Chapter 5: Exohyletics

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5.1 Physical Matter (Exohyle)

5.1.1 Definition

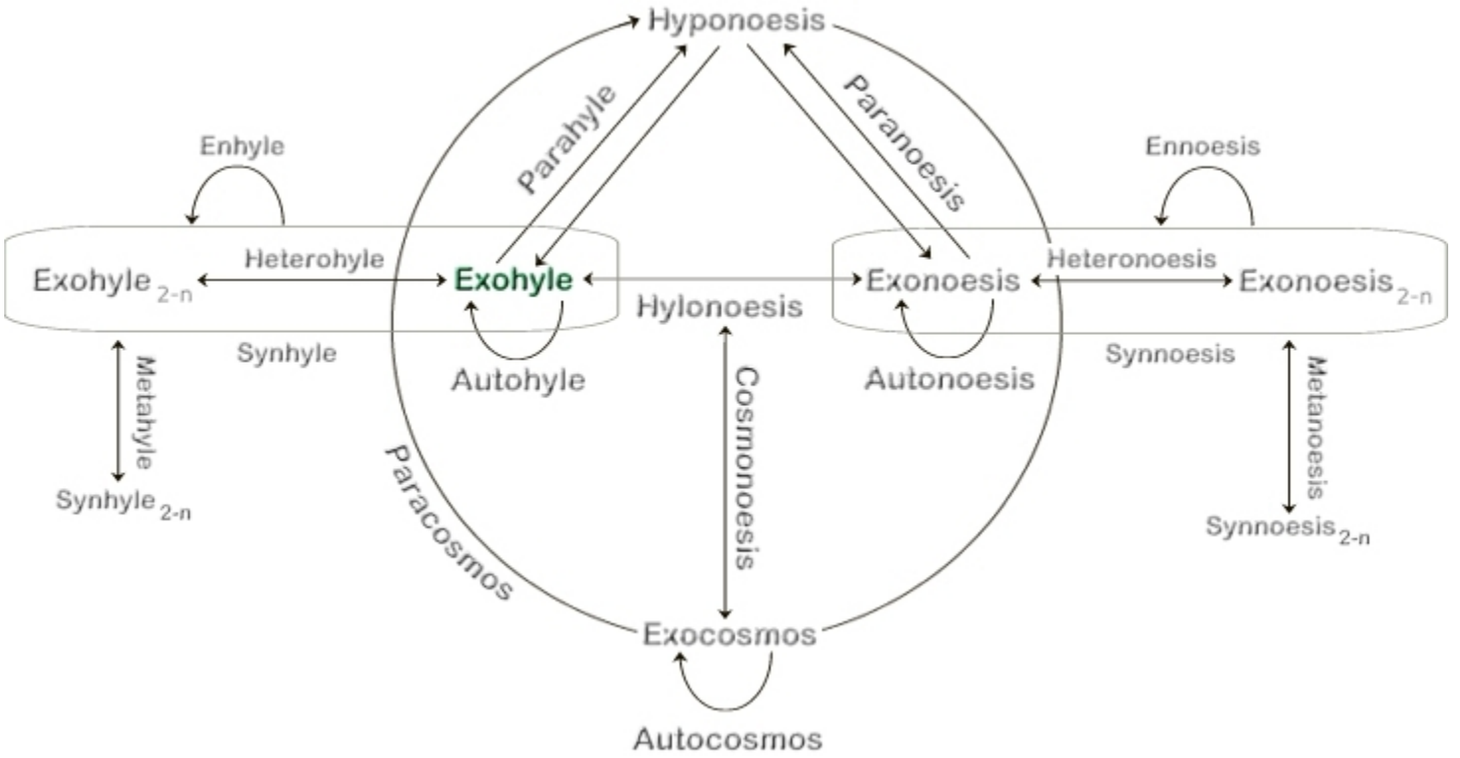

Figure 1 - Exohyle

Exo-Hyle **is derived from the ancient Greek ἐκ, ἐξ (ex = out, away, off, from, from out of) and ὑλη (hyle = stuff of which things are made, material, matter).**

The second basic Noeme (aspect) of *Hyponoesis* is *Exhoyle* or physical matter. Let me add a caveat regarding the concept of matter: we usually understand 'matter' as the stuff of which all things we perceive in this world are made. Science, however, refrains from using the term 'matter' in this sense because it is loaded with metaphysical significance and has a long historical lineage. I will, therefore, describe the philosophical and the scientific concept of 'matter' separately in this section.

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5.1.2 Theories of Matter

The Ancient Greek philosophers developed the idea of a basic material constitutent (ἀρχή, arche) common to all existing things in our world. It was thought of as a substance that constitutes the essence and existence of all individual things. Some philosophers thought it to be water or air or fire, others believed that a more metaphysical principle is the basic substance. Anaximander called it the *unlimited* or *boundless* (ἀπείρων, apeiron).

Aristotle developed a concept of ὑλη (hyle) or matter that influenced philosophical thinking throughout the ages. *Hyle* is the primary substratum of change and it is juxtaposed against another concept, that of form or εἶδος (eidos). *Hyle* is potential, stripped of all qualities or determinations, and it is only in connection with form that a material thing exists at all. Form or *eidos* is the formal cause or the dynamic principle, which together with matter, constitutes an individual thing. It is the essence of an existent, that which makes it complete and actualizes it (*energeia*, *entelecheia*).

The Scholastic philosophers thought of matter as the principle of individuation. Matter is that which constitutes the essence or nature of an individual being. Like Aristotle, Thomas Aquinas held that the soul was the form of the body, which is the underlying material constituent. Aquinas defined *prime matter* as a purely potential substrate that is capable of receiving the forms that determines and individuates a thing as an existent of this world.

Descartes separated matter from mind, and thus provided the basis for the development of modern science. Matter, for Descartes, is that which has extension (*res extensa*, extended thing), and opposed to matter is mind or thinking substance (*res cogitans*, thinking thing). Thus, the realm of the material bodies could be studied independently of the realm of the spiritual or mind. This naturally led to the modern concept of matter as physical particles (atoms) interacting through physical forces.

For Schopenhauer, matter was causality or action itself. "For what is material is that which acts (the actual) in general, apart from the specific nature of its acting. Therefore...matter is not an object of perception, but only of thinking".[1]
He conceived of matter as the permanent substratum that the *Will* uses to become objectified or visible in the world.

Basically, we can distinguish between two main concepts of matter in philosophy:

a. In the Aristotelian tradition matter constrasts with form, and it is the potential, formless substance out of which an individual, formed thing emerges. Since matter cannot exist without the form, what we know is only the formed matter, the actualized form. This concept of matter is, therefore, similar to the idea of actualized individuals in my philosophy of *Hyponoetics* (see below).
b. In philosophy since Descartes, matter received the meaning of a physical substrate that is in contrast to mind or spirit (or the ideal, or abstract in German idealism). It is the homogeneous 'stuff' of which everything consists. Some philosophers, such as Berkeley or Hegel, thought of matter as an empty notion, lacking reality.

The first scientific concept of matter was probably formed by the Ancient Greeks, especially Democritus who developed a theory of the infinite number of indivisible material particles which he called *atoms*. This concept was later used by Newton together with the concept of force as the basic material constituents of the world.

The concept of matter in science changed considerably since Newton. The idea of indivisible material atoms was replaced with Einstein's theory of matter as energy. Matter became even more elusive with the development of quantum physics which postulated matter as an indeterminate probability field. The current theory of super strings states that the ultimate constituents of all physical phenomena are vibrating strings and not particles.

Since this is a book about philosophy, I will not dwell on these scientific concepts too long. It is noteworthy that quantum physics proposes a few fundamental principles that are similar to my philosophy of *Hyponoetics*, and they deserve to be mentioned.

[Discussion of concepts of matter in modern physics will follow here...]

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[1] Arthur Schopenhauer: *The World as Will and Representation*, Vol. II.24, Dover Publications, 1969

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5.1.3 The Theory of Exohyletics

5.1.3.1 The Principle of Actualization

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5.1.3.2 The Theory of Formal and Material Transiency

Every individual entity that exists, be it either a physical or mental object, is determined, by being subject to temporality, to perish or get transformed into other, new forms. Each process of individuation has a beginning and an end because it is a process in time. Individuals are formally *transient* or impermanent by nature because their temporal being is subject to change and deterioriation, or what is called entropy in physics. Since change is a constant in nature, everything that exists in one form or another, is continually transforming and never stays the same.

The theory of *formal transiency* is similar to the concept of impermanence in Buddhism. However, Western philosophers have advocated a theory of nature that is based on concepts of constant flux or processes. A proponent of the former idea is the Ancient Greek philosopher Heraclitus who wrote: "Into the same river we can step and we cannot step"[1]. The often cited "Everything flows" is not directly attributed to Heraclitus but sums up his ideas succinctly.

Similar ideas of constant flux can also be found in modern quantum physics. David Bohm writes:

> I regard the essence of the notion of process as given by the statement: Not only is everything changing, but all *is* flux. That is to say, *what is* is the process of becoming itself, while all objects, events, entities, conditions, structures, etc., are forms that can be abstracted from this process.[2]

Material transiency, on the other hand, refers to the disposition of an individual's subsistence. Individuals do not exist as independent substances or as anything substantial for that matter. There is no unchanging substance throughout all the changes. That means that concepts of ego and soul that are traditionally conceived as the permanent structure of an individual are themselves considered insubstantial.

What we mean by *insubstantiality* is similar to the Buddhist idea of dependent origination and based on my theory of *Relational Topology* above. Things do not exist by themselves but are dependent on other things. Every individual is determined by its internal and external relations and is ultimately nothing else but these relations. The unique compound of an indefinite number of relations makes up the individual essence of a physical as well as organic entity.

This essential interrelatedness and interconnectedness of individuals has been recognized as a fundamental feature of the actualized reality by many thinkers in East and West. For example, the Pre-Socratic philosopher Anaxagoras wrote already 2500 years ago: "There is no isolated existence, but all (things) have a portion of every (element)."[3]

The contemporary philosopher Whitehead views the world as consisting of processes or what he calls 'actual entities':

> According to this principle [of universal relativity] an actual entity is present in other actual entities... We must say that every actual entity is present in every other actual entity.[4]

The concept of non-separability and interconnectedness becomes increasingly a cornerstone of modern physics based on experimental findings as well as new theoretical models:

> Theorists such as d'Espagnat and David Bohm argue that we must accept that, literally, everything is connected to everything else, and only a holistic approach to the universe is likely to explain phenomena such as human consciousness.[5]

That individual entities are made up of internal and external relations has already been described in my Theory of Relational Topology (see 4.3.3).

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[1] Diels-Kranz, *Fragments*, B49a

[2] David Bohm: *Wholeness and Implicate Order*, p. 48, Ark Paperbacks, 1983

[3] Diels-Kranz, *Fragments*, B6

[4] Alfred North Whitehead: *Process and Reality*, p. 50, Free Press, 1979

[5] John Gribbin: *In Search Of Schrödinger's Cat*, p. 229 f., Black Swan, 1984

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5.1.3.3 Actualization Process and Modes

5.1.3.3.1 Introduction

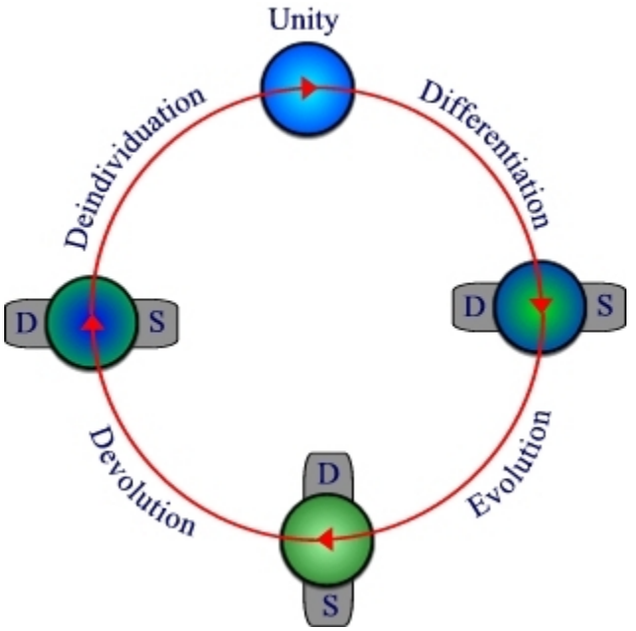

Figure 1 - Actualization Process and Modes (Life Cycle)

The actualization process describes the life cycle of individual entities (forms) – in this case physical entities – from becoming manifest in our world through a process of differentiation through evolution and finally death or reunion with reality.

In a nutshell, I am going to discuss the following stages or phases of actualization:

1. **The original unity of Matter in Hyponoesis**
2. **The process of differentiation that actualizes all the physical entities (Exohyle).**
3. **Each physical entity has an initial structure (σύστασις = systasis, Greek for structure, composition, constitution, formation) distinguishes it from other physical entities (represented by the letter 'S' in the diagram above).**
4. **Each physical entity has also intrinsic processes (μεταβολή = metabole, Greek for change, transition) related to its structure and other physical entities (represented by the letter 'D', for Dynamics, in the diagram above).**
5. **Once forms are actualized and possess an idiosyncratic structure and internal processes, they change and develop over time through the process of evolution (γένεσις = genesis, Greek for generation, coming into being, creation).**
6. **Once evolution has reached its peak, a process of devolution or degeneration starts that is a pre-step to the final dissipation of Matter.**
7. **In the final phase of deindividuation, the idionsyncratic structure of the physical entity breaks up and dissipates into the unity of reality from where it once originated.**

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5.1.3.3.2 The Unity of Matter

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5.1.3.3.3 The Differentiation of Matter

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5.1.3.3.4 The Structure of Matter (Systasis)

5.1.3.3.4.1 The Theory of Physical Patterns

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5.1.3.3.4.2 The Spatiality of Matter

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5.1.3.3.4.3 The Identity of Matter

We all know the difference between things and their properties and we also know that although these properties change over time, things remain the same and can be recognized as the same things. What is it that remains the same beneath all these changes in appearance? Philosophers used the term *substance* to denote the essential nature of a thing.

The term 'substance' is from Latin *substantia* meaning that which is underlying, the substratum that persists through the changes (from Greek ὑποκείμενον, hypokeimenon). Substance is that which does not change and which is the bearer of attributes or qualities (accidents) that change. Substance is also that which cannot be predicated of other things (see Aristotle, Metaphysics 1017b 13). Aristotle used another word, οὐσία (ousia) which originally had the meaning of property (that which is owned) or the origin of a thing, its natural constitution, the stuff of which things are made.

> Substance in the truest and primary and most definite sense of the word is that which is neither predicable of a subject nor present in a subject; for instance, the individual man or horse.[1]

Qualities or properties that are attributed to substances are technically called *accidents*, and they cannot exist apart from the substance, which has that quality. The same applies to relations between substances. *Accident* derives from Latin *accidens* meaning that which is not the essence of a thing, or that which can be present or absent in a subject without altering it. It is translated from the Greek τὸ συμβεβηκός (to symbebekos).

The Greek notions of substance are essentially the following ones[2]: substance as

a. A concrete individual
b. A core of essential properties
c. What is capable of independent existence
d. Center of change
e. Substratum (that which underlies and supports its qualities)
f. Logical subject

Descartes defined substance as "...nothing other than a thing which exists in such a way as to depend on no other thing for its existence."[3] He postulated three substances – matter, mind, and God, the latter being the primary substance on which the other two are dependent.

Similarly, Spinoza determined substance as "...that which is in itself and is conceived through itself: that is, that, the conception of which does not depend on the conception of another thing, from which conception it must be formed."[4]

The British empricist philosophers Locke, Berkeley and Hume attacked the traditional notion of substance and questioned its reality:

> I say our specific Ideas of Substances are nothing else but a Collection of a certain number of simple Ideas, considered as united in one thing.[5]

Kant gives a more lucid definition:

> All phenomena contain the permanent (substance) as the object itself, and the changeable as its determination only, that is, as a mode in which the object exists... Our apprehension of the manifold of phenomena is always successive, and therefore always changing. By it alone therefore we can never determine whether the manifold, as an object of experience, is coexistent or successive, unless there is something in it which exists always, that is, something constant and permanent, while change and succession are nothing but so many kinds (modi) of time in which the permanent exists.[6]

This is a radical deviation from the traditional concept of substance. Substance was no longer a fundamental feature of an objective world, but merely an aspect that is determined by mind's own intrinsic structure – what Kant calls *Pure Concepts of Understanding* or *Categories*.

Generally, substance is that which has qualities, and these attributes can change over time. That which is the bearer of those qualities is permanent, unchanging, persisting through time.

The problem of substance is the question of what substance ultimately is. Is it of physical (materialism) or mental (idealism) nature? But, if substance is just the carrier of changing qualities, what is it in itself, without those qualities? Can it subsist without determinations or is the totality of the determinations the substance? Is it something real or just an empty, logical, or abstract concept? Is anything at all capable of independent existence?

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[1] Aristotle: *Categories*, 2a11

[2] The Encyclopedia of Philosophy, Vol. 8, p. 39, MacMillan 1967

[3] Rene Descartes: *Principles of Philosophy*, I.51

[4] Spinoza: *Ethics*, I, Definitions III

[5] John Locke: *An Essay Concerning Human Understanding*, II.23.14

[6] Immanuel Kant: *Critique of Pure Reason*, A182/B225.

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5.1.3.3.5 The Dynamics of Matter (Metabole)

5.1.3.3.5.1 Change

There are basically two opposing concepts of change: change is unreal and change is the only reality.

Proponents of the first view are Parmenides and Zeno of the Ancient Greek philosophers and Spinoza and Bradley in 17th and 19th centuries. Parmenides held that reality is one, unchangeable, full, and undivided Being, and all change is just illusory: "Only Being is, Not-Being is not and cannot be thought."[1]

Spinoza based his arguments of the unchangeability of reality on his concept of substance, which can only be conceived through itself. Since substance is all there is it cannot be changed through an external agency, nor could it be changed through itself because its nature or essence consists in being conceived through itself.

The British idealist philosopher F.H. Bradley introduces a more subtle argument of a changeless reality by denying that time is objective:

> **Time in fact is 'before' and 'after' in one; and without this diversity it is not time... Time, like space, has most evidently proved not to be real, but to be a contradictory appearance.[2]**

The Ancient Greek philosopher Heracleitus (540-475 BC) was the first to postulate the opposite view of the changeless reality. He believed that change is the only reality and that everything is in constant flux: "We step and do not step into the same rivers, we are and we are not.[3]
The most concise statement is his famous πάντα ῥεῖ (panta rhei), everything flows or is in a flux (see Fragment 65A3).

The French philosopher Henri Bergson (1859-1941) maintained a similar view:

> **The flux of time is the reality itself, and the things which we study are the things which flow.[4]**
> **There are changes, but there are underneath the change no things which change: change has no need of a support... Reality is mobility itself, that is what I was expressing when I said that there is change, but that there are not things which change.[5]**

In the 20th century, Alfred North Whitehead developed a philosophy that is based on the concept of process rather than things:

> **That the actual world is a process, and that the process is the becoming of actual entities...Each actual entity is itself only describable as an organic process. It repeats in microcosm what the universe in in macrocosm.[6]**

Buddhism describes reality in a similar fashion. It is called the principle of impermanence (*anicca*):

> **The doctrine of anicca, or impermanence, is essentially a denial of the substance view of reality... It is...a denial of the reality of the world as substance... Buddhists claim thata reality consists of processes, not substances.[7]**

The problem of change boils down to the question whether change is real or unreal, whether it is a property of reality or just an appearance. If reality is only made up of processes, is there anything besides them that remains unchangeable? On the other hand, if reality is ultimately unchangeable, how can we explain all the changes that we perceive and experience?

Another problem connected with change is the problem of the *Identity of the Self*. How is it possible that we as *selves* remain the same, while everything including our body, changes over time?

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[1] Parmenides: *Fragment 4*, 6f.

[2] F.H. Bradley*: Appearance and Reality*, p. 39f., Swan Sonnenschein, 1902

[3] Heracleitus: *Fragment B49a*

[4] Henri Bergson: *Creative Evolution*, p. 344, University Press of America, 198

[5] Henri Bergson: *The Creative Mind*, p. 147, 150, Citadel Press, 1992

[6] Alfred North Whitehead: *Process and Reality*, p. 22, 215, The Free Press, 1979

[7] John M. Koller: *Oriental Philosophies*, p. 179, Prentice Hall, 1985

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5.1.3.3.5.2 Causation

Causation is the problem of the relation between cause and effect. Is there a necessary or contingent relation between cause and effect? Is causality part of our reality, or part of our mind's structure? Again, different philosophical views developed over time.

Aristotle's doctrine of the four causes combines his theories on *Matter and Form* (see substance above) and *Potentiality and Actuality*. The four causes are:

a. **Material cause (e.g. the stone on which the sculptor works)**
b. **Formal cause (e.g. the idea of the statue present in the sculptor's mind)**
c. **Efficient cause (e.g. the activity of the sculptor to chisel the stone)**
d. **Final cause (e.g. the final completed statue)**

These four causes are also operative in nature, for example in the process of growth from a seed to an oak tree. Aristotle not only assumed physical causes, but also what is called a teleological cause, that is, the goal or purpose determines the final result of a process.

In general, mechanical and teleological causation are two opposing views, especially between science and religion. Mechanical causation is the scientific view of the natural laws, of an effect determined by a preceding cause. Teleological causation emphasizes the concept of purpose, of the self-determination of a thing's nature, of development for its own sake or a higher goal.

The classical metaphysical *principle of sufficient reason* says that "...nothing ever comes to pass without there being a cause or at least a reason determining it, that is, something to give an a priori reason why it is existent rather than non-existent, and in this wise rather than in any other".[1]

David Hume attacked the view of cause and effect to the extent that he denied their reality:

> **All belief of matter of fact or real existence is derived merely from some object, present to the memory or senses, and a customary conjunction between that and some other object. Or in other words; having found...that any two kinds of objects – flame and heat, snow and cold – have always been conjoined together; if flame or snow is presented anew to the senses, the mind is carried by custom to expect hear or cold...[2]**

In modern science, quantum physics in particular, the rigid framework of cause and effect was dropped for the inherent indeterminism of quantum mechanical processes. Natural laws are regarded more like an ordering principle of the human mind which suggests a tendency to an idealist, Kantian view of reality.

> **Physicists have come to see that all their theories of natural phenomena, including the 'laws' they describe, are creations of the human mind; properties of our conceptual map of reality, rather than reality itself.[3]**

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[1] Leibniz: *Theodicy*, sec. 44

[2] David Hume: *Enquiries Concerning Human Understanding and Concerning the Principles of Morals*

[3] Fritjof Capra: The Tao of Physics, p. 317, Flamingo, 1992

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5.1.3.3.6 The Evolution of Matter (Genesis)

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5.1.3.3.7 The Devolution of Matter

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5.1.3.3.8 The Deindividuation of Matter

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5.1.3.4 The Theory of Actualized Existents (Actuants)

Hyponoetics **does not separate the aspect of matter or the physical Noeme from other aspects or Noemes. Therefore, this is actually not a theory of matter, but a theory of matter and mind as manifested in everything that exists.**

Matter in the philosophical, scientific, and folk-psychological sense must be revised and understood more like a totality of a variety of Noemes or aspects that interact with each other and are interdependent.

Whitehead introduced a similar concept, that of *actual entities*:

> **'Actual entities' – also termed 'actual occasions' – are the final real things of which the world is made up. There is no going behind actual entities to find anything more real. They differe among themselves: God is an actual entity, and so is the most trivial puff of existence in a far-off empty space. But, through there are gradations of importance, and diversities of function, yet in the principles which actuality exemplifies all are on the same level. The final facts are, all alike, actual entities; and these actual entities are drops of experience, complex and interdependent.[1]**

An *actualized existent* or *actuant* represents an individual entity that is a totality or unity of internal and external relations between objective and subjective Noemes. This entity is a multi-dimensional unity, conjoining gradations of actualized Noemes (or dimensions) with a dynamic functionality based on the interaction and the internal configuration of an actualized existent.

Noemes **are not parts of an actualized existent but rather dimensions or scalar aspects that are unified in an existent. Although *Noemes* can and do change within this unity, they always remain in a consistent and coherent state. The main functionality and configuration of a thing cannot alter to the extent that the thing is no longer coherent with its preceding state of being. Otherwise it is no longer the thing it was, its essence has changed completely. This is the problem of the identity of the self in philosophy.**

Although a thing can change dramatically regarding its outer appearance throughout its life cycle, it still is referred to as the same thing and not as a new or completely other thing that replaced, as an existent, the thing that preceded it. For example, if a caterpillar metamorphoses into a butterfly, or a tadpole into a frog, we do not think of these two living beings as unconnected and completely different organisms. We know that the larva changes, through an internal process of transformation, from one state into another. It is the basic actualized functionality of the larva to metamorphose into a different shape. Still, the caterpillar-butterfly is the same actual existent that it was in the beginning, the same unified totality of aspects. The process of metamorphosis just changed the internal configuration of the *Noemes* that make up the larva as well as the butterfly. The different stages in a being's development are the result of the dynamic nature, the constant flux of processes that constitute an actualized existent.

A similar process of growth exists in human beings who undergo various changes from their early years as a baby to mature adulthood and finally to old age. We would, however, never say that the baby and the old man are two different beings. They are one and the same actualized existent subject to the process of time.

These processes in time are the *external* relations that determine and constitute the existence of an individual entity. I do not regard an actualized existent as an entity strictly separated from its environment and other entities. Although there is a unity that determines a unique existent as such, this unity of internal relations is constituted by its very nature through external relations as well. The functionality of an actualized existent consists in this constant flux of interactions and relations with itself and other beings. The degree of interaction is, however, determined and limited by the nature of the actualized existent, which is its coherent and self-identical state of being.

Change is, therefore, necessarily coupled with time. Time is what makes change possible in the first place. Time, however, is a fundamental process or *Noeme* that is intrinsic to each and every actualized existent. As long as an individual entity exists as an actualized form, it exists in time and is subject to the relations of time, to the process of time that modifies its internal configuration, and thus forces it to pass through various stages of change or development. Once the actual existent is *de-actualized*, time and change no longer exist, but neither does the individual entity. As a potentiality in *Hyponoesis*, nothing is subject to time and change. Only as an actualized, real entity, as an individual form, does time and with it, change, become a distinguished and inevitable feature of an entity's inner configuration.

Here, a short remark to the concept of death. Common sense considers death in two ways. It is either the final stage of the human or animal life, or it is an intermediate stage to an afterlife of the soul, and not the body. Both ideas are true depending on point of view. If we consider a human being an individual actualized entity, death is the final stage of this entity's life cycle. If, on the other side, we believe in the idea of a soul, then the afterlife is just another stage in the total life cycle of a soul. Even though the physical body decays and the soul lives on, this does not necessarily mean that the physical *Noemes* no longer exist in that entity, but that they have transformed into a different, maybe more refined or subtle *Noeme*, such as an astral body. I do not mean to imply here that I support these ideas, but I want to emphasize the fact that *Hyponoetics* is an open framework that includes all ideas, however far-fetched from another point of view. The synthetic capability of *Hyponoetics* is one of the most important features of my philosophy.

Death, or the end stage of an actualized existent is determined by its own nature and through external relations. From a pure philosophical standpoint, I do not interpret death or life in any teleological sense, that is, there is no 'meaning' in life or 'purpose' to death. These meanings are interpretations of our mind and thinking, and are dependent on cultural, psychological, religious, ethical, and other aspects. The theory of actualized existents just states that since time is an integral aspect of each individual form, its duration or life-cycle is limited. This is a natural and necessary stage within the whole process of actualization and de-actualization. Death, in this sense, is

neither something bad nor tragic. It is the necessary end to what began in time.

Hence, the problem of change is not the question whether change is real or not. Change is real and it is not real - depending on whether we consider individual entities or pure potentiality (*Hyponoesis*). Change is real for actualized existents of any kind. Change is not real in *Hyponoesis* which is pure potentiality and therefore timeless. Time is not even an issue for the ultimate reality, because time simply does not exist and does not make any sense when applied to *Hyponoesis*. Time is something that can only be conceived of in connection with actual existents and not with potentiality as such which is completely outside of time, although containing the aspect of time potentially.

The problem of substance is solved as well with the theory of actualized existents. The concept of substance is replaced by the concept of *Noemes* or aspects, which represent gradations of manifestation of the same underlying reality (*Hyponoesis*). The interaction between *Noemes* is possible because they are not different, independent substances (such as the Cartesian *res cogitans* and the *res extensa*) but rather manifestations of the same reality and therefore are originally one. *Noemes* remain, therefore, interconnected with every other *Noeme*, as well as actualized existents are interconnected with every other existent in the universe. This interconnection is based on the concept of non-locality as applied similarly in quantum physics (see Theory of Relational Topoloy and Non-Locality above).

Finally, the problem of causation is resolved by understanding that cause and effect is not part of a given world, not fixed, pre-determined natural laws that are "out there" and just wait to be discovered by us. The world is constituted through mental models we develop. Models that are successful over a long period of time and can be applied to different areas of life tend to corroborate a certain view of the world that people think represents reality per se. The model is like a geographic map. It structures the terrain into easily recognizable symbols and abstractions, but this map does not represent reality, it is just one of many possible ways of conceptualizing or comprehending reality. I will further discuss this process of *abstractive modeling* is in my theory of the World (*Exocosmos*) and explain how our knowledge constitutes reality.

Thus, cause and effect are concepts of a model that presupposes causality as a fundamental feature of our world. The Humean view of causality as a habitual disposition of our mind is true as well as the classical view that every effect has a cause. The model we apply does not matter, it is its success in explaining events in the world and in pragmatic applications that determine the degree of truth, or rather of acceptance, of a model. Currently, modern science questions the classical concept of a rigid causality, especially since causality fails in quantum-physical processes. This indeterminacy is a counter-current to the previously deterministic views of classical physics and sustains my theory that models change and with them what we call 'reality'.

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[1] Alfred North Whitehead: *Process and Reality*, p. 18, Free Press, 1979

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5.2 Interobjectivity or Causality (Heterohyle)

5.2.1 Definition

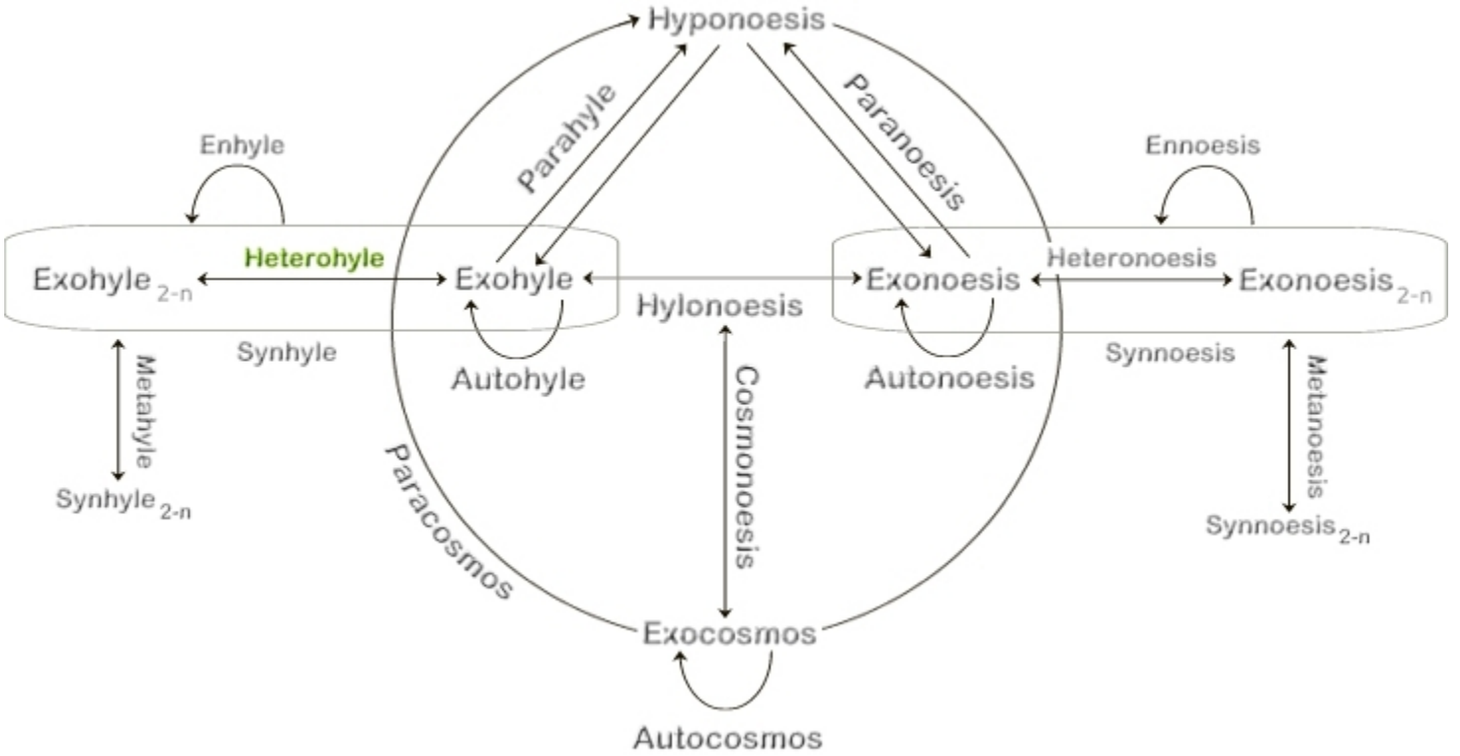

Figure 1 - Heterohyle

Hetero-Hyle **is derived from the ancient Greek ἕτερος (heteros = other) and ὑλη (hyle = stuff of which things are made, material, matter). The relationship between a cause and its effect, or the prinicple of causality.**

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5.2.2 Theories of Causality

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5.2.3 The Theory of Heterohyletics

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5.3 Physical Systems (Synhyle)

5.3.1 Definition

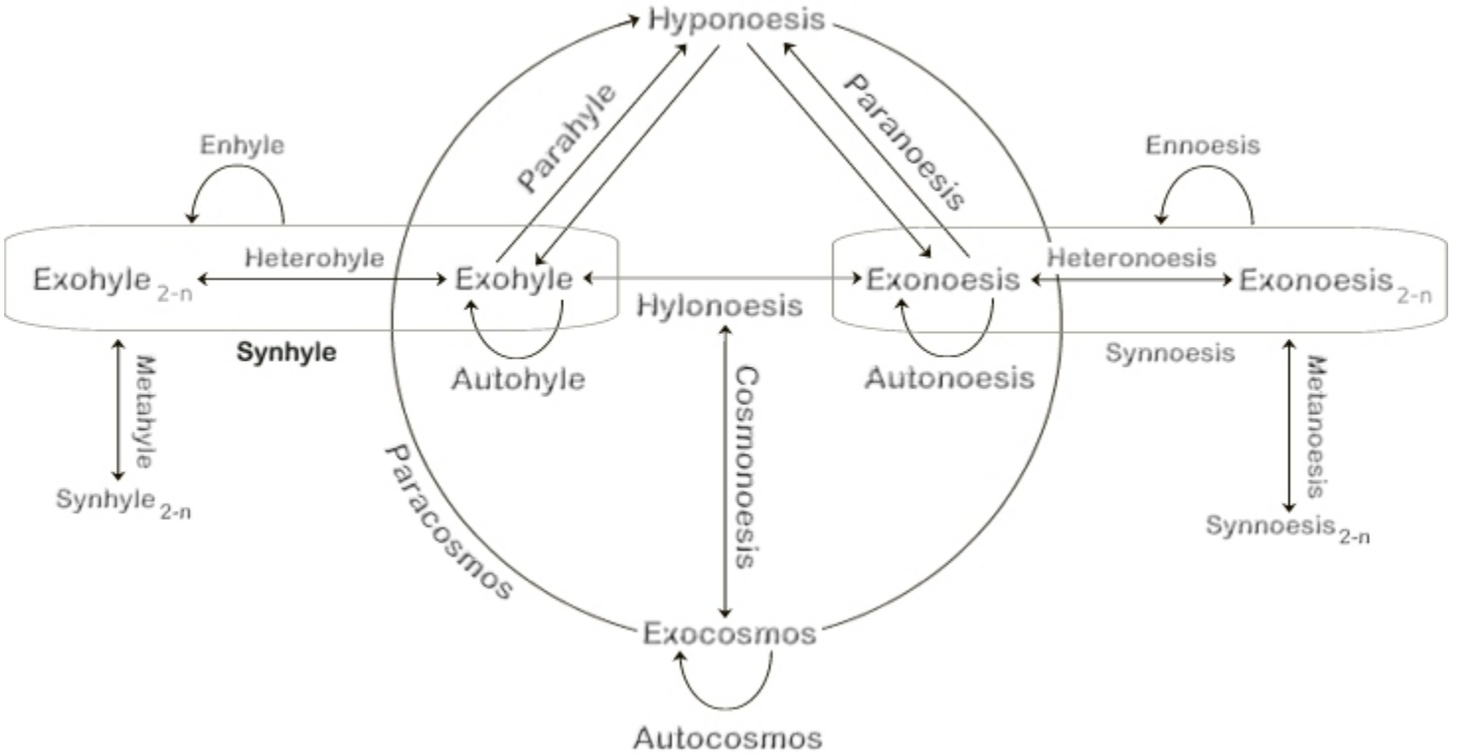

Figure 1 - Synhyle

Syn-Hyle **is derived from the ancient Greek** *σύν* **(syn = with, together with, participating in) and** *ὑλη* **(hyle = stuff of which things are made, material, matter). Matter organized as a physical system that is holistic by nature, that is, the whole is more than its parts.**

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5.3.2 System Theories

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5.4 Energy (Enhyle)

5.4.1 Definition

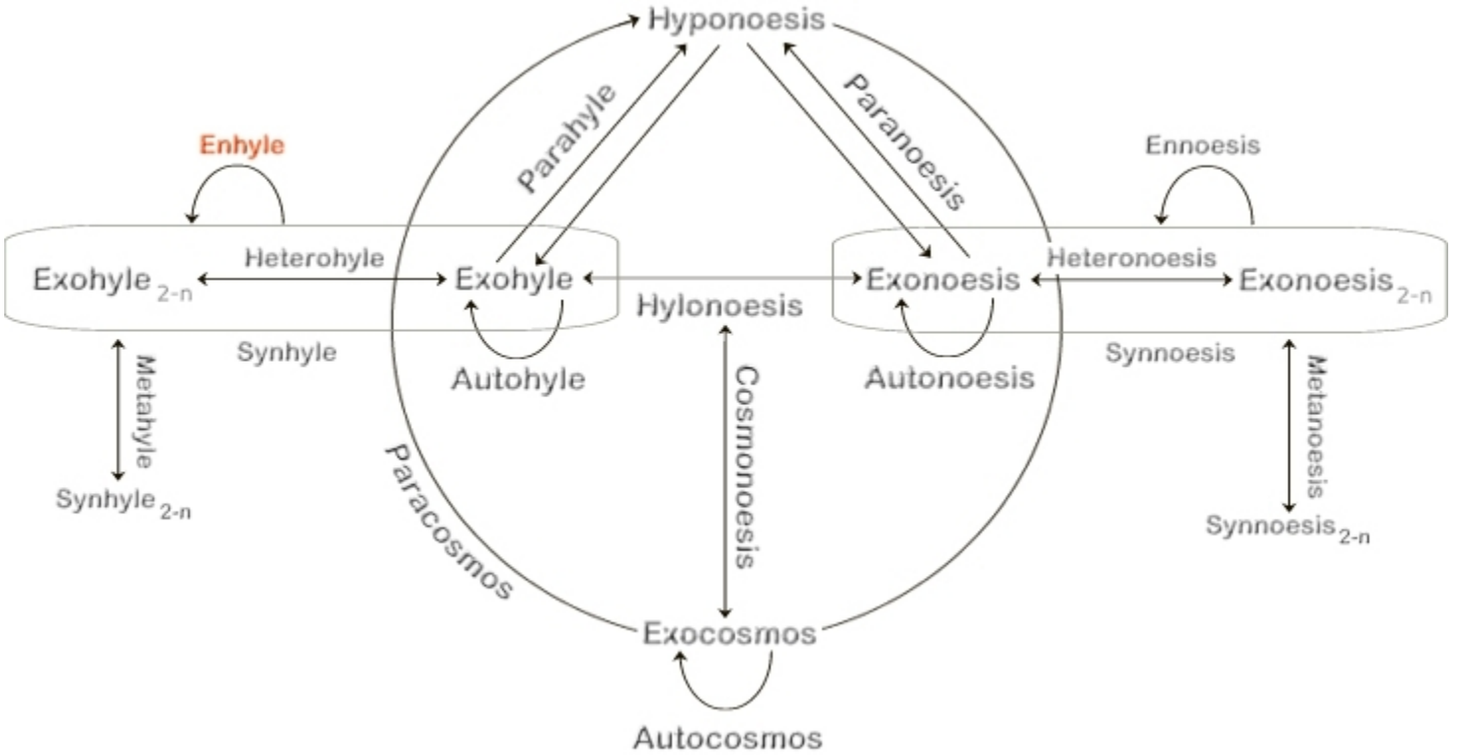

Figure 1 - Enhyle

En-Hyle **is derived from the ancient Greek ἐν (en = in, within, amongst, surrounded by) and ὑλη (hyle = stuff of which things are made, material, matter). The concept of energy and force in science, including natural laws. Sustains also the notion of a vital force in biological systems (e.g. Bergson's *elan vital*).**

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5.4.2 Theories of Energy and Force

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5.4.3 The Theory of Enhyletics

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5.5 Organic Systems or Life (Autohyle)

5.5.1 Definition

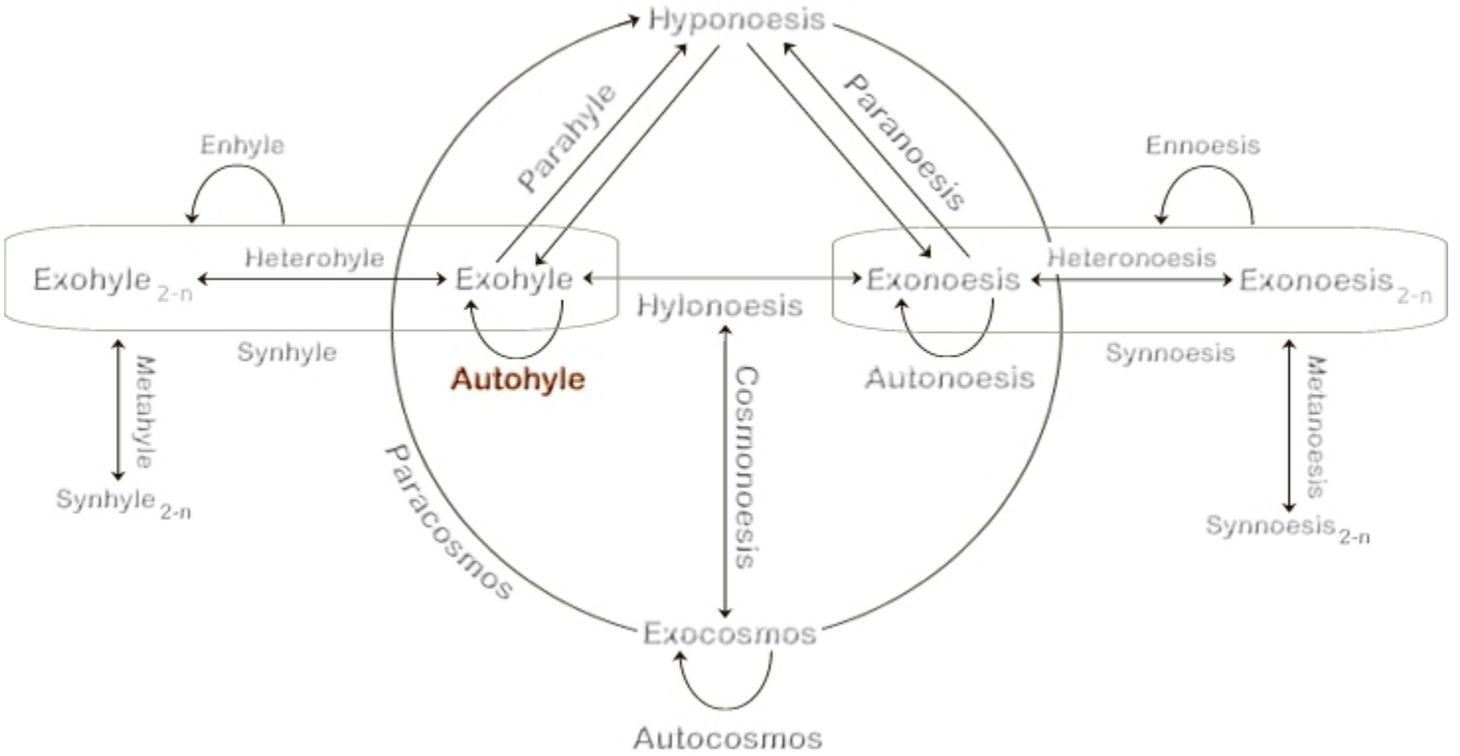

Figure 1 - Autohyle

From Greek αὐτός (autos = by or in itself, self) and ὑλη (hyle = stuff of which things are made, material, matter). The dynamically self-organized matter-energy (*Exohyle*) represented as higher-order entities, such as organisms.

***Autohyle* represents the concept of organic, living systems in Nature. An organism is a complex and higher developed system than mere *Exohyle* (physical matter). The recursive relationship in the diagram represents the ability of an organic open system to organize and regulate itself through internal processes, which also leads to new emergent structures.**

In this section I don't intend to present theories on the origin of life or regarding the meaning of life. My goal is to present the most important concepts of life that various thinkers developed throughout history. *Hyponoetics* treats the notion of life as another and special aspect of our world, a *Noeme* of its own.

***Autohyle* is indicative of what we call *Life* and what the ancient Greek philosophers meant by the concept of "Psyche".**

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5.5.2 Theories of Life

Starting with the Ancient Greeks, who believed that everything with a soul (psyche) is alive: "everything that lives has a soul" or "the soul is that in virtue of which we are alive."[1]
The Milesian philosophers held that life (zoe) is the coordination of soul and movement (kinesis). Plato tried to prove the immortality of the soul by postulating that what makes the body alive is the inherence of a soul and that, therefore, the soul's entering and exiting the body decides over life and death of the body (see Plato's dialogue *Phaedo* 105b-107a).

Aristotle defined life as "...the self-caused nutirition (trophe), growth and decay."[2] Other criteria for the existence of life he adduced are: presence of mind (nous), sensation (aesthesis), movement (kinesis) and rest in space (stasis) (De Anime, 413a).

Aristotle introduced another term, entelechy (*entelecheia*), which denotes the internal capacity of a living organism to strive to a state of completion or perfection, to full actuality determined by its own nature. He sometimes used another concept, *energeia*, synonymously. *Energeia* is that which a thing is naturally suited to do, its function. Aristotle held that an organism is a whole (*holon*), including both function (energeia) and finality or end (telos):

> An organ is the part of a living creature that is directed toward an end or purpose that is an activity (praxis); nature (physis), the internal principle of growth in these beings, has made the organs to perform certain functions, and a body so constituted is an organism.[3]

For Kant, things considered as physical ends are organisms. A thing exists as a physical end (*Naturzweck*), according to Kant, if it is both cause and effect of itself. Kant mentions two requirements of a thing in order to be a physical end:

> The first requisite of a thing, considered as a physical end, is that its parts, both as to their existence and form, are only possible by their relation to the whole... Then this second requisite is involved, namely, that the parts of the thing combine of themselves into the unity of a whole by being reciprocally cause and effect of their form... Every part is thought as owing its presence to the agency of all the remaining parts, and also as existing for the sake of the others and of the whole, that is, as an instrument, or organ.[4]

Kant defines an organism as an organized natural product in which every part is reciprocally both end and means. It is (self-)organized because it produces other parts that are each end and means to each other. Those other parts again produce other parts, and so on. An organism, according to Kant, cannot be described with principles of mechanism:

> An organized being is not a mere machine. For a machine has solely motive power, whereas an organized being possesses inherent formative power... This is a self-propagating formative power, which cannot be explained by the capacity of movement alone, that is to say, by mechanism.[5]

Hegel's view of life lies in the same non-mechanistic tradition as Kant's view. The living organism has two dimensions: an inner, its soul, and an outer, the body. The soul is the concept or idea that is realized in the body. The organism is an individual in virtue of the interaction between body and soul, and the organism is finite, that is, body and soul are separable. This separation constitutes death.

Life involves three processes: a) the organism with the three functions of sensibility (sensing or feeling one's whole body), irritability (responsiveness to stimuli), and reproduction (self-maintenance through physiological regeneration), b) the organism interacts with inorganic nature outside it through assimiliation and self-production, and c) the organism is in itself a member of a genus or species (Gattung).[6]

For Bergson, "life is like a current passing from germ to germ through the medium of a developed organism... The essential thing is the continuous progress indefinitely pursued, an invisible progress, on which each visible organism rides during the short interval of time given it to live. Now, the more we fix our attention on this continuity of life, the more we see that organic evolution resembles the evolution of a consciousness".[7]

Bergson introduced a speculative concept to support his theory of life and consciousness, that of the vital impetus (élan vital). It is a "current of consciousness" that has penetrated matter, given rise to living organisms, and determined the course of their evolution. Life is "consciousness launched into matter". The essence of life is mobility, the "movement by which life is transmitted", or in other words, life is a "continuously growing action".

The main theories of life are:

1. Mechanism: In the 17th century, mechanism was the prevalent scientific view that human beings or organisms are machines and work according to mechanistic laws. It was based on Descartes conception of mind and matter. Later, this definition was refined to mean that biological functions can be reduced to physicochemical functions. Scientists also applied mechanistic theories to nature as a whole and the universe. Nature is like a huge clockwork governed by strictly deterministic laws.

2. Vitalism: Originally a view inspired by Aristotle who held that life cannot be fully explained in material terms. There is something

non-material in a living organism that differentiates it from inanimate matter. In the 19th century, vitalism rose as a counter-current to scientific materialism. Vitalists believe that life consists in movement and becoming, rather than in static being. Reality is organic, not mechanical. Hans Driesch (1867-1941) believed that organic activities were due to *entelechies* that are non-physical, non-spatial entities that control organic processes. Bergson (see above) introduced a more technical concept, that of the vital impulse (élan vital) as a current of consciousness that penetrates matter and is the condition for an organism to be alive.

3. Organicism: Organismic biologists oppose both mechanism and vitalism in that they hold that a) life cannot be explained in purely mechanistic terms, b) that organic processes are not caused by a nonphysical entity (as vitalism postulates), c) that the living body and its physiological environment forms an organic whole, d) that organic systems are so organized that the activities of the whole cannot be understood as the sum of the activities of the part, e) that at a higher level of organization, a directive or teleological behavior is an aspect of an organism. Organismic biology shifted focus from function, which is essentially a mechanistic concept, to organization, patterns, and finally, systems thinking.

4. Finalism: Based on Aristotle's doctrine of final causes (*telos*), finalism or teleology is the view that things and beings merely realize a plan immanent in their nature (see Leibniz's monads). All things exist for the sake of an end or goal. Teleological explanations "attempt to account for things and features by appeal to their contribution to optimal states, or the normal functioning, or the attainment of goals, of wholes or systems they belong to."[8]

5. Systems Theory: Organisms are often compared to systems and modern systems theory, although primarily mathematical, can still be applied to living systems. Fritjof Capra is a fervent proponent of systems theory and he lists the following criteria of a system[9]:

- "...the essential properties of a living system are the properties of the whole, which none of the parts have. They arise from the interactions and relationships among parts." (p. 29)
- "Systemic properties are destroyed when a system is dissected into isolated elements." (p. 36)
- "...self-organization is the spontaneous emergence of new structures and new forms of behavior in open systems far from equilibrium, characterized by internal feedback loops and described mathematically by nonlinear equations." (p. 85)
- "The *pattern of organization* of any system, living or nonliving, is the configuration of relationships among the system's components that determines the system's essential characteristics." (p. 158)
- example of bicycle: "The complete configuration of these functional relationships constitutes the bicycle's pattern of organization. All of those relationships must be present to give the system the essential characteristics of a bicycle." (p. 159)

5. Holism: Jan Christiaan Smuts introduced a holistic approach to life in his seminal work *Holism and Evolution*. He conceived of life as consisting of structures that are natural wholes, such as bodies, organisms. Wholes are not just an abstraction in thought, but refer to something real in the universe:

> Taking a plant or an animal as a type of a whole, we notice the fundamental holistic characters as a unity of parts which is so close and intense as to be more than the sum of its parts – which not only gives a particular conformation or structure to the parts but so relates and determines them in their synthesis that their functions are altered. The synthesis affects and determines the parts, so that they function towards the 'whole.'[10]

Smuts believed that holism represents a process of "creative synthesis". Wholes are not static and mechanical, but dynamic, evolutionary, creative structures. The evolution of the universe is a "movement towards ever more and deeper wholeness."[11]

> We find thus a great unifying creative tendency of a specific holistic character in the universe, operating through and sustaining the forces and activities of nature and life and mind, and giving ever more of a distinctive holistic character to the universe. This creative tendency or principle we call Holism.[12]

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[1] Aristotle: *De Juventute*, 470a 19, *De Anime*, 414a 12

[2] Aristotle: *De Anime*, 412a 14

[3] F.E. Peters: *Greek Philosophical Terms*, Holon 8, New York University Press, 1967

[4] Immanuel Kant: *The Critique of Judgement*, §65

[5] ibid

[6] G.W.F. Hegel: *Encylopaedia of the Philosophical Sciences*, §216

[7] Henri Bergson: *Creative Evolution*, p. 27, University Press of America, 1983

[8] Ted Honderich: *The Oxford Companion to Philosophy*, Oxford University Press, 1995

[9] Fritjof Capra: *The Web of Life*, Anchor Books, 1996

[10] Jan Christiaan Smuts: *Holism and Evolution*, p.95, Sierra Sunrise Books, 1999

[11] ibid, p. 161

[12] ibid, p. 117

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5.5.3 The Theory of Autohyletics

Organisms produce and actualize other parts that complete themselves to establish a whole (organism, living creature). Life constitutes itself as the capacity to co-create or co-actualize individual entities. The act of actualizing implies that the actualized and new entity is a coherent existent that is intrinsically capable of self-organization and self-perpetuation. Life (Authohyle) is a function of *Exohyle* that enables an individual entity to create new forms of life or new systemic structures. These new structures are an integral and contextual part of a holistic system (organism) that develops and modifies itself (morphogenesis). An organism and its species evolves through different stages (ontogenesis, phylogenesis) thereby producing new emergent properties that are, however, still part of the underlying intrinsic dynamics of self-actualization.

If new properties can emerge from the interrelationship of parts, then the structure or organization of these properties, their essence, must somehow already be intrinsic in the parts, although in a latent way. Since a system cannot have arbitrary properties, but only properties relevant to its structure and within the limits of its structural organization, the emergent properties must somehow be connected to the properties and the physical structure of its components. Otherwise, the emergent properties would be random and could not be traced back to the interrelationship of certain clearly analyzable parts. The properties of a system are therefore typical and characteristic of the way parts interrelate. Different parts interrelate differently. Substituting a system's component with another not only changes the interrelationship the former component had with other components, but through the changing pattern of relation, one or more properties of the system may change, too, although this is not usually the case (s. identity of organizational pattern = system's properties). If we replace a part with a functionally different part, then the system's whole pattern changes, and with it, the properties of the system.

It is very important to understand that a system cannot have properties that are not somehow related to its parts, although the system properties are never found within the parts themselves. The way the components of a system interrelate, what Fritjof Capra calls a "pattern of the network", is characteristic of system properties. It is the very essence and existence of system properties. System properties depend on the interrelated patterns of the components. Any change in the components is reflected in the organization of the system, in its idiosyncratic pattern. This close relationship between system properties and the pattern of relationship between the components shows that my proposition, that a system is the product of its components and that system properties cannot be foreign to the components of the system, must be true.

The necessary connection between patterns or objects or parts of a system and the properties of the whole emergent at differing systems level is obvious. Otherwise, a system would not be a coherent, synergetic whole, but would either fall apart with every fundamental change of its parts or behave erratically and against all natural laws. Although there is a natural frame of determinism that regulates what kind of properties emerge at a particular level, Capra's definition of self-organization is still valid, because it allows the spontaneous emergence of new structures or forms of behavior - but only within certain constraints.

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5.6 Ecosystem and Universe (Metahyle)

5.6.1 Definition

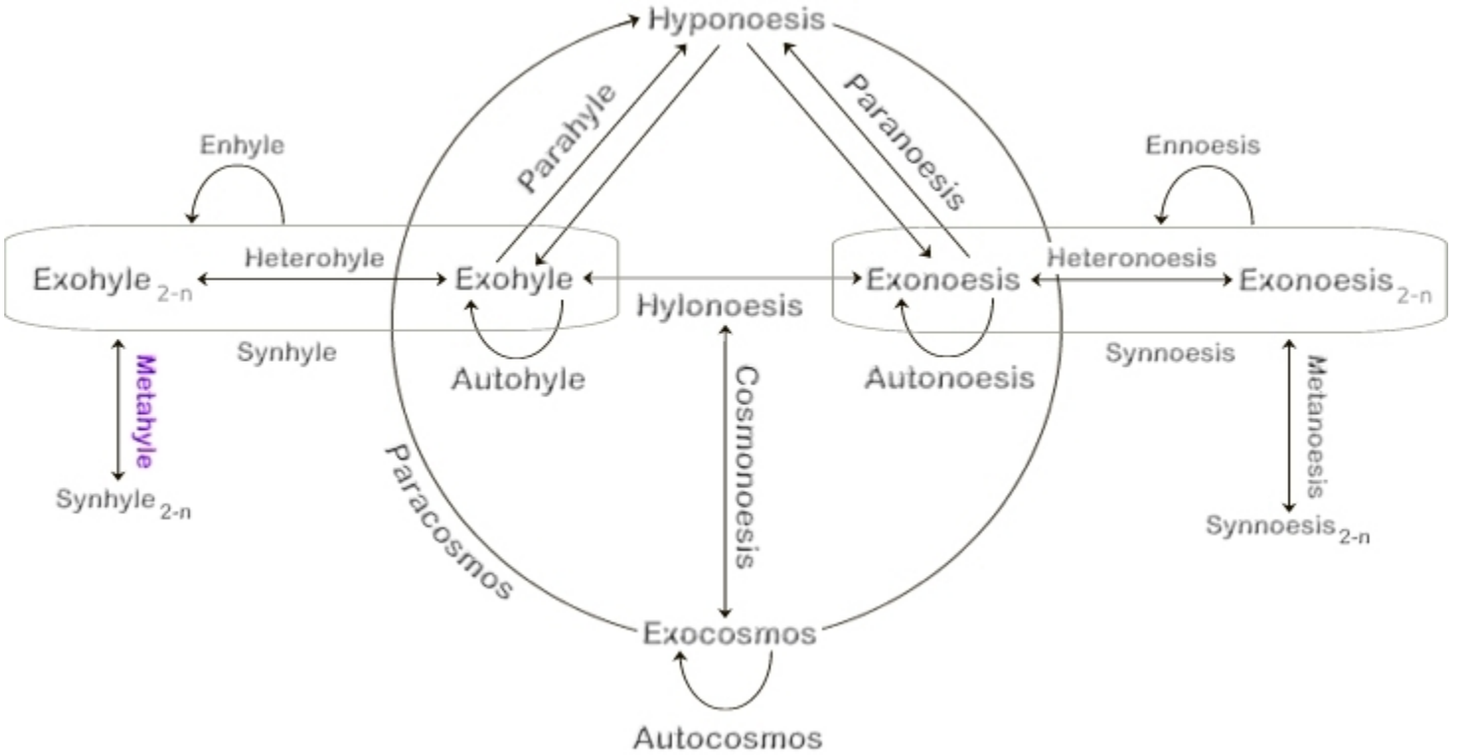

Figure 1 - Metahyle

Meta-Hyle **is derived from the ancient Greek μετά (meta = in the midst of, among, between) and ὑλη (hyle = stuff of which things are made, material, matter). The combination of different physical and biological systems within a larger organized whole, such as an ecosystem, the solar system, a galaxy, or even our universe as a whole.**

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5.6.2 Theories of the Universe

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