the wheatear progeny, taking place beneath the shelter of the calcium shell, is equally biological dynamism and one of a *key* significance. It is this delicate dynamism (sensitive to the unfavourable influences of its surroundings) which evidently dominates the endeavours of the adult wheatear described. Without the protection of the embryogenesis there would not be an adult bird capable of bequeathing life to a subsequent generation of wheatears.

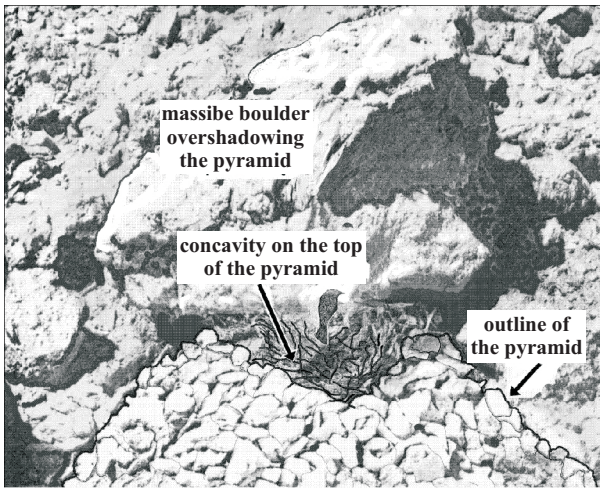

Fig.2. The heap („pyramid") of pebbles build by bird. Redrawn from George (1978/147)

Selecting dynamism. By observing a wheatear we see with total obviousness how it undertakes varied *selection* – its dynamism (as opposed to the mineral dynamism) is *selecting dynamism*.

(a) *The selection of time*. The wheatear does not collect pieces of stone for the whole year but merely during the period that precedes the laying of eggs. The moment for the commencement of nest building is correlated with the availability of sandstone pieces of an appropriate size. If the wheatear realizes that the building material is scattered over a large area (and therefore the search for it and transportation are time and energy consuming) then the construction of the pyramid will be undertaken even several months prior to hatching. When the material is not scattered then building will be started a few weeks, or even a dozen or so days before eggs are laid.

(b) *The selection of place*. The wheatear does not build its nest on just any patch of desert, but – if this is possible – in a place which will be for at least part of the day shaded. The adult bird, in examining the area it inhabits, is itself searching for shelter from the scorching sun's rays, and therefore it is aware of where a patch of shade may be found.

(c) *The selection of material*. The area inhabited by the wheatear is full of various pieces of stone. But not every piece is appropriate for the building of a nest. The bird chooses exclusively sandstone, and therefore a material which absorbs and holds water the most. Amongst the pieces found in the desert the wheatear selects the most economic „size class", i.e. stones that are not too big and not too heavy (for the transportation of the stones is energy consuming, especially when the distance from the nest is significant), yet equally not too small (for though the transportation of a lighter stone is less energy consu-ming than that of a heavy one, the construction of a nest from small pieces requires a greater number of trips which „in itself" is energy consuming). The weight of the pieces of rock collected by the wheatear is not constant. The bird – if it has the choice (and on the whole it does) – collects pieces of an „economical weight" for it is aware of the distance it will have to transport them, and instinctively it takes this into consideration when choosing the building material[19].

(d) *The selection of architecture*. Taking into consideration the climatic and topographic conditions in which the wheatears live, the protection of progeny from the drastic daily differences in temperature can be ensured by an airy, stone construction shaped as a mound („a pyramid")[20].

Correlations and orientation. What is the most remarkable about the varied selective activities of the wheatear? There are numerous and clear *correlations* that are striking. Correlations, i.e. the links between the physical phenomena or certain of their parameters. Links invisible to the senses yet obvious to the intellect. These links do not result from a purely mineral dynamism (cf. Koszteyn, Lenartowicz 1997, Lenartowicz, Koszteyn 1999, 2000a). There is no purely mineral link between, for example, the weight of the stones out of which the nest is built and the distance of these stones from the building place, between the shape and size of the pieces of rock and the shape and size of the nest. There is equally no such connection between the wheatear picking up the stones and the transportation of these stones to the nest site, or between the dynamism of building the nest and the dynamism of laying eggs by the female.

It is the inner dynamism of the bird that creates this type of linkage. The *cognitive dynamism* of the wheatear plays a significant role in the creation of these *correlations* both in surroundings as in the structures and dynamism of its own body[21]. At the same time

[19] Biologists often come across this type of action strategy that takes into consideration „energy costs". This concerns not simply wheatears, starlings, and other birds, but invertebrates likewise. For example, the mass of nectar that is collected by bees, and put into special little baskets found on their legs, is correlated with the distance to the hive. The further from the hive, the less the load of nectar and pollen transported by the worker, for the weight of the nectar to a significant degree increases the energy cost of the flight (cf. among others Krebs, Davies 2001/55-61, Schmid-Hempel 1986, 1987).

[20] Wheatears do not always build pyramid nests. If they find a hole in the ground or a crack in the rocks which is of an appropriate size and depth, then they set up nest there.

[21] Obviously one can not overlook the mysterious sphere of instinct. Nonetheless, however, even in so-called instinctive activities the living organism does not act „blindly", but an element of orientation occurs in them. E.g. the construction of a perfect web for catching prey is instinctively done by the spider, yet without orientation in the spatial arrangement of the

the objectively existing and clearly perceived by us *correlations* are an indicator that behind these specific links is hidden *the dynamism of orientation*. Certain correlations – e.g. those, so to say, „frozen" within the architecture of the nest – are traces of the biological dynamism which is difficult to observe. We can see them when the bird will finish building the pyramid or when it will abandon the breeding area.

Integration. The varied, selective and correlated activities of the adult bird which lead to the construction of the nest, are equally correlated with a range of other actions of the bird (such as the build of the body structure, the acquisition of food, defence in the face of an aggressor, the search for a mate, etc.). The building of a nest is an action „contained within" the *individual (undivided and integrative) dynamism of the life cycle*. It is also in an obvious way *subordinated to* the development of progeny. The lost of any kind of activity would ruin its perfect embryogenesis. This means that in this delicate „network" of *correlated* (*coordinated*) activities no single element can be mis-sing[22]. In other words the construction of the nest is an action *dynamically indivisible, incorporated* into the *life cycle* of the wheatears and inseparably (in a significant way) linked with the endurance of the generation lines of this living form. The building of a nest is therefore an integrated action.

Technical dynamism. The specific, cooling – warming, circulation of the air within the interior of the nest resulting from its architecture (i.e. equally from the material as from the structure), is a result of the varied endeavours of the wheatear. This air conditioning, though maybe „primitive", is for all that *technical dynamism* – of the sort created by man when, for example, he hangs a porous clay container filled with water upon the radiator.

What is technical dynamism? Briefly, technical dynamism is a *selectively „confined" („constrained")* – in relation to place, time, form as well as intensity – mineral dynamism.

These varied *selective „constraints"* do not result from mineral dynamism but from the dynamics of a living being. Biological dynamism does not create mineral dynamism. This dynamism – i.e. varied physico-chemical processes – is the result of the matter's properties. Biological dynamism only *selectively „confines"* mineral dynamism.

Biological dynamism – dynamism constringing mineral dynamism

Biological dynamism – as opposed to technical dynamism – is not „constrained" by mineral dynamism, but is a dynamism *constraining* mineral dynamism.

It is said that a living organism is „something more" than „the sum of the mineral matter"[23]. There is a great deal of truth in this. But – and this needs emphasis – on the part of

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objects between which the web is to be spread, without orientation where the web has been fastened, as equally a lack of orientation as regards the size of potential victims, the spider would not build webs, and not webs thanks to which it would be able to effectively catch insects (cf. among others Krink and Vollrath 1997, 2000).

[22] One can say that within this complicated action – that is building a nest – there can be observed the physiological principle „all or nothing" (cf. among others Lenartowicz, Koszteyn 2000a).

[23] An illustration of such a viewpoint can be a fragment from the introduction to A. L. Lehninger's textbook for biochemistry: *„Living entities are composed of dead molecules. If we isolate*

the *organization of the structures of a body* (to which biologists first and foremost draw attention, and with which simply they identify the living entity) a living organism is „something" decidedly *less* than mineral dynamism. A living body is *a highly selected* fragment of the dynamic possibilities proper to the mineral matter.

The conditions for the biological *constraint* of mineral dynamism

In what way does the living form „confine" „constrain" mineral dynamism? In other words what must it have at its disposal in order to „confine" mineral dynamism?

The necessary – „minimal" – conditions for „constraining" mineral dynamism by a living entity are: *the possession of the biological tools, the ability to utilize these tools, the aptitude to orientate oneself within the surroundings and in the structures of one's own body.*

(a) *Possession of the biological instruments.* With their help a given living form is able to influence material objects – or influence their purely mineral dynamism. The wings and legs (i.e. the locomotive apparatus) are *biological instruments* serving to lift the rock fragments and to transport them to a given place. Our hands are such instruments as well. With their help we are able to shape a water jug out of clay. Eyes help us to realize whether the jug we have made is well-proportioned. Vocal cords help us sing. Digestive enzymes precisely disassemble for us the polypeptide chains of assimilated protein, etc.[24]

(b) *The ability to utilize these instruments.* It is not enough to merely have wings or hands. Equally essential is the *ability to utilize* these biological instruments. This ability

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isolate and analyze these molecules then we can state that they are subject to all the physical and chemical laws /.../ of inanimate matter. However, living organisms distinguish themselves by such extraordinary characteristics that are not indicated by the collections of inanimate matter. /.../ They show the complicated internal structure encompassing many types of complex molecules /.../ In opposition to this, inanimate matter in the environment that surrounds, i.e. soil, water and rocks, is comprised usually of a chance mixture of simple chemical compounds with a relatively low degree of structural organization. /.../ We can now ask: if living organisms are composed of inanimate molecules then why does living matter differ so extremely from nonliving matter, which is, after all, equally composed of dead molecules? ***Why is a living organism something greater than merely the sum of its inanimate components?****"* (Lehninger 1979/13; bold type – JK).

[24] The greater part of the structures of the body of living entities (people, animals, plants, bacteria) is biological instruments of a varied size scale - from molecular to anatomical. The majority of molecular instruments are *biological machines* such as, for example, ATP, the proton motive force of the bacteria *Escherichia coli*, ribosome, proteosome. G.M. Whitesides, although he used a rather imprecise definition of a machine, has, however, correctly noted that biological molecular machines are *sensu stricto* machines such as those constructed by man: *„What is a machine? Of the many definitions, I choose to take a machine to be 'a device for performing a task'. /.../. Although machines are commonly considered to be the products of human design and intention, why shouldn't a complex molecular system that performs a function also be considered a machine [...] accepting this broad definition, nanoscale machines already do exist, in the form of the functional molecular components of living cells /.../ The broad question of whether nanoscale machines exist is thus one that was answered in the affirmative by biologists many years ago. /.../ Cells include some molecular machines that seem similar to familiar human-scale machines: a rotary motor fixed in the membrane of a bacterium turns a shaft and superficially resembles an electric motor"* (Whitesides 2001).

could be instinctive or acquired by learning, training. In that way birds are learning to fly or to build their nests, a baby learns to crawl and walk.

(c) *The aptitude to orientate oneself within the surroundings and within the structures of one's own body.* Any living form must be oriented in the closest sphere of material reality. The wheatear must see pieces of the rock (otherwise it would not be able to pick them up with its beak), it must perceive the nest under construction (otherwise it would not erect the construction), it must be orientated as to the location of the „building site" (otherwise it would not reach it after the search for stones), etc. This obviously equally requires some orientation in the structures of one's own body – first and foremost in the position of biological tools as well as in the range of possibility in their utilization.

This is not a complete list of the conditions for the process of constraining the mineral dynamism, but – as it seems – it is the „minimal set".

The origin of the tools

Where do the tools come from? Almost all of them are created in the course of embryogenesis. Only relatively few are received like a „dowry" from the parental organism within the structures of gamete. Biological tools (organs) are constructed by living entities. In exactly same way man builds its *technical instruments.*

Manipulation of matter

Orientation and the selective utilization of the previously made biological instruments enables the living entities to *manipulate* material objects. These selective and integrative manipulations impose constraints upon mineral bodies[25].

Consequently *manipulation* is a selective *interference* in material phenomena. It is possible thanks to the fact that the *dynamism of the biological instrument* (or *the dynamism of the technical instrument*) is subordinated to *orientation*. The *dynamism of orientation* is obviously different from *the dynamism of the instrument*, but within the framework of the *manipulation* of material (or energy) these two dynamisms are closely correlated[26].

Manipulation is one of the types of *selective*, *coordinated* and *integrated* actions

[25] This „biological constraints" of the mineral dynamic do not only concern macroscopic phenomena but also the ultramicroscopic ones. Peskin, among others, has drawn attention to the role of molecular biological machines: *„Biological cells contain microscopic robotic machinery that is used for cell motility, for transport of vesicles and organelles within cells, to move protein molecules across internal membranes, to partition chromosomes at cell division, and to manufacture the entire biomolecular machinery of the cell. Unlike the macroscopic machinery of everyday experience, these molecular motors function in a regime in which Brownian motion plays an important role. Chemical energy is used* [by the living being – JK] *to rectify the Brownian motion and hence to drive a molecular motor in a particular direction"* (Peskin 1997).

[26] In mineral nature we are not dealing with manipulation. Solar rays are not „instruments" serving the Sun to warm the surface of the Earth. Solar rays radiate in every direction, the Sun is not aware of the position of our planet.

Technical dynamism – e.g. the functioning of a machine – is not manipulation. No orientation or selectivity can be detected in the movements of an engine. A machine is just a tool, that is used by a living form.

which is referred to as *the behaviour* of living forms (cf. Koszteyn, Lenatowicz 1997)[27]. We perceive *behaviour* when a living form utilizes technical instruments, e.g. when we see a man building an engine or hunting with a crossbow, when we observe the building of a nest by a bird, or when we observe the immunological defence processes.

Regardless of the organizational (anatomical, cytological, organellar, biomolecular) level of the living entity we observe, we will always observe the *behaviour of the (whole) living entity*. The structure and size of the *instrument* has no significance here whatsoever.

It is important to realize that *behaviour lies at the basis of the fundamental, developmental dynamism of living forms* – i.e. the construction, reconstruction and repair of the body's structures.

Orientation and the problem of *action immanens*

Orientation

Orientation is the primary cognitive dynamism. Therefore it cannot be defined by the indication of other, secondary cognitive phenomena. It may be only „shown" through demonstration (an event or experiment in which it appears).

Orientation can be recognized when the living form, in an obvious way, *choose* (*select*) his actions (their character, moment, direction, etc.) as well as the object of its action – and the selection „makes sense", i. e. it is evidently integrated with other, presumably selective, actions. An organism which behaves in a chaotic way may be considered „mysterious", but it does not illustrate the idea of orientation.

Orientation can be recognized even amongst people who are almost completely paralyzed, when, for example, in squeezing our hand or closing their eyes they are able to confirm the content of our verbal suggestion.

This, however, is not enough. We must register a *correlation* of this action with some distinctive trait of the object of the action. If the object is homogeneous, then we are unable to determine *orientation*.

For example, if a solution is completely homogeneous and a bacterium swims in it in a straight line we are unable to determine whether this is the result of *orientation* or not. If the bacterium swims straight in the direction of the only light around then we may *suppose* that it possesses orientation in this light. If the bacterium swims in the direction of the larger concentration of food, we may conclude that the bacterium is able to orientate itself in the gradient of food concentration.

There is nothing as obvious as *orientation*[28]. The notion of reality and its understan-

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[27] This has been emphasised by, among others, E.B. Holt in his book *The Freudian Wish* (New York, Henry Holt and Company, 1915, p. 155): *„Phenomena which derive from the integrated organism are no longer only the stimulation of a nerve or the contraction of a muscle, or merely the play of reflexes provoked by a stimuli. All of them are present and have a basic meaning for the phenomena talked about here, but now they are components because they have become integrated. This integration of reflex arches – with everything that composes it - in a state of systematic mutual dependence has created something that is not only a reflex action. The biological sciences have for a long time recognized this new and more advanced something and have called it 'behaviour'"* (quoted from Tolman (1995/25).

[28] The opposite to *orientation* is *lack of orientation* (e.g. in a state of deep unconsciousness), or

understanding are derivatives of *orientation*. *Orientation* in material phenomena is more basic than any further, intellectual forms of cognition (cf. the entry *Orientation* or *Cognition* in: Lenartowicz, Koszteyn 2000b/170-172; 174-177).

Orientation means the actual „cognitive contact" with an object. Therefore it does not concern the „past". A remembered „contact" with the object should not be substituted for the genuine orientation. *Attained orientation* (i.e. *in actu*) is something *momentary,* which has to change itself accordingly to the changes in the object of this orientation. Memorized, but no more actual forms of orientation help us to reconstruct a temporal pattern of an object or event.

The concept of the attained orientation should be distinguished from the concept of a *unique, particular act of attaining orientation* (orientation *in fieri*), i.e. from cognitive dynamism itself (which is an *immanent activity*)[29].

The orientation *in fieri* should in turn be differentiated from the cognitive *behaviour* which is essential in the process of acquiring orientation. This *behaviour* is connected with the utilization of the instrumental structures (sense organs, locomotory system … and so on). When we read a newspaper we constantly move our eye balls in order to discern the text printed on its pages. A dog standing on guard constantly moves its head in order to hear or smell an intruder[30].

However, in this behaviour (as opposed to *manipulation*) any interference with the object is avoided (as far as it is possible). The means of observation do not change the observed phenomena - the eyes do not move the objects, the ears do not interfere with the bells[31]. Even the organs of touch are constructed and manipulated in the way which does not modify the original properties of the object of observation.

Orientation is immanent dynamism *par excellence*. However, the cognitive dynamism producing the orientation in the objects does not produce a „unity" between the subject and the object. Within the sphere of this cognitive dynamism the split between

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disorientation. Many animals in adopting appropriate shapes (a stick insect), colours (chameleon) or postures (immobility feigning death) *disorientate* the observer, disenabling it – at least momentarily – from a correct sense of orientation.

[29] Cognitive dynamism could be – in certain circumstances – ineffective, i.e. it could – despite cognitive efforts – fail to acquire the appropriate level of orientation. Such a „fruitless" process remains – despite everything – an immanent activity *sensu stricto*.

[30] Orientation *in fieri* is dynamism of *substance*, i.e. the dynamism of living existence in its most essential, comprehensive sphere, while in *behaviour* there is involved equally the sphere of attributes. All processes connected, for example, with the movement of the eye balls or the photochemical processes in the retina (the selective catching of photons and the transformation of their energy into the form of electrochemical signals) are not therefore immanent dynamism *sensu stricto*, but only *sensu lato*. Man could undoubtedly recreate the dynamism of the instrument in an appropriate laboratory, but it would be difficult to call the result „cognition" – the acquisition of orientation.

[31] Sometimes the acquisition of orientation in the feature of some object requires manipulation. For example, if we wish to be convinced that the petals of flowers are smooth or silky we must stroke them with our fingers. But it is not via the instruments of our sense of touch that we are involved with the flower petals but the instrument that is our hand. At the same time the manipulation of the fingers of the hand is a highly delicate one – so as not to damage the flower.

the observing subject and the observed object remains clear and sharp. The preceding phrase does not explain the „mystery" of this fact, but it does stress the evident, objective, empirical character of it.

The dynamism of orientation as a fundamental, necessary component of various forms of the behaviour, makes them immanent activities. *Wherever the orientation is evident, there actio immanens has to be recognized*.

Actio immanens and technical instruments

The construction of a nest, the construction of a computer or a Martian landing craft, are *immanent dynamism*, as is the construction of an enzyme molecule, the construction of a Golgi apparatus or the construction of brain structures. An immanent activity is also the selective usage of constructed instruments – biological and technical. The control of the functioning of a landing craft, the reading of data or the viewing of pictures sent by it from the surface of Mars is an immanent activity of the employees of NASA. While the technical installation is used by man, then to a certain degree it becomes a part of his phenotype – just like an artificial leg, or spectacles which can – after Dawkins (1982) – be called an *extended phenotype*.

Of course when the scientists lose contact with a landing craft or a space probe then the installation **„**escapes from**"** human activity – remaining merely technical dynamism, being a material trace of biological dynamism. In a similar way, when a spider leaves the web it has built or the wheatear the nest it has constructed, there remains only technical dynamism and structure (until all the consequences of biological activity have been destroyed).

An attempt to change the criteria for discerning a*ctio immanens*

The distinction between *actio immanens* and *actio transiens* presented at the beginning of the paper was based upon spatial criteria, i.e. upon the localization of the source and terminus of the activity of some material object. Besides, the meaning of the terms „object" and „action" was rather vague.

It seems that the more appropriate criterion for this distinction might be found in the very nature of the dynamism of the object, and not in the spatial characters of the object. This dynamism „informs" us about the nature of the „object". This aggrees well with the Thomist principle *agere sequitur esse* („dynamism is rooted in the depths of existence" or „dynamism manifests the nature of existence").

Therefore let us have a look, once again, at the characteristic features of *mineral dynamism* and the *dynamism of living forms.* The best method for such a „look" is the Aristotelian method of epagogé (cf. Lenartowicz, Koszteyn 2002b).

Nonselective limitation (physical determination)

Particles of dust of various size fall on to the surface of the earth, together with the rain. The larger ones rest on the surface of the soil, while the smaller will be „squeezed" (together with the water) into the free spaces between the grains of sand. Depending on the structure of the soil there can occur a stratification of the particles into several size fractions – from the largest close to the top, to the smallest in its depth. The size of the interstitial spaces determine (limit) the penetration of the dust particles into the depth.

In the air the particles of dust are evenly mixed. The process of „fractionation" occurs when they fall to earth and start (together with water) to penetrate the soil. However, neither the water nor the soil are „selecting agents". The stratification of the

dust particles – their spatial „arrangement" – has taken place without the need of a „selecting, oriented agent". Here the dynamisms inherent in the mineral „nature" of the water, gravity, dust and the structure of the soil are sufficient[32].

Selective limitation (biological determination)

Various objects fall upon the surface of the earth – including fragments of the branches of trees and shrubs, pieces of roof tile, broken bottles, bird feathers, leaves. Larger and smaller pieces of rock, lumps of earth of various size lay on the surface. Here young jackdaws start their first architectural enterprise. Before they build their first nest, however, several forms of dynamism appear.

During the first stage they grab with their beak „any" object „at all", and take it „just anywhere". Of course such „anythingness" is limited depending on the weight and size of the objects. This stage could be called „training in the ability to carry".

In the second stage the jackdaws „practice" breaking twigs and picking them off the ground. The selected twigs are of an appropriate thickness and length. Jackdaws take them to some place or other and forcibly assemble from them a structure with a definite shape and of a certain durability. This is „training in the construction of a nest".

In the third stage – which is the shortest one – the jackdaws build a nest in its final shape (cf. Fig. 3), and in an appropriate place[33]. Unlike other members of the crow family, jackdaws do not build open nests in trees, but in holes in trees, in chimneys or in niches in walls and rocks. The bowl of the nest woven from twigs is padded by the birds with straw, hay, feathers and fur so that the twigs that stick out do not hurt the delicate little bodies of the chicks (cf. Il'ichev, Mikheev 1986/487, Lorenz 1937/20-22, Sokołowski 1972/51-52).

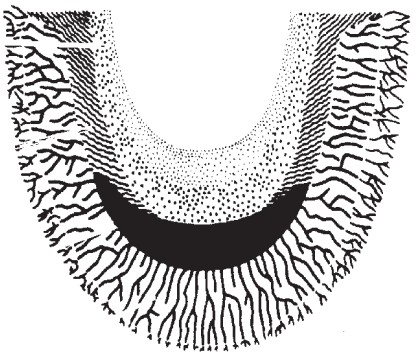

Fig.3. A section through the nest of the rook. (Redrawn from Kulczycki 1973 and Hansel, 1984/103).

[32] Ziemiański has correctly noted that in the „world" of mineral phenomena *„the principle of the determinism of action"* is ruling (Ziemiański 1995/63).

[33] In Poland, jackdaws start to build nests at the beginning of April. At that time they break off smaller twigs from trees, with which they build the significant part of the nest. If they are working in trees outside windows, one is able to hear in his room, the crack of the twigs they break (cf. Sokołowski 1972/52).

We can already see the *selective dynamism* in the first stage of the jackdaws' actions. This contrasts, for example, with the stream of water, at the same time „attacking" those objects that offer it resistance, as well as those which are able to be taken with it. If the stream takes only certain objects then this does not constitute an expression of „selective dynamism", but only a *physical determination*. The jackdaw does not grab nor attempt to lift up objects that are either too heavy or too big. It is in this that *selectivity of action* manifests itself. And this selectivity is clearly connected with the *orientation* of the jackdaw.

We see that the jackdaw is in the position to recognize an object before it picks it up in its beak (selection of material). It is in the position to know the results of its own dynamism during the attempts to weave the twigs. This ability to orientate oneself within the object of manipulation clearly limits the range of its dynamism. Here we can detect something more than selectivity, we can see a *correlation*. The selected material is arranged in a selective way. These two different forms of selection are clearly correlated. Again, without an orientation the correlation would be impossible.

In the third stage, the selectivity of action is even more striking, even though the jackdaw possesses the same structure of its biological instruments as previously. Besides the obvious correlation there appears the aspect of *integration*. The finished nest is an integrated structure.

As has been mentioned earlier the bird's behavior embraces many other dynamisms without which the eggs would not appear, their hatching, and their feeding would not take place. All this implies an unimaginable number of varied forms of *selection*, *correlation* as well as *integration*[34].

From the above examples and considerations it results that orientation (elementary cognitive dynamism, observable even in bacteria – cf., among others, Hartwell *et al*. 1999, Kirschner *et al*. 2000, Koszteyn and Lenartowicz 1997) is an absolutely essential condition which enables living forms to act selectively, and sometimes to act in an integrated way. For orientation, as cognitive dynamism, is *immanent dynamism sensu strictissimo*. Consequently all the forms of biological dynamism (i.e. activities, the behaviours of living forms) depend on *actio immanens*[35].

It remains to return to the starting question: are spatial criteria the most fortunate of means of distinguishing between what is, and what is not biological dynamism, between what is, and what is not immanent dynamism?

It seems that the classification of the various dynamisms that we encounter in our surroundings should be based upon two criteria, that of *orientation* and that of *integration* (cf. Table 3). Immanence means a „whole", an inner, intrinsic unity, so the element of „integration" is crucial to that concept.

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[34] How does *correlation* differ from *integration*? During the second stage of training the jackdaws built imperfectly shaped nests. These „exercises" quickly fall to pieces and the only lasting result of this stage is the acquisition of practice, ability. These unfinished, training nests can serve as an example of correlation, but they cannot be considered as an accurate model of a completed, integrated structure.

[35] The metaphysical or ontological aspects of this statement will not be the subject of these considerations, even though this is a truly fundamental problem.

Table 3

	Orientation	Integration of material	Type of dynamism	Examples
1	+	–	***actio immanens*** *sensu strictissimo*	Observation (the process of gaining orientation)
2	+	+ (*in causa*)	***actio immanens*** *sensu stricto*	Biological dynamism (e.g. embryogenesis, biosynthesis, repair)
3	–	+ (*in effectu*)	***actio immanens*** *sensu lato*	Technical dynamism (e.g. functioning of a machine or an enzyme)
4	–	–	***actio transiens*** *sensu stricto* *sensu lato*	Modification of the external objects (e.g. boring, shaping, digging, damaging, destroying, killing) or Purely mineral dynamism (e.g. sedimentation, air current, particle collision, erosion)

In the columns of Table 3, four types of dynamism and their examples are given.

(1) *Actio immanens sensu strictissimo*. This is the *dynamism of „pure" observation* (*orientation*), which involves no manipulation of the object. When swallows observe a terrain from high, sitting on telegraph wires, they are not manipulating trees, people or cars, but simply see them or hear them, sense the smell of exhaust fumes. A man provided with the immanent results of the observation (orientation) can proceed towards the creation of more complex, synthetic concepts, he may contemplate the truth in his mind, and carry out similar intellectual activities.

(2) *Actio immanens sensu stricto*. This is the most common *dynamism of biological beings.* This dynamism is rather complex. It involves both *orientation* in the properties of the material and the *manipulation* of the material. There is no life without *orientation.* Orientation refers here both to the surroundings and to the sphere of one's own being (regenerations are a good illustration of this). On the other hand, living bodies are able to *manipulate* energy and material. In these manipulations an element of *the selective physical determination* of matter and energy is crucial. The quantitative aspect of them seems opposed to a true immanence. Consequently these biological activities cannot be considered to be *actio immanens sensu strictissimo*. However, *orientation* thoroughly „permeates", so to speak, the activities of living forms. These activities are evidently subordinated both to the orientation and to the indivisible, comprehensive (by its nature), integrative pattern, typical of a concrete living form. The mani-

pulative trend towards integration, therefore, creates a kind of unity, which deserves to be treated as a genuine trait of immanence. All truly biological activities (pathology excluded) should, therefore, be classified as *actio immanens sensu stricto* (and not as *actio transiens*).

(3) *Actio immanens sensu lato.* This might be called „technical dynamism". The „model" examples of this kind of dynamism are man-made automatic devices, or enzymes (nano-automatic-machines). We can clearly perceive their dynamic indivisibility (i.e. the evidently necessary structural integration). They are, to a certain degree, autonomous (like the landing craft on the Moon, or Cruise missiles), yet there is a lack of orientation in their activity. The monitoring that often appears in such machines is not a cognitive dynamism (cf. Koszteyn and Lenartowicz 1999). The photoelectric sensors which automatically switch on the light of searchlights can serve as an example of monitoring.

(4) *Actio transiens. Actio immanens sensu stricto* can produce some accidental effects in the surroundings. For instance, the process of locomotion can produce footprints and the process of feeding can damage the leaves on a bush. This element of biological dynamism is not immanent. This is *actio transiens sensu stricto*. Still it is necessary to distinguish such dynamism from purely mineral phenomena (e.g. sedimentation, erosion, particle collision) – i.e. from the *actio transiens sensu lato*.

Conclusions

Many scholastic and neo-scholastic authors have been in agreement that the essence of life depends upon the ability to move oneself, i.e. *immanent activities* (cf. for example, Urraburu 1894/34). It was an obvious thing for these authors that biological forms are not machines as Cartesius and his followers considered them. On the other hand, *immanent activities* are not limited just to the intellectual activities. This was also Saint Thomas's position, who wrote about living entities as follows:

> *„Illa proprie sunt viventia, quae seipsa secundum aliquam speciem motus movent, sive accipiatur motus proprie, sicut motus dicitur actus imperfecti, id est existentis in potentia, sive motus accipiatur communiter, prout motus dicitur actus perfecti, prout intelligere et sentire dicitur moveri ... Ut sic viventia dicuntur quaecumque se agunt ad motum vel operationem aliquam."* (De Veritate. quaestio 18, art. 1).

As results from the text, Saint Thomas – in perceiving the difference between acts *perfectly immanent* and acts *immanent in an imperfect way* – believed that also the latter are *biological dynamism* in the *strict, and true* sense of the word.

The initial criteria for the determination of *actio immanens* has traditionally been related to the spatial relation between the object and the subject of this activity. In applying these criteria (cf. Table 2) many forms of biological activity were ascribed to *actio transiens.* Consequently many Thomists limit the sense of the concept *actio immanens* to the dynamism of a pure spirit (e.g. dynamism of the intellect).

The acceptance of the spatial criteria (inside/outside) as appropriate for the recognition of *actio immanens* and *actio transiens*, influences the proper shaping of our concepts concerning biological forms of life and helps to obfuscate the most important aspects of the difference between biological and mineral forms of dynamism.

If, instead of the spatial criteria, the dynamic criteria – of (a) *orientation* in the properties of matter and (b) *the integration* of matter – is adopted, then it will show that bio-

logical *dynamism* is an immanent activity, regardless of whether this is taking place within the spatial limits the living body or beyond of it.

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Jolanta KOSZTEYN

ACTIO IMMANENS – PODSTAWOWE POJĘCIE BIOLOGII.

Streszczenie

Pojęcie *actio immanens* jest pojęciem *par excellence* biologicznym. Zostało ono ukształtowane na podstawie obserwacji istot żywych i w pierwszym rzędzie do nich się odnosi. Należy ono do grona tych kluczowych pojęć, bez których – jak się wydaje – nie ma mowy ani o prawidłowym opisie, ani o prawidłowym zrozumieniu zjawisk biologicznych.

W podręcznikach, encyklopediach i słownikach, uwzględniających pojęcia filozofii arystotelesowsko-tomistycznej (A-T), termin „*actio immanens"* definiowany jest jako czynność, działanie, pochodzące od podmiotu i w nim pozostające, nie udzielone z zewnątrz przez jakiś inny byt. Zatem zarówno „źródło", „zasada" (*principium*) działania, jak również „kres" (*terminus*), czyli rezultat tego działania, znajdują się w podmiocie.

Działaniu wsobnemu przeciwstawiane jest działanie przechodnie (*actio transiens*), którego „kres" (rezultat) znajduje się poza działającym podmiotem. Innymi słowy – jak ujmuje to m.in. Podsiad – o ile w *actio immanens* „*przedmiot* [działania] *znajduje się w samym podmiocie działającym"*, o tyle w *actio transiens* „*przedmiot* [działania] *znajduje się poza działającym podmiotem".*

Z tych wypowiedzi wynikałoby, że podstawowe – a przynajmniej wyjściowe – kryteria rozróżnienia pomiędzy *actio immanens* i *actio transiens* miały wyraźnie przestrzenny charakter. Były nimi bowiem: (1) lokalizacja „źródła" działania obserwowanego podmiotu, oraz (2) lokalizacja „kresu" działania tego podmiotu (Tabela 1).

Kontekst wypowiedzi większości autorów, omawiających te dwa pojęcia, wskazuje – *explicite* lub *implicite* – że „podmiotem" był według nich organizm żywy (najczęściej człowiek), a „działaniem" czynność tego organizmu. Warto jednak w tym miejscu zaznaczyć, że najczęściej podawanymi przykładami *działań wsobnych* były czynności intelektualne – np. analiza pojęć, rozwiązywanie problemów logicznych, kontemplowanie prawdy, itp. Natomiast czynnościom organizmu na poziomie molekularnym – mimo że ich „kres" w oczywisty sposób nie wykracza poza podmiot – odmawiano „pełnej wsobności".

Kwestia działań wsobnych i przechodnich dodatkowo się komplikuje, ponieważ wielu użytkowników aparatu pojęciowo-terminologicznego A-T poszerza zakres znaczenia terminu „podmiot" i obejmuje nim dowolny „obiekt", będący przedmiotem aktualnej uwagi obserwatora. Siłą rzeczy termin „*actio"* przestaje oznaczać wyłącznie działanie organizmu żywego. W związku z tym poszerzeniem zakresu znaczeń terminu „podmiot" i „działanie" należy wziąć pod uwagę możliwość, że „działanie podmiotu" może być albo *autonomiczne,* albo *heteronomiczne*. Gdy to uwzględnimy, wówczas pojawiają się – przynajmniej teoretycznie – cztery sytuacje (Tabela 2), spośród których aż trzy są klasyfikowane jako *actio transiens*.

Tak więc zakres stosowalności pojęcia *działania wsobnego* niezmiernie się „kurczy". Zaciera się również granica między działaniem przechodnim i wsobnym. Pojęcie *actio immanes* staje się „nieostre" i gubi treść, którą św. Tomasz wyraził w swym lapidarnym stwierdzeniu: *„Actio immanens est tantum viventium"* (*De potentia*, q. 10, a 1).

***Actio immanens* a dynamika żywa.** Pytanie o *actio immanens* jest *de facto,* wciąż aktualnym pytaniem o *życie* – o *dynamikę żywą*. Nie można na nie odpowiedzieć, nie badając konkretnych *form żywych*.

Wyrażenie *konkretna forma żywa* nie oznacza – a przynajmniej nie przede wszystkim – „zamrożonej w czasie", wycinkowej, wyodrębnionej z otoczenia, *struktury organicznej*, którą widzimy *tu i teraz*.

Złożona struktura – np. żaby – zmienia się bowiem z minuty na minutę, ale żaba pozostaje ciągle *tą samą* żabą tak długo, jak długo trwa jej *dynamika rozwojowa* czyli budowanie oraz nieustanne regenerowanie organów ciała. Ta dynamika, w niearbitralny sposób „wytycza granice" rzeczywistego i podstawowego przedmiotu badań biologów.

To oczywiście nie oznacza, że forma żywa jest wyłącznie *dynamiką rozwojową*. Niemniej jednak *ta* fundamentalna dynamika biologiczna umożliwia dostrzeżenie *całości* formy żywej, poza którą *nie ma* dynamiki życia.

Te uwagi są istotne, ponieważ – co najmniej od Kartezjusza – pokutuje w biologii patrzenie na organizmy żywe jako na struktury, a tym samym mechanicystyczne traktowanie dynamiki żywej. Takie podejście leży u podstaw dominującego we współczesnej biologii (i filozofii przyrody ożywionej) redukcjonizmu ontologicznego, który ma niejako dwa „oblicza". A właściwie lepiej byłoby powiedzieć, że redukcja przebiega „dwuetapowo".

W pierwszym etapie dochodzi *redukcji dynamiki biologicznej do dynamiki technicznej* (np. maszyny, automatu). W drugim etapie następuje *redukcja dynamiki technicznej do dynamiki mineralnej* (tzn. takiej, jaka zachodzi w przyrodzie nieożywionej).

Trzy rodzaje dynamik. Dynamikę istot żywych zwykło się rozważać w kontekście jakiejś „uogólnionej" dynamiki abiotycznej (nieożywionej). Jednak – biorąc pod uwagę owe dwa „oblicza" redukcjonizmu – tę dyskusję należałoby przeprowadzić osobno w zestawieniu z *dynamiką techniczną* a osobno w zestawieniu z *dynamiką mineralną*.

Wprawdzie biologa (czy też filozofa przyrody ożywionej) interesuje przede wszystkim dynamika żywa, nie może on tracić z oczu pozostałych rodzajów dynamik, tym bardziej, że pozostają one w wyraźnych, choć specyficznych relacjach z dynamiką istot żywych.

Ilustracją, ukazującą specyfikę tych relacji – a tym samym ujawniającą osobliwość dynamiki żywej – może być przykład zaczerpnięty z życia ptaków zwanych białorzytkami saharyjskimi (Rys. 1).

Budowanie gniazda przez saharyjskie białorzytki. Białorzytki saharyjskie (*Oenanthe leucopyga*) zamieszkują tereny, prawie całkowicie pozbawione roślinności, która tworzyłaby mikroklimat łagodzący drastyczne różnice temperatur między dniem i nocą. Dlatego ochrona potomstwa, rozwijającego się pod osłoną cienkiej skorupki, spoczywa na rodzicach.

Istotnym elementem tej ochrony jest wybudowanie odpowiedniego gniazda (Fig. 2). Gniazda białorzytek mają kształt przewiewnej piramidki, zbudowanej z kilkudziesięciu, a nawet kilkuset niedużych odłamków piaskowca. Na szczycie znajduje się zagłębienie wysłane gałązkami i/lub zeschniętymi źdźbłami traw.

Porowatość piaskowca powoduje, że w ciągu chłodnej nocy – gdy skrapla się para wodna – nasiąka on wilgocią. W ciągu dnia natomiast, woda stopniowo wyparowuje, chłodząc jaja (a potem pisklęta), znajdujące się we wnętrzu gniazda. Gniazdo białorzytki jest więc „komorą klimatyzacyjną", zapewniającą cyrkulację powietrza oraz warunki termiczne stosowne dla rozwoju potomstwa.

Przykład białorzytek umożliwia wyraźne dostrzeżenie trzech, wymienionych wcześniej, rodzajów dynamik.

Dynamika mineralna. Powstawanie piaskowca i jego kruszenie, nasiąkanie wodą odłamków skalnych, parowanie wody i skraplanie się pary wodnej, nagrzewanie powierzchni ziemi przez promienie słoneczne, itp., to przykłady różnorakich *dynamik mineralnych*, w powstawaniu których białorzytka nie miała żadnego udziału. U ich podłoża tych dynamik leżą właściwości tzw. materii.

Zjawiska, z którymi spotykamy się w jakimś fragmencie przyrody nieożywionej, to zbiory różnorodnych, wzajemnie determinujących się, homogenicznych i nieselekcjonujących dynamik mineralnych, lub skutki tych dynamik.

Dynamika biologiczna. Wyszukiwanie i przenoszenie kawałków piaskowca w zacienione miejsce oraz stopniowe układanie ich tak, by powstała odpowiednich rozmiarów piramida, to działalność ptaka – to *dynamika żywa*.

Obserwując białorzytkę z całą oczywistością dostrzegamy różnorakie formy *selekcji*:

(1) *Selekcja czasu.* Białorzytka nie zbiera odłamków skalnych przez cały rok, ale tylko w okresie poprzedzającym składanie jaj. Jednocześnie moment rozpoczęcia budowy gniazda jest skorelowany z dostępnością (stopniem rozproszenia) odłamków piaskowca.

(2) *Selekcja miejsca.* Białorzytka poszukuje takiego miejsca, które przynajmniej przez pewien okres dnia będzie zacienione, i tam buduje swoje gniazdo.

(3) *Selekcja materiału.* Materiałem budulcowym są odłamki chłonącego wilgoć piaskowca. Ponadto białorzytka zbiera kamienie o „ekonomicznym" ciężarze, tzn. skorelowanym z odległością w jakiej odłamki znajdują się od miejsca budowy (co jest ściśle związane z „kosztami energetycznymi" transportowania kamieni).

(4) *Selekcja architektury.* Zbudowana z piaskowca, przewiewna piramidka gwarantuje odpowiednią cyrkulację powietrza oraz odpowiednie warunki termiczne dla rozwoju potomstwa.

Dynamika techniczna. Dynamika techniczna jest *selektywnie „zawężoną"* (*„ograniczoną")* – co do miejsca, czasu, formy oraz intensywności – dynamiką mineralną. Te różnorakie selektywne „ograniczenia" nie wynikają z dynamiki mineralnej, ale z dynamiki istoty żywej.

Manipulowanie materią. W przeciwieństwie do dynamiki technicznej, *dynamika żywa* nie jest „zawężoną" dynamiką mineralną, ale jest *dynamiką zawężającą* dynamikę mineralną. Niezbędne „minimalne" warunki tego „zawężania" to:

(1) *posiadanie narzędzi biologicznych*, za pomocą których forma żywa może wpływać na obiekty materialne i ich dynamikę,

(2) *umiejętność posługiwania się narzędziami*, która może być instynktowna lub nabywana w drodze uczenia się,

(3) *zdolność orientowania się w otoczeniu oraz strukturach własnego ciała,* dzięki której istota żywa może wywierać *selektywny* wpływ na otaczającą ją rzeczywistość materialną.

Orientacja i selektywne posługiwanie się wybudowanymi przez siebie narzędziami biologicznymi, umożliwia istotom żywym *manipulowanie* obiektami materialnymi. *Manipulowanie* zatem, to selektywne *ingerowanie* w zjawiska materialne, możliwe dzięki temu, że *dynamika narzędzia biologicznego* (lub *dynamika narzędzia technicznego*) jest podporządkowywana *orientacji*. *Manipulowanie* jest jednym z rodzajów *behawioru*, który dostrzegamy zarówno wtedy, gdy istota żywa posługuje się narzędziami technicznymi, narzędziami z anatomicznego poziomu organizacji struktur ciała jak i wtedy, gdy wykorzystywane są narzędzia wewnątrzkomórkowe.

Orientacja a problem *actio immanens*. *Orientacja* jest pierwotną dynamiką poznawczą. Dlatego nie może być zdefiniowana przez wskazanie na inne, wtórne zjawiska poznawcze. Może być jedynie „ukazana" poprzez ilustracje (konteksty, w których się przejawia) i eksperymenty, w których prowokuje się np. zwierzę lub człowieka do zdobywania *orientacji*.

Orientacja jest aktualnym „kontaktem poznawczym" z przedmiotem. *Orientacja osiągnięta* (czyli *in actu*) jest czymś *momentalnym*, co musi zmieniać się odpowiednio do zmian zjawisk, które są jej przedmiotem. Orientację osiągniętą należy odróżnić od *aktu osiągania orientacji* (orientacja *in fieri*), czyli samej dynamiki poznawczej. Z kolei orientację *in fieri* należy odróżnić od *behawioru*, który jest konieczny w procesie nabywania orientacji. Ten behawior wiąże się z wykorzystywaniem struktur narzędziowych (organów zmysłowych).

Orientacja jest dynamiką *par excellence* immanentną. *Dynamika orientacji*, jako istotna i niezbywalna składowa różnych form zachowania się istot żywych, czyni je działaniami immanentnymi. Tam, gdzie jest *orientacja*, tam jest *actio immanes*.

Kryteria rozpoznawania *actio immanens*. Z ilustracji empirycznych oraz rozważań, zawartych w artykule wynika, że rozróżnienie między *actio immanens* i *actio transiens* powinno być dokonywane – i to w punkcie wyjścia – w oparciu o charakter *dynamiki* obiektu, a nie w oparciu o dotychczasowe kryterium *przestrzenne* (tzn. lokalizację „źródła" i „kresu" działania obiektu). To dynamika bowiem wskazuje na naturę „obiektu" – co dobrze wyraża tomistyczna zasada *agere sequitur esse*.

Przyjęcie kryterium przestrzennego (wewnątrz/zewnątrz) za istotne dla rozpoznawania *actio immanens* i *actio transiens*, przechyla – *de facto* – „szalę zwycięstwa" w kształtowaniu naszych pojęć dotyczących życia, na element przestrzenny, materialny, ze szkodą dla poprawnego opisu dynamiki autentycznie biologicznej.

Dynamika istot żywych jest *zintegrowana* i *selektywna*. Koniecznym warunkiem, który pozwala formom żywym działać w sposób selektywny, a w ostatecznych konsekwencjach w sposób zintegrowany, jest *orientacja*.

Wydaje się zatem, że podział dynamiki, z którą spotykamy się w otaczającej nas rzeczywistości, powinien być oparty na *kryterium orientacji* i *kryterium integracji* (Tabela 3). Te dwa kryteria pozwalają na wyróżnienie czterech rodzajów dynamiki.

(1) *Actio immanens sensu strictissimo*. Jest to dynamika „czystej" obserwacji (*orientacji*), która nie ma charakteru integrującego materiał. Dalszą konsekwencją tej dynamiki może być, na przykład u człowieka, tworzenie pojęć syntetycznych, kontemplowanie prawdy i tym podobna dynamika intelektualna.

(2) *Actio immanens sensu stricto.* Jest to dynamika istot żywych, selektywnie posługujących się narzędziami. Ta dynamika ma charakter złożony. W pewnym aspekcie jest to *actio immanens sensu strictissimo*. Nie ma bowiem życia bez *orientacji* (zarówno w otoczeniu, jak i w sferze własnego bytu). Z drugiej jednak strony, ciała żywe *manipulują* energią i materiałem. W tych manipulacjach jest zawarty element *selektywnego determinowania fizycznego* bytów przestrzennych, a zatem wykluczających pełną immanencję. Zatem wiele (jeśli nie większość) działań istot żywych, nie może być uznane za *actio immanens sensu strictissimo*. Niemniej jednak należy im nadać rangę *actio immanens sensu stricto*, ponieważ dynamika orientacji niejako „przenika" działania form żywych

(3) *Actio immanens sensu lato.* Jest to dynamika, której modelowym przykładem jest funkcjonowanie maszyny, lub enzymu (czyli nanomaszyny). Dostrzegamy tu wyraźną dynamiczną niepodzielność (a więc pewną formę integracji) ale, równocześnie brak tu orientacji. Zintegrowana dynamika maszyny jest rezultatem działania istoty zdolnej do orientacji i do manipulacji integrujących, stąd jest to immanencja *in effectu.*

(4) *Actio transiens sensu stricto.* Jest to działanie przechodnie, będące skutkiem manipulowania narzędziami (biologicznymi lub technicznymi), np. powstawanie otworów w drewnie, śladów stóp na śniegu lub kolein na piaszczystej drodze. Takie dynamizmy zachodzą we wnętrzu ciał żywych i są związane z mechanizmami obronnymi, np. immunologicznymi. Jednak należy je odróżnić od *actio transiens sensu lato* czyli „czystej" dynamiki ciał mineralnych, takiej jak np. cyrkulacja mas powietrznych lub wodnych, parowanie wody, wybuch wulkanu, kolizje ciał astronomicznych, itp.

Jeżeli, zatem, zamiast kryterium przestrzennego przyjąć kryteria dynamiczne – *orientacji* w materii oraz *integrowania* materii – wtedy okazuje się, że *dynamika żywa* jest przeniknięta *immanencją*, bez względu na to, czy dokonuje się w granicach powłok ciała, czy poza nimi.