The General Theory of Metadynamics Systemicity

Part 6: Neighbourhood and the 4D Neighbouring of things

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ABSTRACT

The theory of Systemicity emerged from applying the principles of "The Bioethism Transdisciplinary Paradigm" to "*Universal systems*" and *"Living systems" during their temporal survival"*, which the author J.-J. Blanc has developed since 1996. "Systemicity" surge from interrelations, intrication[1] … and a permanent interdependency of synergetic things. The systemicity of atomic and molecular cycles has made and goes on sustaining both cosmic systems and Life on planet Earth. In order to exist, cosmic objects and living creatures cope with environmental changing events, replicate and evolve within global, glocal and local areas, while permanently confronted with changes both at endogenous and external environmental ecosystems' milieus.

As a reminder, the author's past proceedings developed, part after part since 2004, are meant to show the structure and chapters of a "General Theory of X-dynamics Systemicity." One will observe that the building-blocks of the theory are being centred on the Universe dynamics diversity, such as peta[2], teradynamics, gigadynamics', metadynamics', dynamics' and microdynamics' inducing results to a systemic feedback symbiosis named "Systemicity". The publication of the Systemicity theory is meant to support the acquisition of a wide transdisciplinary understanding of the x-dynamics' which systemicity sustains the whole evolution of the Universe ecosystem's components as well as those of the livings. While systems natural structure and behaviors are adapting with their milieu by "neighboring" within "neighborhoods" (ecosystems), they specifically cope with endogenous and exogenous events that induce the temporal retroactivity to result as structuring things.

The Universe dynamics and Cosmo-planetary Metadynamics's systemicity have participated in the Sun and its planets to form, and particularly Earth orbiting around it on a right "habitable green zone." The General Theory shows the close links between cosmo-planetary and terrestrial x-dynamic systemicity, its strength, fluxes and moves cycles that made Life to have happened and thriven. Life emerged from the apparition of proto-organisms which, evolving, drove humans to develop, as forged with their individuality, social traits and behavioral statuses that have accounted for the species biodiversity developing, evolving or getting extinct over billions of years.

For example, when the Earth became a "snowball" from a nearly total glaciation (-600 Mo/y), the survival of some bacteria and micro-organisms escaping the drastic extinction of most species, conversely boosted up an extraordinary explosion of marine species bearing quite new functions (-545 Mo/y), that after volcanism reheated the planet from the systemicity of interrelated terrestrial and cosmic metadynamics.

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[1] - **Intrication:** Quantum entanglement is a physical phenomenon that occurs when pairs or groups of particles are generated or interact in ways such that the quantum state of each particle cannot be described independently–instead, a quantum state may be given for the system as a whole. Measurements of physical properties such as position, momentum, spin, polarization, etc. performed on entangled particles are found to be appropriately correlated, a neighboring end with a variable status.

[2] - **Petadynamics:** in physics, multipliers are defined in powers of 10 from 10^{-24} to 10^{24}, proceeding in increments of three orders of magnitude (10^3 or 1,000).

These giga and metadynamics are the main physicochemical drivers of the universal X-dynamics sets that are atomic, cosmic, galactic, stellar, planetary and terrestrial which as feedback processes, participate in forming matter and cosmic objects (nebulae, baby stars, stars and planets), within a molecular world originated from after the "Big Bang".

The neighboring of sub-atoms, atoms, matters and gas, within a set of synergetic retroactivity results, promote dynamics (forces and fluxes) which systemicity permanently goes to specific directions in the 4D environment of the Universe. Life is a whole set of "neighboring" ecosystems, which components are confronted with gravitation, electromagnetism, chemical and physical phenomena …, particularly with temperature, water and the "thermodynamics of entropy lethal effect". They are all being forces and fluxes which are driving the structure and behavior diversity of objects, species and things up within their systemic neighborhood and their intricate concomitance, in other words, integrating facts existing or occurring with or by something else.

Furthermore, ecosystemic neighborhoods (ecosystems) are confronted with the terrestrial x-dynamics cycles of water, minerals, and climates statuses which currents and physical effects permanently drive up their metabolism. Among drivers are the coalescence, conjunction, co-evolution, convergence, symbiosis, percolation, phase transition and threshold outputs that together comply with adaptations to neighborhood components varieties and temporal sustainability. At each step, perception means (chemical, biological, physiological, social…) are transducing a sense given from a variety of signals both endogenous and exogenous.

To convert energy from one form into another will infer from the level of survival need components. Then feedback driving the universal atomic, molecular and physicochemical worlds is permanently provoking a change and an evolution among the several x-dynamics systemicity cycles.

The specific bonds and traits in the structures and behaviors of "living creatures" as well as in their evolution trends reveal the survival quality of their neighboring knowledge towards actions-reactions (drivers) events. The treatment of ago-antagonistic signals and stimuli emerging from their ecosystemic and socio-systemic metabolism and environmental conditions is of a major priority surviving. The confrontation between bodies and entities, their milieu components and the natural environment necessitates treating signals and information which perception is adequately setting with the fundamentals of "survival dynamics" and "drivers" like "symbiosis" and "feedback" according to the sense given over to sustaining. Processing stimuli and signals is an adaptation of trends participating with the metabolic dynamic balance pertaining with both internal and external changing conditions as to cope with survival needs.

Part 5 of this theory only describes some drivers: symbiosis, coalescence, convergence and synergy, percolation, phase transitions, threshold output, feedback … that permanently influence the systemicity of cosmic and terrestrial matter, objects and things interacting among the universal networks of the 4D worlds. Feedback driving the survival metadynamics systemicity sustains "the atomic and molecular cycles from cradle to grave."

Part 6 of this theory is describing some of the effects of neighboring between individuals and ecosystems which, among living species, characterize their apparition, their adaptation and evolution as well as the causes of their extinction. Both are a matter of balance.

Keywords: neighboring, x-dynamics, systemicity, symbiosis, metabolism, synergy, convergence, coalescence, feedback, survival drivers, entropy, plants, ecosystems.

INTRODUCING, "THE NEIGHBORING EFFECT"

The universality of atom chains (open or straight) forming the Cosmos components and of Life's creatures is the result of close symbiotic interrelations of their x-dynamics systemicity. Objects,

things and entities that are neighboring at different scales in the wide array of cosmos ecosystems that do structure molecule clouds, galaxies, stellar systems, planets and our Planet biosphere and their specific ecosystems. Neighborhoods of incommensurable 4D networks are strictly interconnected because of their symbiotic and synergetic exchange of energy and matter.

Neighboring Is the Universal Dynamic of All Interrelated Things

Let's observe the space-time imbrication of the subatomic worlds, bottom up towards the present form of living beings, their evolving culture and today's harsh creativity of mankind. Atoms are the building blocks of everything in the universe: different types of atoms or elements behave diversely while interacting and bonding as to form molecules (2 or more atoms). Billions of specific molecules combine in making four macromolecule kinds as found in all cells: proteins, nucleic acid (DNA, etc.), carbohydrates (sugar, starch), and lipids (fat and oils).

The simplest element of life is then an **atom** like oxygen is. Two or more atoms are a **molecule** like dioxide is. Genes are complex molecular structures (DNA). Proteins are very large molecules compared with molecules of sugar or salt and consists of amino acids linked together… Many molecules are **macromolecule**s, such as a phospholipid is (ref. cell membrane). A **monera** is a biological set made up of single-celled organisms without real nuclei, lowest level of rhizopods (prokaryotes). Multiple macromolecules form a **cell**, like a club cell is (respiratory organ tissue components). A group of cells functioning together is a **tissue**, for example, the epithelial tissue. Different tissues constitute an **organ** like a lung is. Organs work together to form an **organ system**, such as the Respiratory System. Several organ systems build a **living organism** as to function, like what a lion is. A group of the same organism living together in an area is a **population**, such as a "pride of lions" (a group) or also a *human family* as a tribe. Two or more populations interacting form a **community**, for example, lion and zebra populations or humans of different ethnic groups. A community interacting not only with others, but also with the physical and natural environment, encompassing an **ecosystem** such as the Savannah, is an ecosystem where a specific diversity of animals are neighboring with plants and other species. A large region that has a distinct climate and combination of plants and animals is a **biome**.

Observing the components of biomes, **habitats** are ecological areas that are inhabited by human and/or particular species of animal, plant, or other types of organisms. Most world places are composed of ecosystems where many living things interrelate, which, sharing geographical areas, are protecting a territory producing specific energetic resource needs as well as survival habitat opportunities.

> *A territory is here a* natural environment *where an organism can find food, shelter, protection and mates for reproduction.* It is parallel of physical environmental neighborhood areas that species population are appropriating themselves since finding energetic survival resources that suit their temporal sustainability.

A habitat is made up of physicochemical matters and biological factors such as soil, moisture, range of temperature, and availability of light as well as biotic factors such as the availability of food and shelter buildings as appropriate with their security necessities against their specific predator attacks. A habitat is not necessarily a geographic area—since for a parasitic organism; the body of its host is the proper source of energy for its descendent development: part of the host's body is adequate according to species such as the digestive tract, or a cell within the host's body.

The earth itself can be considered as being one large **biome**: the land tropical rain forest, coniferous forest, and broad-leaved forest, grassland, desert and tundra, plus the water biomes are together very large. The whole of the living world present on Earth together with the four layers that surround it along with the lithosphere (rock), hydrosphere (water) and atmosphere (air) is the sum of all the ecosystems as structured forming what is called the **biosphere**.

Neighboring: a Matter of Proximity and Retroactivity

Considering the development of the "General Systemicity Theory," *a new scientific "reading grid» as a consequence developing the new transdisciplinary paradigm – "The Bioethism". Created by J-J Blanc, 1996*, it is here in 2014-2015, the moment and place to develop the "*neighboring x-dynamic systemicity meanings and evolution results"* both notions being two among the major universal x-dynamic mechanisms that interfere with objects, entities[3] and things which, while confronted with survival necessities, standing against the thermodynamic laws 1 and 2 of entropy.

The neighboring dynamics relate to events occurring at a certain distance in between things that induces to mutual symbiotic interactivity and retroactivity assorted with the possible variation results of the gravitation law[4] according to mass variability (e.g. distances at peta-cosmic scales down to fundamental particle scales, including biological cells functions). Other phenomena such as time and elevation above the earth are complemented with its rotation.

The Semantics of "Neighboring" Terms

Purposely, semantics will also help understand what meanings and cultural interpretations are around the word "neighboring" that differentiate itself with the notion of social relationship so close with the notion of causality as being the relation with a set of factors (causes) and a phenomenon (the *effect*). Anything that transforms an effect is a factor of that effect: causality and effect being typically related to changes, events, or processes; such causes are Aristotle's moving causes in terms of dynamics. The linguistic semantics is the study of meaning that is used for understanding human expression through language and writing; it is also the interpretation of signs or symbols used in agents or communities within particular circumstances and contexts. Within this view, sounds, facial expressions, body language, and proxemics have semantic (meaningful) content, and each has several branches of study. Here:

- **Neighbor** is one presence in the nearby, someone or something in the nearby; a 3D spatial area where neighbors are in, usually having different and specific behavioral characteristics,
- **Neighborhood** is an area composed of objects, things and individual entities making up a specific ecosystem, an area where things and objects constitute a 3D set, a vicinity where geographically and socially linked groups interact,
- **To neighbor**: is to be near, to be in the proximity (nearness) of, to be next to, to be in the vicinity (nearness) of, to be close by, to lay close to or border directly on.
- **To be neighboring** is the verb in relation with the French word "voisiner"[5] meaning: to live near with, to interact around *and have temporal exchange with nearby things, objects and entities (e.g. other species).*

Within the whole of the universe, "nearness" has a very specific and relative meaning whether a distance is observed at the level of sub-particles, atoms, molecules … or for example at the distance of galaxies and stellar systems. Chemical reactions of molecular compounds, their nearness leads to the transformation of sets of chemical substances to others inducing to covalent links[6]. In the biological world, "nearness" is the consequence of specific molecules proximity and their chemical reactions and adequate links are forming different objects, matters and entities. It is, furthermore,

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[3] - **Entity:** one that has a real and independent existence, an individual.

[4] - **Newton's Third Law**: *"To every action there is always an equal reaction - if a force acts to change the state of the motion of a body, the body offers resistance equal and directly opposite to the force."*

[5] - **Voisiner:** also used in mathematical topology and graph theory.

[6] - **Covalence**: valence characterized by the sharing of electrons. Valence as a single electron or one of two or more electrons in the outer shell of an atom is responsible for the chemical properties of the atom.

the case of nearness between micro-organisms (e.g. viruses, bacteria) and macro-organisms (living species of all size) while interacting and adapting to neighborhood signals and resources opportunities.

"To be Neighboring" is "To be responding to Signal Stimuli"

Stimuli are external conditions or forces that "stimulate" an object or an entity system by causing a chain of feedback - typically physicochemical and/or biological - that detect the variability of external phenomena (gravitation, electromagnetism, other entities effect…). Furthermore, in life, phenomena or event signals are percolating through the body and processed with physical, biochemical, light, or other types of physicochemical fluxes by means of membrane receptors specialized in sets of cells. There, receptors detect changes in the body milieu and the natural environment and permanently change body processes bringing about a new result (most of these stimuli – electrical, chemical and neuronal transmitters are often being turned into electrical impulses). Receptors of these moves are usually located in sense organs: eyes (light), ears (sound and position), tongue (biochemical molecules), touch (usually through skin cells... pain, heat, cold, stretch and pressure) and nose (smell of chemical molecules...).

> *This list seemingly quite usual suggests the complexity of the massive treatment of information and signals that an object, a thing or a body entity is submitted with and permanently changing their functioning. It shows how deep enough it is to have a wide scientific knowledge understanding the continuous interrelation between things, particularly observing and interpreting top down and bottom-up dynamics systemicity cycles.*

A stimulus response mechanism that is mediated by a signal transduction pathway shows that the phenomenon is using chemical and electrical messengers that operate in conjunction with different cell types receptors. For example, neurons or the rod and cone cells of the retina transmit signals to the central nervous system so as to convey information and produce a response such as pain, or the sensation of heat, or of color vision of a move or image. These are to be considered as the "art to be neighboring"!

Signal transduction is the process by which an extracellular signaling molecule activates a membrane receptor that in turn alters intracellular molecules creating a response. There are two stages in this process: a signaling molecule activates certain specific receptors on the cell membrane, causing a second signal to relay the preceding signal into the cell and elicit a physiological response in exchange (dynamics systemicity symbiotic results). In either step, the signal can be amplified, meaning that one signaling molecule may cause several different responses for which the brain has a major role.

> *Example: "You hit your finger with a hammer that touch receptors (pain and pressure mechanoreceptor) transmitting electrical signals through the peripheral nervous system to the central nervous system (CNS) and the brain where the signal is interpreted. The feedback then produces voluntary and involuntary signals addressing the appropriate stimulus or not. In this case, one would probably recognize the danger and withdraw the finger from the hammer, and a reflex action would also operate automatically doing the same… The matter of perception means and effects will be developed in part 7 of the theory.*

Within a neighboring process, the relationship between sensory and motor neurons can be observed in a reflex action, or feedback (rapid motor response to a stimulus: a positive or negative retroaction). Reflexes are quick moves because they involve few neurons which is either somatic (resulting in contraction of skeletal muscle) or autonomic (activation of cardiac and smooth muscles). All reflex arcs have five basic elements: a receptor, sensory neurons, and the integration center (CNS), motor neurons, and effectors.

The stimulus response mechanism is a major survival metadynamics which systemicity is a sub-dynamic of an arc-reflex permanently submitted with neighboring objects, things and entities along with which they have variable links.

To be neighboring (verb) has therefore multiple definitions

> *"to have temporal exchange with nearby things, objects and entities, together with; "to be in the proximity (nearness) of something," is, in the chapters below, developed within specific neighborhoods - named ecosystems - where things, objects and entities interact, reproduce and recycle from being universally interrelated. The sense and quality of an interaction – its dynamic systemicity – induce to an adaptation of the actor's structure, metabolism[7] and behavior sustainability that together are working up for its temporal evolution".*

The development of the x-dynamics systemicity, the present theory is, in no-means, related to some present mathematical modeling of "Nature", or computed models since Nature is only observed as a physicochemical result that is temporally persistent, reproducing and at the same time partially lethal[8] or fatefully recycled: for example the collapse of a stellar system inducing to the birth of new "baby stars", the recycling of dead green plants or animals inducing to the emergence of evolving species entities...a recycling that sustains the perpetuation of most things as well as that of all entities permanently differentiating their form, their behaviors and languages.

However, life's natural facts scientifically described are based upon assumptions, experimentation and discoveries presently known up to 2015 as realities attested to physical, chemical, natural (biosphere components) and systemic measurement of scientifically observable forms. Altogether, it is the "universal art describing neighboring attitudes" during survival temporal period of objects, entities and things sustainability during which they are absorbing energetic resources and rejecting wastes. "Mathematics can, broadly speaking, be considered as the "research thinking of facts" and a "measurement tool" in the solution of a problem that is subdivided into the study of properties: forces, flux, quantity, structure, space, and change (i.e. arithmetic, algebra, geometry, analysis, computer thinking…) that support researches, and application mathematics of which methods are used in science of the livings, technological and industrial science, business, engineering science together with computer science (theoretical foundations of information and computation). Altogether, mathematics is an interdisciplinary tool and language.

NEIGHBORING DYNAMICS SYSTEMICITY

"Sustainability and Adaptability for Survival" is a Matter of "Strategical, Political and Social Systemicity"

In an ecosystem, local species individuals, including men, are confronted with satisfying survival needs according to their biological structure, their cultural communities' membership, their specific art how to manage their interdependence with their ecosystem components and neighbors, their behavioral interactivity towards endogenous and exogenous environmental events along their common or distinct food chains. Moreover, their survival is tied up to respecting «fundamental values for natural life" and to their Cultures and traditions that relies the known to the unknown and which, specific to each entity, group and species population, give them relevant aptitudes for local and global adaptations to sustainability and sociality. Permanently confronted with the components

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[7] - **Metabolism:** the set of life-sustaining chemical transformations within the cells of living organisms. These enzyme-catalyzed reactions allow organisms to grow and reproduce, maintain their structures, and respond to their environments (dual catabolism-anabolism).

[8] - **Nature:** in the broadest sense, is the natural, physical, or material world or universe, Life as included.

of their ecosystem, Planet Earth's physical areas and other terrestrial x-dynamics, they also have to cope with worldly climatic conditions.

Neighbors' Territorial Confrontation and Keen Relationship

Most interstate wars are fought for between neighbors or begin with, usually because of their territorial vicinity in view of increasing survival area resources and wealth, most of the time for prerogative wills and strategic reasons. The relationship between contiguity and war acts enlargement is recurrent. The major reason has been essentially considered as a trivial relationship, reflecting the opportunity for war acts rather than the reality underlying the cause of war which so often is imperialistic at least at a human thinking level.

Recent works on territoriality and their issues, over which wars are fought for, present a territorial explanation of relationships and juxtapose them with the explanation of their interaction proximity and collateral effects (John A. Vasquez, 1995). Territorial areas containing appropriate resources are being sustained because inhabitant behaviors are such they protect the availability of specific energy needs: a predator-prey's dynamic (fighting and struggling) becomes both an act and an end product, in other words, the final or resulting product of a survival behavior, or a process of growth which components are sub-dynamics of the species evolution that induce to circumscribing a sense of territorial defence.

The complex and global relational interdependency between all universal elements of the cosmos, the terrestrial natural matters and living species link their diversity into a world of closeness and factual neighboring niches. It yields them to getting aptitudes that induce to learning how managing their survival behaviors in order to acquire a compatible fitness. Survival necessities and neighboring quality surveys are some of the sustaining blocks of any entity life as coping with a permanent confrontation with predation and the lethality of the entropy pressure that would be lasting for a temporal period of time, usually until death time (a matter of inference by experience and relationship nature).

THE WORLD OF X-DYNAMICS SYSTEMICITY

A General Systemicity of Life's dynamics under Cosmic and Early Earth Conditions

Life arose within the limits of specific sets of flux, moves and forces issued from local physicochemical environments (ecosystems) integrating a common liquid medium (oceans) where circulating molecules were around forming relatively short RNA molecules, such as viroid-like particles, in some small virus shape, which is having a great predation accuracy and a prospective diversity at a capacity replicating.

The convergence of cosmo-planetary forces in the Sun system (thermodynamic pressure, energy, cosmic radiation, magnetism, gravitation...), the Earth-Moon accretion, their mass and orbiting and new terrestrial conditions (geologic, geo-chemical, geophysical, geo-climatic...) have been retroactively sustaining the Earth life within a "habitable zone". It yielded up the apparition of living systems finding out profitable neighborhood resources enabling a physical fitness to live together with specific biological components of which symbiosis induced to proper emergent conditions. Their meta-dynamic survival means (replication, biotope equilibrium, local ecosystems biodiversity, food chains, sustainable climate conditions, their reproduction behaviors...) have participated (and still are participating) with the complexity of such sustainability.

> *The "re-seeding" ability of things enables physicochemical, biological and psychological processes to feed cycles. Everywhere, the evolving mass of molecule replications together with the mass of objects, things and organisms provoke the enlargement of the energy mass, space, and of their building blocks that soon become limited, inducing proto-organisms to*

have neighboring behaviors turning into competition, wars that are bringing about x-dynamic synergetic heavy processes[9] : natural selection for survival as issued are favoring efficient molecules to be linking since having beneficial traits leading to a fruitful replication fitness.

Ernst Haeckel (1886) described what he calls a "friendly relationship" in the vast world, such as: - Cooperation - Mutualism - Mutual aid - Symbiosis by which the livings (fungi, plants and animals), act individually as well as collectively, and that is in a relative balanced neighboring built on predator attack, arrogance, the ill will or the breach of others' trust as well as some neighborliness (sometimes amity). These terms in scientific culture, indeed being both emotional or, from the other sides of reason, driven from intellectual feelings, are anthropomorphic expressions. Rummaging among such notions describing microscopic and macroscopic cosmic and biological features and moves as being the proof of reality are inducing to an undesirable anxiety as much as to provoking pathogen behaviors (environmental psycho-somatopsychism = a permanent brain-body-brain cycle supporting the interactive survival). Nonetheless, the qualification of "the good neighborhood of objects, things and entities" will refer to part of their behaviors fitness leading to a certain dynamic balance called that of "sustainability".

To Be Neighboring in the Universe and the Living World

The following chapters of this theory is approaching and developing a set of phenomena and their dynamics systemicity that results from the growing arborescence of the branching lines of living creatures. However, they account for features that are fundamentally the base of ancient and modern cultures issued from primary organism's aptitudes and are genealogically linked to their biographical and environmental history. Cultural features are induced to from organic, physiological and psychological way of life functions together with their natural structure, their evolution and the induction of neighboring population networks, the mix in genetic, social and economic exchanges as issued from world colonization effects.

On the tree of life, since the genetic and environmental characteristics of hominine tribes very slowly emerged (anthropoid), some branching resulted from behavioral adaptations temporally facing changing survival resource areas: local geophysical conditions, emergence of a natural landscape change and types of ecosystems induced to a necessary quest for new survival behaviors provoking bipedalism fitness as over viewing shelters, plants and preys around. Having basic common physiological reflexes, neighboring populations became progressively more creative from exchanging technological and linguistic means: permanently influenced by survival necessities, evolving syntax are tending to become more complex in terms of the "sense given to things" and the use of fire both appearing as strong drives to acquiring specific cultural lines.

Neighboring around, hominoids, within the diversity of savanna components and the effect of natural fires around, step by step developed new ways of life and means for survival. Wandering about the Earth, as nomads within geophysical and ecosystemic habitats, mankind groups in search for survival means and local women have scattered over the world (great discoveries in a progressing archeological science). In the beginning, along an immense period of neighboring time in the oceans, bacteria and viruses, through natural selection and adaptation, transformed into organisms. Life evolved out of a universal mix of chromosomes and genes of RNA/DNA, however, with a low genetic variability.

The symbiosis process of a set of x-dynamics systemicity and thus the adaptation to one or several variables within the physicochemical milieu conditions always goes together with its biological status and structure. The comprehensive reality of things is a succession of x-dynamic symbiotic

[9] - **Synergy**: combined effect as greater than the sum of their individual effects.

intricacies which result into retroactive features induced to form "cycles of phenomena confronted with a possible resistance to 1st and 2nd law of thermodynamics". Systemicity support differential survival means and periods of time that specific objects, things or species individuals' encounter while getting adapted with. Becoming a move of evolution until an end happens, everything is being recycled within the universal retroactive world of atoms, molecules, dusts (the molecule world) respectively getting back to possible accretions (e.g. molecules, baby stars, planets, organisms…)

The symbiotic results between some of the X-dynamics systemicity, their inducing to evolutionary architecture of living organisms' species took its part in the living population adaptation, an acceleration within processes sustaining "ecosystems metabolic networks and their upholding". It is shown that a positive synergy of survival in "a proper neighborhood", is favorable to energy exchanges and reproduction. Some call it "a positive environmental effect between the mineral and the biological milieus", inducing to "specific intervals" of survival temporally reproductive: phenomena occurring between the effects of reality confronted with opposite facts (ref. to the notion of "black or white" or "in-between in the nuance of grays").

The general law of the dynamic balance maintenance of milieus being neighborly with one another is well showing that a great variability of physicochemical phenomena (gravitational, climatic, electromagnetic, geophysics like aquatic ones…) impact the qualitative and quantitative nature of living species evolution particularly over their differentiation. It is not the least with worlds of minerals, cosmic, galactic, stellar, planetary and terrestrial objects which, confronted with very similar phenomena, are also showing how they take a large part in the general transformation of neighboring worlds and of their population. Being neighboring tidal spaces, phytoplankton and zooplankton came out of the water and formed *the complex and ineluctable destiny* of plankton plants, animals, fungi, insects, and men installation on Earth.

THE NEIGHBORING DYNAMICS BETWEEN PREDATORS AND PREYS

Predatorship and Allelopathy

The European Molecular Biology Laboratory, EMBL (2015) developed the action of "*Allelopathy" as involving the production and release of chemical substances by one species that inhibit the growth of another. Allelopathic substances range from acids to bases to simple organic compounds. All of them are known under the general term: secondary substances chemically produced by plants that seem to have no direct use in metabolism. A good example of a secondary substance is the antibiotic juglone which is secreted by Black Walnut (Juglans nigra) trees and known to inhibit the growth of shrubs, grasses, and herbs found growing near a Black Walnut tree. In the chaparral vegetation of California, certain species of shrubs, notably Salvia leucophylla (mint) and Artemisia californica (sagebrush) are known to produce allelopathic substances. Often these chemicals accumulate in the soil during the dry season reducing the germination and growth of grasses and herbs in an area up to 1 to 2 meters from the secreting plants. A neighboring predation act principle often observed on communities.*

Perspective of Allelopathy as a Neighboring Behavior

David A. Wardle et al., 1997, wrote: Allelopathy is an interference mechanism by which plants release chemicals which affect other plants; while it has often been proposed as a mechanism for influencing plant populations and communities. Its acceptance by ecologists has been limited because of methodological problems as well as difficulties of relating the results of bioassays used for testing allelopathy to vegetation patterns in the field. Here we argue that the concept of allelopathy is more appropriately applied at an ecosystem-level, rather than at traditional population/community levels of resolution. Firstly, we consider the wide-ranging effects of secondary metabolites (largely regarded as allelochemicals) on organisms and processes which

regulate ecosystem function, including herbivory, decomposition and nutrient mineralization. Secondly, it is apparent that plants with allelopathic potential against other organisms induce net changes in ecosystem properties, which may in turn impact upon the plant community in the longer term.

One, then, may illustrate these concepts using two contrasting examples of how invasive plant species with allelopathic potential may alter ecosystem properties through the production of secondary metabolites, i.e. Carduus nutans (nodding thistle) in New Zealand pastures and Empetrum hermaphroditum (crowberry) in Swedish boreal forests. In both cases the production of secondary metabolites by the invasive species induces important effects on other organisms and key processes, which help determine how the ecosystem functions and ultimately the structure of the plant community. These examples help demonstrate that the concept of allelopathy is most effectively applied at an ecosystem-level of resolution, rather than at the population one (i.e. plant to plant interference).

Neighbors confronted with emotional pleasure, danger and fear

Will Smith quotes: "Danger is very real. But fear is a choice." However, fear is an unpleasant emotion caused by the threat of danger, pain, or harm. Fear is a feeling induced to a perceived danger or threat that occurs in certain types of organisms, which causes a change in metabolic and organ functions and ultimately a change in behavior, such as fleeing, hiding or freezing from perceived traumatic events. Fear in human beings may occur in response to a specific stimulus occurring in the present, or in anticipation or expectation of a future threat perceived as a risk to body or life.

The fear response arises from the perception of danger heading towards a confrontation with or escape from/avoiding the threat (also known as the fight-or-flight response), which in extreme cases of fear (horror and terror) can be a freeze response or paralysis (ref. this theory, part 7).

Neighbors are either peaceful having differential but harmless behaviors towards each other's or they may turn out to get violently aggressive against each other's or one to others, the next being peaceful. Erupting out, such moves, percolating through the entity's mind and body, such violence or ire is surging out from specific interactions sometimes ending into lethal circumstantial acts. Deep inside the body's organ or brain, these moves of aggressiveness (ref. to climatic and variable social effects) raise interactions that are differentially perceived until the reaction of a strengthening level would induce to a domino effect, often ending into a butterfly inflating effect (ant conflicts, revolution…).

At a brain level, neural networks stitch together three structures (Jaak Panksepp, 1990):

- The *hypothalamus* that regulates the release of adrenalin and testosterone respectively related to motivation and emotion,

- The *periaqueductal* gray[10] that is coordinating incoming stimuli and outgoing motor responses,

- The *amygdala* which is associating with automatic emotional responses, especially fear lighting up in answer to an angry face, aggressive behavior or climate phenomena.

The result out of prejudicial behaviors like fear depends upon the subject posture level and of its ability how to cope with any possible and dangerous endogenous-exogenous events meanwhile assessing with the emotions of others. Motivations supporting those behaviors are much various according to the concerned kind of individual entity, object or thing related to behavior aptitudes to cope with an event. Inside the specificity of predator-prey cycles, motivations and targets are being

[10] - **Periaductal gray:** the primary control centre for descending pain modulations that has encephalin-producing cells that suppress pain.

distinctly observed and specifically classified or attributed to what is happening around (solo hunt, group rummaging and shoal of fishes getting after plankton…).

The world of interrelated predator-preys move and it's x-dynamics systemicity

Predator-prey systems are most of the time involved with multiple predators and multiple types of preys such as herbivore-plant interactions and predator-prey other animal species interactions, but parasites also play an important role in regulating populations of their hosts.

One must here remember that mankind, or other mammals, are built together with 90% viruses and bacteria, plus structuring cells. Under ideal circumstances and on a regular basis, an individual will choose high-quality nutriment items for surviving when encountered. These energetically preferred nutriments provide the most metabolic benefit with the fewest costs. Costs for an organism are usually requiring some handling time (e.g., time required to catch prey or remove a nut from its shell, and in the cosmic world time for a baby star to become a star) or also to deal with chemical surroundings, such as tannins or the reduction of the food item nutritional quality. When preferred foods or dynamic results are scarce, objects, things and organisms must switch to other alternatives which, though more or less-desirable, will fit as adapting for survival.

The point at which an organism would make such resource shift depends upon its relative abundance or of other "survival needs" along with the potential costs associated with the nutriments. Other factors such as the risk of exposure to predators while moving, eating or drinking is a reflex that is requiring *a permanent vigilance*.

While neighboring species move around, the hazard of their encounters and environmental event opportunities induce to those choices that are ruling natural selection and enhance adapted behaviors to a "game between strategies, tactics and chance to take". Moreover, survival perspectives depend upon the acquired fitness from one's genetic and historic origin, furthermore, from education and apprenticeship evolution. All living beings, then, really strain themselves maintaining their sustainability at adapting relevant interactions to their local ecosystem niche components and to their sub-elements.

Economic globalization is, in such vision, not procuring for a sustainable and adaptable metabolic current situation within local ecosystems and their sociosystems, since survival first depends on the local maintenance of things and resources (local environment, social living groups…) most of the time living away from a direct global entropy. In other words, things are submitted with the x-dynamic interrelated systemicity results from which "local ecosystems" are sustaining a balanced stability, first from their local current situation, together appreciating glocal and global events of the moment in view to complement their survival means.

Within an ecosystem, species are interacting at many network levels as being part of those complex dynamic meta-system forming interacting ecological communities. Animal and insects are predators and preys as well as plants and parasites, and are consequently and over time influencing small to bigger changes into their population sizes, neighboring area structures and into capacities to adapt and evolve.

Simple systems may undergo large, cyclical changes, but communities with more complex resource searching webs are likely to experience more subtle shifts in response to being fit with the permanency of changes in parasites weight, predation pressure, nutriments and herbivore rarity. However, one is considering humans to have severely impacted many ecological communities and areas by provoking slow extinction of predators or reducing the availability of their prey resources or other nutriments. The break of a link in the food chain may impact ecosystem chains as much as to mainly make them collapse away (domino and butterfly effect). Cosmic and terrestrial catastrophes play a similar role (e.g. the dinosaurs' extinction, -66 Mo/y ...).

The emergence of both an increasing power and/or the finance decadent holism[11] over populations is inducing to tragically dry survival needs as to much impoverish them. Burdened with lack of resources is straining people and environments, usually propagating the world over. The actual neighboring things situation (21st century around 2016) is showing why a global, glocal and local degradation of natural areas and of survival resources imperil plants, animals and humans. The unbalance of metabolism at any species level on our Planet Earth is a volatile phenomenon inside the perpetuation of a natural development of living creatures. It includes mankind social and socioeconomic needs that are increasing into the inherence of the global pressure, as well locally as globally, provoking a world decadence inducing to 70% of populations' precariousness and on the verge of a large impoverishment or indigence.

> *"It is impossible for 70% of the working age population to earn enough income to afford necessities, without taking on ever-increasing levels of debt, which they will never be able to pay back because there are not enough jobs that generate the necessary income to keep up with the cost of living" - David De Graw 2014.*

The Environmental Scale of Neighboring Objects, Things and Entities

Generally speaking, the set of meta/intra-median/dynamics systemicity (of retroactive variable and sometimes volatile effects) has "temporary median results" that sustain survival means within biological, physiological and psychological imbrications occurring at different metabolic sub-levels of a body. Consubstantial[12] (ref. atomicity and molecularity) and interrelated with galactic, stellar, planetary and terrestrial x-dynamics networks, the biological general principles of Life inducing specific "x-dynamics systemicity" results are participating in the whole of Earth's life, structuring the planet called "Gaia" by Lovelock. A "complex organism" of which ecosystem networks are so much imbricated that all their entities are functioning, renewing, reproducing and sustaining at specific tempo (kind of action or activity proper to a thing).

An object, entity, thing or element has its sustainability fitness for a certain period of time even though it is confronted with the lethality of thermodynamics 1 and/or 2 laws. Geographically speaking, survival forcefully depends on creatures' capacity to get protected and adapted to both physicochemical and biological factors and change within their endogenous-exogenous milieu events. Moves variability are modulating the metabolic survival conditions due to their supporting *filtering functions* and *protection outfits participating with* at necessarily sustainable behaviors:

- At *molecular clouds of gas, grains and dust level*, the interstellar medium has a density and size permitting the formation of molecules, most commonly hydrogen (H_2). Grains have an icy surface protecting molecular chemical bonds from stellar radiation providing a milieu on which a diversity of atoms and molecules congregate while interacting between in-and-out physicochemical levels.
- At a *comet level,* if the outskirt is mineral as a sort of rocky mass, it travels so fast at about 10,000 miles a minute that it *exudes part of is nexus body components* made of ice, molecules and mineral dusts (ref.: the Churyoumov comet exploration by the spatial Rosetta and the robot Philae, Nov. 2014)

[11] - **Holism:** the theory that whole entities, as fundamental components of reality, have an existence other than as the mere sum of their parts.

[12] - **Consubstantial:** regarded as the same in substance or essence.

- At the *planetary levels*, the Earth crust[13], its magma and nucleus, and its atmosphere, have "filtering functions", the Van Allen Belt (electromagnetism) and its magma forces (plates convection and volcanism) both play an immense role in the x-dynamics systemicity of terrestrial and climatic interconnected moves. "The Gaia planet" is sustaining long chains of volcanic protrusions mostly above sea level but also along the terrestrial plate's lines[14], permanently forming emerging lands along several directions and chain disasters such as earthquakes and tsunamis. The intra-extra stellar physicochemical fluxes and moves of molecules, as universal phenomena, induce to different types of weathering behaviors over the Earth that have an immense influence over nature's matters and living creatures survival.
- At the *biological level*, protocells, organisms and other evolved living creatures have a filtering membrane (or also a water-treatment plant) that is selectively permeable to ions and organic molecules, controlling the movement of proteins and other in and out cell or protein substances, therefore protecting the cell from negative influences of the milieu as much as sending signals and molecules composites.

By neighboring, cosmic entities, biological cells and other things are keen to attach to others or the extracellular matrix[15] and other entities which help their clustering together as to form systems, tissues and organisms. Three of the main laws as living together are behavioral security, social cohesion and civic neighboring balance (ref. to: animals and mankind's social neighboring such as gregarious or nomadic tribes or sedentary ones) and are at life first support for living creatures, to helping sustain and survive.

Dynamics Systemicity and Emergent Results Effects

Moreover, the symbiosis of x-dynamics systemicity amounts to anabolism effects - in other words to the use of energy to sustain or construct the components of objects, things (for example the birth of a baby star as well as that of cells such as proteins and nucleic acids, or psychosomatic effects…) as well as to catabolism effects (notion of entropy, decay and death). In biology, emergent properties (epigenetics…) which are the combination of individual atoms to form molecules, such as polypeptide chains, in turn possess behavioral properties folding and refolding to form proteins functions. Such reactions reshuffle the systemicity results of the structure of endogenous and exogenous survival means where feedback moves induce cycles to be close at reactivating. Assuming their systemic functional status (e.g. stem cells, enzymes for survival sustainability, hormones[16]) issued from a spatial conformation, proteins interact as achieving higher biological levels of survival functions in form of organelles …, cells …: inducing to the architecture of sustainable tissues, organs, organ systems (endocrine system…), organisms: they are all developing behavioral reflexes of protection (fight or fly, habit…) and survival means efficiency. Therefore, x-dynamics systemicity results, as structuring an entity (objects, individuals or things), is the synergetic and symbiotic convergence of such results towards temporal adaptation, reproduction and forcibly generating evolution traits.

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[13] - **Craton:** The term *craton* is used to distinguish the stable portion of the continental crust from regions that are more geologically active and unstable. Cratons can be described as shields, in which the basement rock crops out at the surface, and platforms, in which the basement is overlaid by sediments and sedimentary rock (lands).

[14] - **Tectonic plate:** Tectonic plates are pieces of Earth's crust and uppermost mantle, together referred to as the lithosphere.

[15] - **Matrix:** intercellular substance of a tissue, or by analogy, a social group.

[16] - **Hormones:** The endocrine system includes all of the glands of the body and the hormones produced by those glands. The glands are controlled directly by stimulation from the nervous system as well as by chemical receptors in the blood, and hormones produced by other glands. By regulating the functions of organs in the body, these glands help to maintain the body's homeostasis. Cellular metabolism, reproduction, sexual development, sugar and mineral homeostasis, heart rate, and digestion are among ... the many processes regulated by the actions of hormones.

Arising from individual genes replication, cascading phenotype reactions mutate as much as bringing about biological changes in a body or communities. Over the world, they form the biosphere and its ecosystems where living systems, e.g. plants, fungi, insects, animals and humans survive in their ways habiting, feeding, adapting, evolving and reproducing. Neighboring, they participate in becoming interactive entities, societies, and meta-societal[17] systems such as ecosystems (or architecting the global trade and stock-markets). Since being open systems, "if conditions are left random, the result of conditioning is also random" and the effect of the environmental metadynamics systemicity drives forth evolving and adaptive behaviors that induce to endo-exogenous positive or negative changes, ending with lethality but which atoms and molecules components recycle over. Evolution is a notion considering the "Darwinian natural selection move" as a driver, and is also, and more broadly, the result of the permanency of change variables in one or several directions together with one or another distance of things throughout a 4D milieu (space-time).

Among the metadynamics systemicity moves, some of its components are to be observed in a way their asymptotic systemic effects often become deviant or perverse. Domino effects indicate the multiplication of risks constituted with several events and behaviors present on the same site and tending to evolve, spread and settle well beyond the initial condition of its happening and appearance, even becoming highly dangerous if not lethal. The whole is then not the sum of its parts as the butterfly effect shows!

THE DOMINO EFFECT IS A RIPPLE EFFECT

The expression of "the domino effect" is used as a physical metaphor to represent the propagation by "contagion" (biomedical metaphor, symbiosis) of a local event or of an ideology. It refers to the concept of "coevolution" in ecology where a change on a specific level of nature can promote and facilitates cascading changes on other ones. The domino effect suggests that some change, even small, will cause a similar change to a nearby next object, entity or thing, which is then moved or influenced, will draw another similar change, and so on, in different sequences, by analogy to a falling row of dominos standing on one end.

One may estimate that the collapse of standing dominos has an expected propagation effect velocity which is being a function how they position in a particular environment and at which distance they specifically stand in between. Ecosystems, as much natural, geopolitical or financial structures are sensitive, to the "domino effect" inducing to a successive fall of a number of units standing in the file or network, a set of falling by so forth the way over. The World's history, year after year, pace by pace, is overwhelmed by fateful domino ends and chain disasters.

In such a process, there is another dynamic known as "the percolation effect", which as a neighboring effect (vicinity and systemicity) is perfectly similar to the dominos effect. Percolation theory (Dr. Kim Christensen, 2002) is the simplest model displaying a *phase transition*[18], synonymous with the Bethe lattice, a special lattice where each site has z *neighboring sites*, such that each branch gives rise to $z - 1$ other branches. A cluster is a group of nearest neighboring occupied sites. As having a dynamic systemicity similar to that being in a 3D branching tree graph or a set of networks, it is also found in natural evolution whereabouts or in genealogic trees.

The energy gained by dominos that collapse brings into play the moment a domino falls and the time colliding down with the next, the other dominos continuing to switch, each supporting the knocking tilt of the previous one, then on until the last standing in the line. One may estimate that

[17] - **Societal:** relating to the structure, organization, or functioning of society.

[18] - **Phase transition:** a change of state such as it occurs in the boiling or freezing of a liquid.

the collapse of standing dominos effect has a propagation velocity as being a function of how dominos are positioned within a particular distance, a specific environment and physicochemical moves around.

It is understood that dominos falling one after the other while remaining in contact with each other, the fall is a collective phenomenon of the entire set of dominos placed in presence, in other words, the collective collapse of entities under gravity pressure and neighboring position. Gravity is a driving force, and as long as we do not consider present dissipative forces, the earth never appears in the final result, because a factor of weight causes the movement and is a factor of inertia opposed to changes in speed, say, for example, the propagation of terrorist blasts over a close crowd and/or a population whereabouts.

The Expansion of the Butterfly Effect

Besides differentiated emergent results, the effect of amplification of a phenomenon may occur well beyond the place of its apparition then named a “butterfly effect”. In chaos theory, the butterfly effect is the sensitive dependence on some initial conditions in which a small change in the status of a deterministic nonlinear system can result into larger status differences. The behavior of a chaotic system usually shows such exponential growth of perturbations as say in nature, since small variations of the initial conditions may produce large variations in the long term, for example winds and oceanic force evolution or a population genetic drift or stress.

In parallel, “the butterfly effect” direction is generally producing the amplification of a phenomenon. The name of the effect, coined by Edward Lorenz, is derived from the metaphorical example of the details of a hurricane (exact time of the formation, exact path taken) being influenced by minor perturbations such as the flapping of a distant butterfly wings several weeks earlier. The butterfly effect or sensitive dependence on initial conditions is a dynamic property starting from various arbitrarily (close ones) as neighboring initial conditions on the attractor that induces to a noticeable inflation phenomenon.

As said, the energy gained by dominoes that collapse brings into play the moment a domino falls and the time it collides with the next, the other dominos continuing to switch, each supporting the knocking tilt of the previous one. The impact contains a sub effect called “threshold effect” that represents a transition phase that can be of an infinitesimal part of time.

The Metastability[19] scrambles the thermodynamic borders separating the solid, liquid and gas status. Beyond of a certain range of thermodynamic parameters, the phase considered becomes unstable and necessarily passes in another status through a transitory status.

The complex history of the Earth has proven successive statuses of an "evolutionary terrestrial body"; a history that illustrates the results of slow sequences of “fuzzy changes of phase” within ago-antagonistic dynamics (metabolism) that Cosmo-planetary x-dynamics systemicity engenders. These phenomena, perpetuating throughout the Earth's and Life's actual neighboring context, show that Earth's evolutionary living conditions and survival sustainability are "governed" within the systemicity of the cosmo-planetary and terrestrial sets of dynamic forces. The retroactivity sustains such moves far from equilibrium unless a major thermonuclear or earthquake catastrophe would both partially or entirely wipe out species but bacteria and viruses.

[19] - **Metastability:** The concept originates in the physics of first-order phase transitions later to acquire new meanings in the study of aggregated subatomic particles (in atomic nuclei or in atoms) or in molecules, macromolecules or clusters of atoms and molecules. Later on it was borrowed for the study of decision-making and information transmitting systems.

The General Threshold Effect of Phenomena Neighboring Moves

A change of status, as observed at the transition space from one status to another, is within a "threshold status" showing Nature as permanently confronted with critical point phenomena, such as cosmic, natural and species social selections, the case of a population having adaptive responses or inhibited developments, etc. They show that the threshold effect is typically sensitive to certain characteristics of individual and group behaviors while confronted to environmental changes (severe or mild) within specific contextual conditions (planet variability cycles, their neighboring mass interactions and sun evolution, biological group evolution, stem cell transformation, society configuration bust[20]…). A *phase transition critical point* is an important phenomenon that permanently participates in a major primordial manner to form and make gas evolve (e.g. transitions between solid, liquid and gaseous states of matter).

In some other domains, e.g. life and its species, their societies when adapting their behaviors from sometimes deep changes in life forms, ecosystems, and civilizations while coevolving from symbiotic flux steps. Transition forms also affect, sometimes dramatically, molecular patterns of gene activity within cells, behavioral patterns of collective exploration or change in any system's organization or dynamics.

Part of atmospheric gases, oceanic volcanism and other physicochemical contextual milieus were and are at the origin of cells apparitions and renewal (ref. Achaean, cyanobacteria or blue algae and presently evolving cells), from where they emerge, confronted with the terrestrial x-dynamics systemicity which are themselves interrelated with the cosmic universal X-dynamics forces of which own systemicity is permanent.

Coevolution from Each Other's Neighboring Influence

Coevolution, a matter of neighboring influence, takes different aspects of dualism, as often ago-antagonistic sides between living species that show evolving branchy directions issued from their reciprocal influences at interacting. For example, the keystone of survival is in the predator-prey dynamic issue, or host-parasite and symbiosis between two species or association issues of several species: as being systemic phenomena, they are much more significant with "survival principles" mostly common of all living species.

The biology of evolution science induces to observe these dual forms and the importance of coevolution in the history of species and sexual conflicts. Some biologists, such as Thierry Lode and Richard D. Alexander, 1990, describe the effects of these antagonistic interactions, particularly at sexual levels and evolution of characters leading to an antagonistic coevolution of individual entities (apparition of disputes, wars or keen respect, affection, love, empathy and sociality). In other terms, animals, insects and even plants possess some proto-neuronal proteins or neuronal faculties' equivalent to some of human ones such as, *for examples, these governing fear and empathy.*

SURVIVAL AND NEIGHBORLINESS EVENTS

Peaceful Neighboring and Sociality

In a given ecosystem, number of matters, objects and living species get mixed with. The balanced equilibrium of their behavioral vicinity or proximity, endlessly forming and breaking apart, fits in accordance with the coherence of their compatibility as well as with time and climate that pass by.

Beside the universal predatory-prey cycle effects (fusion of galaxies, stars fusion; oceanic predation as well as terrestrial and economic cycles…), a lethal exit is temporarily postponed by the presence

[20] - **Bust:** A process of economic expansion and contraction that occurs repeatedly.

of a specific distance between antagonists (such distance as caused by escape, a strategy of avoidance and/or the effect of gravity). The exit might also be the cause of a physical "fight" or a chemical, biological, psychological or emotional cultural status which systemic result prolongs one's survival for some time since neighboring effects are positive.

Within the vegetal, animal and mankind's population behavior, predation is often interpreted as "a wild cruelty and warmongering" even though it only stands at searching for energy resources intended to the maintenance of predators' survival as satisfying food needs, social predominance and control of their reproduction necessities. However, during species life, neighboring in a given ecosystem, the search time for a "lifestyle at organic-energy ends" is supplemented by sleep and the neutral relationship between individuals of the same species as well as with neighborly species met on the way but not sighted as prey.

> *"To bind amity [21]with unknown ones" is a primary mode of survival adopted by those considering it is "an indirect predation danger" or "a manipulation of some other's mind".*

The Origin of Amity and Friendship

The sense and feeling of amity, friendship, and empathy surged out in the early age of the Australopithecus time, when plants, animal, insects and fungi evolved at having solicitude concerns while evolving from a less capacity surviving alone or in too restricted a family circle as much as out of the number of interactions between massively increasing populations beginning to scatter with. The development of these naturally dispersing groups as the progressive creation of social groups often comes from the fact "singles" separate in search of females to form new social groups installing within sufficiency zones. Along time, the specific colonization of living species over geographic ecosystem areas weighed down over the differentiation of relational nature with the others. Indeed, it specifically became a matter of adapting and compose with others (benevolence with others) rather than too often kill one another; insofar some others were and are not anymore regarded as preys to attack but only as a survival support (a lamprey is parasitic, sucking the blood of other fishes[22]) and/or an outlet for some of one's feelings or sexual and/or societal inclinations.

Aside natural selection and genetic mutations, cooperation and collaboration drive other phenomena of evolution factors fitting survival resources. Survival involvement in communities are numerous and are as well reducing predator menaces while questing for resources and protecting the juveniles. On another hand, safety becomes a manner defending oneself when one invented specific weapons for self-defence or hunting while others physically fought or more peacefully used mental manipulation traits.

The End Dynamic of Creativity

The capacity to perceive the other's intention or to present oneself benevolent if not as a friendly neighbor is part of the risks in "the art to be mixed with and appreciate each other's". An ability that often implicates in taking risks inherent with a specific evaluation of others and some close to them. In other terms, one give another kind of meaning to understanding the social world having a personal perception, interpretation and retroaction of things.

A better conscience at satisfying survival means, resulting from diversified behaviors towards others, comes from finding inspiration resources in one's psychics, in empathy towards the other and within maternal love. The human capacity to perceive the intentions of others, to be friendly,

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[21] - **Amity:** friendly, peaceful relations - the term connotes a relationship which involves mutual knowledge, esteem, affection, and respect along with a degree of rendering service to friends or neighbors in times of need or crisis.

[22] - The remoras: a commensal arrangement as the remora can move around on the host, removing ectoparasites and loose flakes of skin, and feeding on discarded food fragments and feces, while benefiting from the protection provided by the host, the constant flow of water across its gills, and the effortless supply of food.

and to take a chance to be open towards foreigners, is supplemented by the progressive occurrence of cultural codes. Resulting from the psychosocial mobility of dynamics dominate-dominated, the faculty of using codes is very frequent in the animal world, but obviously at a less degree than that of humans who have and are adding various designs at many levels of creativity. The results of creativity have a direct social influence over the means of communication by mimics, gesture, onomatopoeia and language of which richness is significant with the more or less small isolation of animal groups, mankind included.

Isolation comes from a constraint as much geographical (nature of territory, cataclysms,…) as well as social (overpopulation, war,…) but some "friendship feelings" may remain distinguished over time, in the sense that even in the long distance of an environment and with the use of local "patois" as common language, both the relationship with these "distant ones" stands as relatively steady particularly from sound emissions and odor sniffing. In neurobiology, it is observed that specific perception areas with bilateral modality in superior and inferior temporal cortices produce respectively salient features from vocal-auditory and gestural-visual stimuli. However, both classes of stimuli activate a brain common, left-lateralled network of inferior frontal and posterior temporal regions in which symbolic gestures and spoken words may be mapped onto common, corresponding conceptual representations.

In a more general manner, the relations between individuals, groups of the same "clan", of the same obedience are not only economic or strategic but also a necessity to meeting the other since the living creatures have to be neighboring the others' for group integration and reproduction (bacteria, viruses, cells, organisms and other animals, mankind included).

Animal Friendship in the Wild

The evolutionary origins of human friendship is observed in many group-living mammals. In horses, elephants, hyenas, dolphins, monkeys, and chimpanzees, evolution has favored motivations to form close, enduring social bonds either among females, among males, or between males and females. The neighborliness and amity are adaptive in different ways for males and females. Among males, allies have superior competitive ability, higher dominance rank, and improved reproductive success. Among females, individuals with the strongest, most enduring social bonds, experience less stress, higher infant survival, and live longer.

Friendships are striking because they often involve cooperative interactions that are widely separated in time. One male chimpanzee supports another in a coalition, three days later his partner offers him meat, and over many months after, the two behaviors are highly correlated. Enduring friendships are thus built, at least in part, on the memory of past interactions and emotions associated with them. Friendship is also found among animals of higher intelligence, such as higher mammals and some birds. Cross-species friendships are common between humans and domestic animals as well as cross-species friendships that also occur between two non-human animals, such as dogs and cats.

A study of neighboring conducted by Krista McLennan (2008) described friendship in cows by measuring the heart rates of cattle on three separate occasions to determine their stress levels. In the first trial, the cows were isolated from the rest of their herd. The second trial penned (in an enclosure) the animal with another cow that was familiar with. Finally, the third trial put two random cows together. Her research showed that the cows were much more stressed when alone or with an unfamiliar cow than when they were with one of their friends. This supports the idea that cows are social animals, capable of forming close bonds with each other's and it is suggested that if farmers group friends together, it could benefit the cows by reducing their stress, improving their overall health and even producing a greater milk yield.

Friendship Is a Mutual Emotion

Friendship is a relationship of mutual affection between two or more individuals and a stronger form of interpersonal bonds than it is of an association. Friendship has been studied in academic fields such as living science, sociology, social psychology, anthropology, and philosophy. Various academic theories of friendship have been proposed, including social exchange theory, equity theory, relational dialectics, and attachment styles. Individuals with close friendships are happier. Although there are many forms of friendship, some of which may vary from place to place, as raised according to the diversity of emotional feelings and characterizing many types of them.

Such characteristics include affection, sympathy, empathy, honesty, mutual altruism, understanding and compassion, enjoyment of each other's company, trust, and the ability to be oneself, express one's feelings, and make mistakes without fear of judgment from the friend. Since there is no practical limit on what types of people can form a friendship, friends tend to share common backgrounds, occupations, or interests, and have similar demographics.

Interpersonal relationships are dynamic systems that change continuously during their processing along. Every living organisms' relationship has a beginning, a lifespan, a space, an end and tend to grow and improve gradually while creatures get to know each other and become closer. Otherwise they gradually deteriorate if drifting apart, move on differently though neighboring, then forming new relationships with others.

ECOSYSTEMS ARE WORLDS OF NEIGHBORING

An ecosystem is a community of matter and organisms which, interacting with *other environmental phenomena (sun entropy, atmosphere moves, other ecosystems move in the vicinity…)* exchange energy, therefore symbiotic moves participating in system-level processes to emerge, evolve, reproduce and die. The cycling of elements, the cycle of stellar structures, water moves, rock formations, biological entities… also combine with cycle objects, things and living species generation. Sir Arthur George Tansley, describing ecosystems, said that natural systems are in "constant interchange" between living and non-living parts (innate matter). All ecosystems exhibit a constant exchange of matter and energy between the *biotic* and *abiotic* community. Their components are so well interconnected that a change in any one of them will cause subsequent changes throughout the system, sometimes completely ruining it (ref. butterfly effect, universal evolution of a stellar system…).

At a terrestrial level, in an ecosystem, even minute changes in any one of its factors may influence whether or not a particular plant or animal species and bring successful disposition in its environment. Ecosystems' population size and local distribution in an ecosystem may also be affected, either directly or indirectly, because of the way species interact with one another. It also happens within galaxies.

An ecosystem is a specific 3D entity at the level of a neighboring area within spatial milieus (core concept in Biology and Ecology), forming a portal of bio-physiochemical sets of matters, molecules and organisms. Its components as species entities have structures, communities, organizations and interactions (*climatic cycles, predator-prey cycles, reproduction cycles, or simple neighboring at search with common food and water resources* ...) that offer reciprocal surviving means.

Ecological Systems Are Considered as Complex Neighboring Systems

Considered as complex, ecological systems are, indeed, composed of large numbers of species interacting in many ecosystems, sometimes being grouped into clusters[23] as from T. Allen and T.B. Starr (1982).

An ecosystem's population is a neighboring set of livings, which surrounded with minerals, are to be divided into sub-populations corresponding to ages, activities, and phenotypes as ill or safe individuals capable of predation. These individuals are having many activities all day long such as searching for food resources, feeding the juveniles, rest and so on surviving. Furthermore, these individuals move, meet and interact in a fluctuating environment where interactions between 10 species, with 5-age classes and 20 activities, would amount to structure 1000 ordinary differential equations which is a *large-scale system, or a population system with many degrees of freedom and parameters.* The dynamics of ecological systems are consisting of a set of processes that, at each level, are individual systems and sets of ecosystem ones forming symbiotic, temporal and global sets of retroactive effects.

Neighboring Mechanisms between Objects, Entities, Things and Matter

Within the *biosphere* (the planet Earth), there are immensely large categories of living communities known as *biomes* that are usually *characterized by their dominant vegetation key bricks of the living* (grasslands, tropical forests, or deserts) *where fungi, animals and insects cohabit and coevolve surviving*. At levels below, the biomes are in turn made up of much smaller ecosystems that can be seen down with a powerful microscope zoom (e.g. underneath a rotting tree trunk, inside an earth plot or underneath some rock on a beach keeping a small water pool in between tides or under light ground or sandy areas as well as aerial zones). While the livings or biotic parts of an ecosystem, such as plants, animals, insects and bacteria are known as communities, their physical surroundings, or abiotic components, such as minerals found in the soil, are known as environmental milieus serving of habitat (that of bacteria, amebae, worms, small mammals, algae, plants…).

- **The biomes** are essentially regional and local ecosystems that offer biological communities to the dominant vegetation, climate, geographic location, and other terrestrial characteristics of the earth that suit their x-dynamics survival requirements. Characteristics of the physical environment such as precipitation, temperature, and water depth, have a strong influence on the traits of species living status in such natural environments.
- **The biosphere** is the biggest of all possible terrestrial and oceanic ecosystems; it is the planet's entire environment sustaining the livings and also the biological component of earth systems, which include the lithosphere, the hydrosphere, the atmosphere and other "spheres" (e.g. cryosphere, anthroposphere[24], etc.). Since the biosphere includes all living organisms on Earth, interacting with matter, molecules and the dead organic matter produced by them, one must admit the Lovelock concept of the Earth as an open system he named "Gaia" as quite a sensible and essential perception of nature.

Ecosystems include living organisms intrinsically tied up with inert organic matters produced by them, an abiotic environment within which the living organisms exchange innate elements (soils,

[23] **- Clusters:** "group of independent entities (usually in close proximity to one another) interconnected through a dedicated network to work as one centralized data processing resources. Clusters are capable of performing multiple complex instructions by distributing workload across all connected servers. Clustering improves the system's availability to users, its aggregate performance, and overall tolerance to faults and component failures".

[24] —The **anthroposphere:** is that part of the environment that is made or modified by mankind, for use in human activities.

water, and atmosphere) that give specificity to Earth as being a Gaia system. In physicochemical fluxes and moves of structured objects, entities and things represent the interface between their specific behaviors as surviving. Ecosystems embody the concept that living organisms continually interacting within a world of environmental matter, most cycle fluxes and moves produce complex machinery acquiring emergent properties, in such a way that evolving, they suggest and show "the whole is greater than the sum of its parts" and where everything is universally interconnecting.

Societies (or groups, ethnic communities, families, or tribes…), are living entities which, within some ecosystems, are living together, finding and developing security and survival means for the sustainability of their life. An "ethnic community" (a tribe) defines a group of individuals which common ancestry and language are sharing a cultural history and an identifiable territory providing survival means (physicochemical forces and flux effects, vegetal food, games, water…). The Dunbar number shows that for a group to sustain itself at the size of 150 units require significantly more effort to spend in socializing as necessary to keep the group functioning. It has been said a 60 individuals is an average over which some individuals (for ex.: males) separate out founding a new group at a new survival means distance. Except ants!

Ecology and the Universal Interrelationship of Objects

As said before, ecology is the science of interrelationships between individuals, their species and other inert cosmic, physicochemical, geographical and biological components of an environment as formed of all the universal worlds' entities of 4D dimensions (space, climatic, stellar, planetary, terrestrial, temporal…). Dynamic interrelations result from the symbiosis of phenomena that induce to a provisional balanced metabolic status issued from anabolism and catabolism move. In other words, the systemicity of the X-dynamic world as inducing the universe of physicochemical and biological entities to become positive and/or negative, leads or not to an evolutionary conservation of species entities (from atoms to viruses and bacteria). Sustaining standards of one or the other species to a temporal survival status thanks to a positive metabolic capacity as managing intro and interspecific survival functions *is the pillar of life's vitality*.

In other terms and in its most general sense, "survival" is the universal positive result of temporal metabolism that, issued from any of x-dynamic systemicity fluxes and moves symbiosis, cope with antagonistic effects, therefore positive and negative, but are finally dominated by the thermodynamic effect of the first lethal or second sustaining laws. Which naturalness, such as that of physicochemical communities' assembly or socio-psychological ones, at any living beings levels, does induce and structure to a fighting strategy as well as to some tactics sustaining a light or heavy opposition? Such environmental status, along with a balanced neighborhood relationship (more or less neutral!), therefore that of a specific societal milieu determination refers to predators—prey cycles that are permanently ruling the "whole of things within the whole of the globe".

However, the "predator—prey cycle" reigning" at a universal level, does sustain the permanence of variable effects between "the good and evil, its opposite". The position "in between nuances of the grey" (a cursor positioning in an area) illustrates that dualism is a philosophical reality referring to the predator-prey cycle as the pillar of the universe survival in terms of the entropy temporal scale variability. In one sense or the other, the "in-between phenomenon", a universal necessity as said "temporally existing", maybe both near or close, in any vicinity, with a status sustaining "the survival of a specific neighborhood" (a specific ecosystem, a specific object, entity or thing and/or community of them).

The sense given to the effective energy of things, if thwarted by the law of its opposite shows only the contribution of positive energy intervening, usually ensuring dynamic forces to stay positive if not reversing, or at least slowing down. The lethal side of an object or individual not supporting the factors of its survival will, on the basis of an adaptive reactivity, keep up surviving from interior

and external survival conditions. Considering this at living species levels, one observes a certain number of these opposites such as:
—Political combats,
—Politico-economic wars, local and international ones,
—Identity Fights and social and economic competitions,
—Individual, social and economic competition or wars,
—Disputes of all kinds,
—Peace of all kinds,
—etc.

Territorial environment statuses are very and too often baited, even wild if not cruel. Why the fully straining and possibly lethal pressure over objects, entities and things, while neighboring, therefore interacting, are emerging with dissension behaviors? Is it a matter of domineer- dominated and of a predator or prey status? Often both statuses.

The Development of the 6th Part of this Theory and "to be Neighboring."

In the subsequent paragraphs of this theory, we will not develop a sound and detailed scientific encyclopaedic matter as assembling inventories of the whole set of scientific demonstrations stating the universal realities of all the X-dynamics: those governing the "survival" or deadening cosmic, terrestrial or living symbiotic moves and fluxes and interactions are referring to their effects.

From the flux of subatomic up to proto-organism temporal survival of species, one must be assuming that the immense and incommensurable universe of interconnected bodies, entities and species worlds has sustainability and lethality that no laboratory will ever demonstrate as the true reality of the universe at a universal time (t).

Let's algorithms and partially scientific realities sustain our confidence that the Universe is a whole that is made of totally interrelated components of which the evolving temporal survival out of the huge thermodynamic blast is a world of interacting remnants self-feeding new objects and entities (atoms, molecules, matter, dusts…baby stars…) well adapting to their milieu, replicating, evolving, dying and recycling. As well, mankind is submitted to the same global evolving phenomenon. In terms of adapting epiphenomena to universal survival necessities, conditioned with the structuring of biological molecular specificities, life has happened, in other words "has hatched", adapt and evolve while being temporally sustaining!

The x-dynamic components of such symbiotic processes systemicity are to drive the intrinsic life's sustainability of every ecosystem whatever level it is observed from. Since stellar and terrestrial systems and others are relying upon well-balanced metabolism, neighborliness and predation, fights or wars within cosmic or natural biological proper vicinity, it is well known some species population behaviors are structured alike with civility, sociability and neutrality postures, which object, thing and living components are categorized according to the diversity of their specificity.

In the "Systemicity Theory", we will not develop the exhaustive inventory of the incommensurable mille-feuille complexity of x-dynamics symbiosis levels whatever big would be a network of data centres at disposal since they support not only the structure and the temporal survival of the physicochemical universe but also that of living species's biological world both subject to the noxious effects of the 1 and 2 thermodynamic laws. On the other hand, we find essential to describe, in systemic terms, the statuses that justify characterized adaptation and evolution of objects, things and entities. They strew temporal and universal space, as well as how the world of the immaterial, material objects, matters or living species populations temporally but for short or long periods of time, as fitting together with the x-dynamics convergence of universal symbiotic effects within some sort of a universal metabolism (physicochemical and biological reactivity).

LIFE BEFORE THE RNA WORLD

Neighboring Genes in the World of the Primary RNA[25]

The first living organisms consisted primarily of ribonucleic acids (RNA as amino acids components) which are still supporting the genetic code and molecular machinery necessary to species's replication, adaptation and evolution mechanisms. H. Mutschler et al. (2015) shows that RNA is capable of self-replication under the known conditions of life only whether one considers its emergence as issued from non-living matter and that of the abiogenesis process (ref. to part 4 of the theory). All organisms in a phylum[26] should be clearly and more closely related to one another than to any other group, since their neighboring for survival needs a lot of induction as to provoke the morphogenesis and self-forming of their genetic characteristics and composition. Group capabilities are based on the general specialization of all entities structurally built and behaviorally formed according to a universal and/or natural body plan (a fish and its shoal, mussels of rock…).

Symbiogenesis or Endosymbiosis Neighboring Dynamics

Symbiogenesis is an evolutionary process participating with the origin of eukaryotic cells from prokaryotes[27]. It states that several key neighboring organelles of eukaryotes (cells with RNA/DNA nuclei) originated from a *symbiosis* between separate single-celled organisms. According to such process, around 1.5 billion years ago, mitochondria, plastids like chloroplasts, and possibly other organelles representing formerly free-living bacteria, were driven inside other cells, a process named *endosymbiont* as assuming one or another function (mitochondria for energy processing, …) within.

Molecular and biochemical evidence suggests that mitochondria developed from proteobacteria (e.g. the Rickettsiales[28], saying bacteria are "obligate parasites" as they need their *green plant hosts* to ensure their survival or to live in vertebrates or in arthropods). Furthermore, chloroplasts from cyanobacteria, in a particular way are nitrogen-fixing filaments (RNA) that participate in the temporal separation of oxygen-evolving photosynthesis and oxygen-sensitive dinitrogen fixation.

Indeed, the prebiotic chemistry showed that the formation of RNA bits induced to some nucleotides to form; but not having a replication function, they benefited from room temperature traits participating to some of RNA bits to lengthen (ref. epigenetics). Their being neighboring within the components of their milieu was indeed an opportunity to develop new fitting functions and evolution means. Microorganisms include not only bacteria but also fungi, archaea but there is a true symbiotic relationship where both bacteria and organs (colon...) depend on each other and promote each other's health.

At low temperature, short RNA pairs do form stable intermolecular complexes in allowing the creation of longer bits (ref. necklace of beads form). The rise in room temperature causes the dispersion of these bits, thus make them available for a forthcoming cycle. In the world of RNA, the neighboring of billions of self-replicating nucleotides shaped up the ecosystems' biodiversity and produced billions of specific communities by way of their multiple symbiotic metadynamics systemicity power.

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[25] - **Primary RNA:** RNA is used for a range of other things including as a message to convert DNA to protein, to function as enzymes (ribozymes) etc.

[26] - **Phylum:** a major taxonomic division of living organisms that contain one or more classes. An example is the phylum Arthropoda (insects, crustaceans, arachnids, etc., and myriapods)

[27] - P**rokaryote:** a single-celled organism that lacks a membrane-bound nucleus, mitochondria, or any other membrane-bound organelle.

[28] - **Genome phylogenies:** indicate a meaningful alpha-proteobacteria phylogeny and support a grouping of mitochondria with the Rickettsiales (Fitzpatrick et al., 2006).

While neighboring, virus-bacteria communities become more and more complex, which induce to structuring bits of increasingly functional RNA/DNA means, then to increasingly structure functional living entities, successively acquiring new manners how to survive, adapting to their milieu as well as evolving up to new species entities. Nitrogen is one key driver that occurs naturally in the environment in various forms, including inorganic species, such as ammonium (NH4+), nitrate (NO3-), nitrite (NO2-), nitrogen gas (N2) and organic forms such as amino acids, proteins, DNA and RNA. Their metadynamics changing process changes induce to being consequent. Their symbiotic systemicity together with step-by-step interactivity and synergetic[29] feedback is the cycling key process that built Life to have happened.

Microbes, such as bacteria, are the primary mediators of nitrogen transformations, converting inorganic nitrogen into a variety of other inorganic or organic species. A wide variety of bacteria and some Archaea are also responsible for converting nitrogen gas, which is unavailable to all other forms of life, to ammonium, which can support growth by most living organisms, a process called nitrogen fixation. Bacteria may remove inorganic nitrogen from the environment by denitrification or transform nitrogen into bacterial products, which are less available to other living organisms, and which may accumulate in the ecosystem. Primary producers also convert inorganic nitrogen into organic matter: both biological and physical processes which availability can affect the rate of key ecosystem processes, including primary production and decomposition.

Such structuring processes are much consequent in their logic as being opening up the way for these prebiotic living creatures to progressively acquire capacities to develop performing functions and diversify their fitness types. Then, they get enabled to cope with surviving due to the development of their interactions means and power strength while they get confronted with other species, environmental components and milieu conditions changes (air, soil, temperature…) particularly when their research behaviors are oriented towards local terrain food resource components and individuals for reproduction. The structuring processes yield open species genealogies (in the 3D bushy tree of life) as adapting to timely circumstances, evolved and abounded in, in billions of viruses, bacteria and other evolved species such as plankton, algae, fungi, plants, insects, terrestrial and aquatic animal way up to the mankind development. It required plankton to develop their interacting "curiosity" from testing energetic resources out the water, over the fringe of tidal areas. *That was the era of "the livings coming out of the water"!*

THE WORLD OF NEIGHBORING BACTERIA AND VIRUSES

Neighboring Behavior among Archaea and Bacteria

Achaea and Bacteria form communities that were and are coping with interactions much like any individual that is being neighboring with as:

1. C*ommunicating* with each other's, resenting a force, a flux and a pressure, also sometimes a peaceful neighboring or amity.
2. *Growing* out of communicating and cooperating ways.
3. *Competing, sometimes beginning attacks*, when at a reach of survival needs and/or when requiring a community *quorum*.
4. *Living on Earth, they already* became holding descendants, some billions of years before humanity,
5. *Teaching, learning and using* its bacterial mechanisms as evolving up to actual survival fitness for a realistic life.

[29] - **Synergetic** is the empirical study of systems in transformation, with an emphasis on total system behavior unpredicted by the behavior of any isolated components, including humanity's role as both participant and observer.

Individual microbes react individually to a hostile environment in the context of other microbes neighborhood and their mutual interactions often result as producing an integrating collective behavior (population crowd, shoal of fish … or ant communities) The human body, shaped up with 80% of viruses and bacteria, is built with structures and organs similar with these of any other species. It integrates some general survival process principles that induce to symbiotic aggregate results in a close synergy with the whole microbial community of the milieu. Thus, while individual bacteria interactions occur at a nano-scale size range, bacterial communities are shaped up out of local or global biological move and flux networks.

Together with, they are being influenced by cosmic fluxes and moves, atmosphere and landscape environmental structure beginning with nano-scale sizes up with bigger ones (micro, meta and mega sizes), producing collective behaviors at any scale as well (e.g.: social moves, population growth…)

Temporally, the type and size extent of microbe-microbe and microbe-host nutritional interactions will determine the metabolism quality of the entire community in a given environment. In the same way, the Earth became a planet from the accretion of bits and pieces of rocks and comets interacting from the issue of a permanent feedback of systemic exchanges of forces and fluxes from the gravitation results of matters and objects. It also became livable since the moon, a "child from Earth" of a certain gravitational mass, orbited around it, balancing their rotation thus their specific metabolism.

The bacterium *Desulfovibrio vulgaris Hildenborough* functions are part of a two-components signaling pathways, each one of them being specific to one growth direction choice fitting with a viable fate. Once a temporal target has been attained, the type of interactions, their topology relationships, their constraints and the physical means to establish them, determine a metabolic strategy (Rajeev et al. (2014). Nutrient sharing and electron exchange cycles are being transferred among microbes and microbial communities talking together … for example to plants (next paragraph about "plants talking"): they cooperatively gather enough energy since no single species can catalyze by itself its metabolism variability from just its chemical reactions moves without any milieu influence. Two types of electron transfer between microorganisms are today recognized as the transfer of chemical intermediate in redox reactions[30] and direct electron transfer, i.e. the type of molecules confronted with.

Microbes Communities and Neighboring Effects

Microbe behaviors are to form communities, their *networks, therefore their organisms,* affect other microbes at a much surprising distance in terms of physical neighboring means. In a natural sulfide marsh (Sippenauer Moor, Bavaria, Germany), a dominant bacteria *SM1 Euryarchaeon* uses thin appendages (a projecting part of an animal or plant body acting as a rod or a harpoon*) to connect to other cells of same species forming a network* in which each cell has an average of six connections, but also connects to cells of other species. Quite a similar "networking principle" that architecture neuron as communicating within the brain.

In fact, archaea cells appear to connect to bacteria, establishing an interaction across two kingdoms of life (Perras et al., 2014)). Microbes are under evolutionary pressure in order to improve on their environmental fitness; bacteriophages need to dynamically adapt to alter some gene expression at their own survival. Microbes in turn can use part of the bacteriophages machinery as part of their tool box to compete with other microbes. Both bacteria and archaea have different Ribosomal RNAs (rRNA) but archaea have three RNA polymerases like eukaryotes while bacteria have only

[30] - **Redox reaction:** Like acid base reactions, redox reactions are a matched set: you don't have an oxidation reaction without a reduction reaction happening at the same time. Oxidation refers to the loss of electrons, while reduction refers to the gain of electrons. It is a matter of metabolism balance.

one metabolic systemicity result for adaptive and evolving functions. Ludovica Montanucci et al., 2010, said, “Topology does shape the evolution of genes and that the connectivity within metabolic pathways and networks plays a major role in constraining evolutionary rates”.

Cells, evolving, elaborate mechanisms to scavenge for sufficient mineral atoms and biomolecules in order to meet their survival needs and adjust matching energetic supplies. *Metal sensors, transporters and storing spots* have often been discovered as metal-resistance determinants like aluminum that is now medically used as a component with antibiotic medical posology.

Bacteria “Talk” Together and Physically Sense Each Other’s

Bacteria can talk to each other’s via molecules they themselves produce whatever the species is, a function that occurs within species bowels. The mechanism is called “quorum sensing” (QS), and is important when an infection propagates in the body of all living species. If a signal molecule is detected and persisting, more bacteria gather around the site of attack, for example around a wound. Having reached a sufficient population as acting, they behave like multicellular organisms having as much of a willing strength as to survive. Collectively, the bacterial population, besides regulating their social behaviors, offering density-dependent fitness advantages, is expressing virulence factors and biofilm filters (the in/out filtering frontier and its receptors/reactors: a cell’s membrane multifunction) as a will-strength development in all bacteria (ref. to the predator-prey principle). This collectivity also plays a crucial role in eukaryotic host cells to behave for survival since they are regulating various vital functions both antibiotics and body's immune defense systems (refer to the use of minerals as to help the nerve/muscle process as capable of sustaining a skeleton).

Parallel, they progressively become more aggressive and increase their mobility (or motility): they support changes, since triggered when specific molecules - short fatty acids (named AHL) - fasten to receptors inside the bacterial cells as inducing various genes to get turned on and off.

While proteins bind the signal AHL, physical contact (close neighboring) between bacteria and epithelial cells, they show the influence that can be driven at a variable distance": Vikström et al. show that "The protein (designated IQGAP) can both “*listen to bacteria signal*s” and “*change a function within its host cells*”, dialoguing as the recipient of bacteria language,"

The signal AHL can loiter (to be neighboring) freely about the cell’s membrane, not just in simple bacterial cell survival but also within human’s cell populations (skeleton, organs), supporting their structure as well as bio-physicochemical influence that may change their functions. In low concentrations, white blood cells, for example, can be more flexible and effective, but in high concentrations the opposite neighboring might also occurs weakening immune defenses and open a door for progressive infections and inflammations that might be originated with some mineral deficiencies (calcium one…).

In human or animal social groups, to be neighboring other close culture mentality entities or dominant species groups acting over dominates provoke heavy hectic moves in populations as long as their development gets weakening down while confronted with dominating set of other stronger entities.

Bacteria Effects at Communicating Around: their “Talk”

Bacteria encounter different environmental conditions during the course of their growth and develop various mechanisms to sense their environment, and adapt to facilitating a fitness end at surviving. Within next part (7) of this “Systemicity Theory”, one will appreciate having an overall vision about what is “perception” and the different physicochemical and biological tools the universe and the planet Earth have made what we, humans, are able to know even though the better known of the unknown is a matter of the unknown as to be a presumably knowledge.

Further away, "in part 7 of this theory", we will be developing the wide world of perception and entities' means as to make sense to what's happening inside and outside a brain-body or milieu. Bacteria communicating with each other's been known to communicate with their environment through sensing chemical signals such as pH, ionic strength, or biological molecules, utilizing then a "quorum sensing principle" (QS: a social or a personal feeling). However, bacteria do not solely respond to their environment by means of chemical sensing, but also respond through *physical-sensing mechanisms*. At a human's scale, the equivalent phenomena, within physicochemical and environmental psycho-somato-psychism ("e-psops" by JJBlanc, 1999), are also driving survival fitness faculties. "E-psops" is a natural retroactive drive that factually represents the natural biological cycle of any force and flux of a body that sustain the living creature's survival (brain cells to other body cells and back to neurons: a "talk" between their receptors).

Bacteria, upon adhesion to a surface (as sticking to it), may respond by excretion of extracellular-polymeric-substances (EPS) through a mechanism called mechanosensing, allowing them to grow in their preferred, matrix-protected biofilm mode of growth (ref. with plants whirling around some stems as enlacing ropes thus to grow). Chemical sensing relies on the presence of specific molecules such as H^+ ions, antimicrobials, or on the presence of excreted biological signaling molecules that need *to be diffusing towards neighboring organisms at enabling communication and response*. Humanity electrical networks and communications!

The World of Plankton (Phytoplankton and Zooplankton Neighboring)

Oceans are so immense they contain most of the various ecosystems in the world as neighborly occupying the diverse horizontal as well as vertical niches constituting the colossal world of Plankton (98% of the biomass of the oceans). This fauna - *of Greek Planktos = wandering* - is not only at the base of populations total food chain but also at the base of major climatic cycles moves. Half of the oxygen of the atmosphere, and of the breathing of livings, comes from plankton survival aptitudes which induce to a very complex world of predation within the great diversity of who eats and who is eaten. The world x-dynamics systemicity of those piling networks (3D mille-feuille graphs) that globally induce to the sustainability and the evolution of the whole of seawater milieus and living systems are further down, developing surviving means in heritage into all their descendants.

The correlation of planktonic ecosystems' structures within the oceanic medium is a function of physicochemical parameters that are significant with what characterizes a water column: temperature, salinity, acidity and concentration out of oxygen, depth level and its pressure… Indeed, the environmental parameters, even at a certain saline variability, are, in some specific degrees, present in all terrestrial fields and endogenous media of the livings. The oceanic currents induce planktonic worlds of unicellular communities called protists[31] - predatory parasites in an aquatic environment – to be confronted with variable temperatures and the currents natural sensing that are both playing a major function within the balance of the ocean metabolism (e.g.: El Niño).

The protists, at their specific genetic level, account for 85% of the eukaryotes (cells with a nucleus) and form the plankton diversity making the phyto-zooplankton species separation being nowadays obsolete at the profit of great genetic types estimated at approximately one million planktonic eukaryotes species. This balance of biodiversity is in the world, one of the major living ecosystem standards understood as an "operating development rule": subject to specific temperatures, water

[31] - **Protists:** mostly unicellular, some are multicellular (algae), can be heterotrophic or autotrophic,

live in water (although some life in moist soil or even in the human body). All are eukaryotic (have a nucleus) and are any organism that is not a plant, animal or fungus.

pressure and inter-species interactions (predator-preys pressure, depth neighboring species), such balance induces to gene expressions therefore diversity to develop and evolve (depth limit is their being able to capture sunlight photons or deeper for many species that produce their own light).

The sea and water microbiomes are very similar to that of the microbiomes within many animals' organs and bowels and similar to that of humans' ones (ref.: human' bowels, groups and social populations in a specific milieu) since ecosystem operating rules are thoroughly interdependent (ends to be neighboring). They are under the effects of the X-dynamics systemicity of physical, chemical and biological moves (including emotional effects like fear) that influence "cellular community' to manage a temporal survival which mechanisms are fundamentally driven from their specific genes, however, and nevertheless constituent of the universal necessity as to be neighboring and adapt to milieus for surviving.

Parasitism, in the diversity of its forms within plankton worlds, is a precursor process which is also an operating rule in the vegetal world as well as it is in the animal and human ones. A genetic heritage is a necessary process to ensure the diversity means of living species to be fit surviving; most current modes of interaction are part of predation modes such as issued from the dynamic symbiosis and its systemicity results. Feedback induces to architecture their structures and acquires behaviors well oriented towards a positive diversification of their mechanisms functions (modes of survival) then to get capable at perpetuating the pragmatism of their survival. To be neighboring is a driver that supports synergetic variable adjustments.

THE INTELLIGENCE OF PLANTS TO BE NEIGHBORING

The Origin of Plants as the Bricks of Land Life

Earlier the year 2015, Chapman speaking on the genetics and evolution of green plants today's multicellular plants, such as corn, cabbages and all other greenery, arose from a single type of algae. Ones that came out of the water started at adapting to the milieus permanently kept humid from tides. Brent Mishler of the University of California at Berkeley assumed genetic evidence shows that "multicellular land plants are all issued from that algae lineage". It was quite a major phenomenon that boosted Life coming out of the water and install ashore and inland. The threshold effect mean was both a matter of the variability of humidity and the presence of mineral and atmosphere contents that were propitious with the chemistry of biology adaptation and its structural evolution on lands.

Organisms belonging to eukaryotic and cyanobacteria[32] groups are present even in most extreme terrestrial environments such as rocks, in hot and even cold deserts where a certain degree of humidity spreads around. In water, algae are naturally sustaining because as permanently neighboring with a watery milieu (oceans and rivers volume and a matter of temperature variability).

In the beginning of Life, all viruses and bacterium cells had filtering contact with the ocean, which brought them oxygen and nutriments that could be absorbed through their wall (called a membrane supporting quite many endogenous-exogenous receptors filtering biological survival molecule and protein fluxes). At the time, reproduction was that of a simple sexual principle: algae release their eggs and sperm cells into the water where they can meet and form tough little capsules called zoospores capable floating around in the ocean and find new places where to live on. On land, the

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[32] - C**yanobacteria**: Any of various photosynthetic bacteria of the phylum Cyanobacteria that are generally blue-green and are widespread in marine and freshwater environments, with some species capable of nitrogen fixation. Also called *blue-green alga*, *blue-green bacteria*.

survival conditions changed. Algae casting up on the sea shore or trapped in evaporating ponds were subject to drying winds and often to large temperature swings. At first, they probably promptly died, but over millions of years of evolution, a few algae were able to resist short periods of dryness as much as to live on. The primary ones became the ancestors of our land plants:

- **Lichens** were among the early land dwellers, becoming the many species of lichens in the world today, and all found in the terrestrial biomes diversity. They are tough small organisms made up of a partnership between an alga and a fungus: the fungus provides a protective environment, and the algae cell intake energetic food thanks to their *chloroplasts*. Lichens are often found clinging to rocks and may be green, orange, nearly black, or yellow. Since they have no roots, they absorb moisture from the rain and the air. In dry seasons they become dry and brittle, but are revived when moisture returns. Though lichens grow very slowly, they nonetheless provide food for animals and sometimes for people.
- **Mosses** were also among the first land plants and belong to a family called Bryophytes. They form low mats which small rods, grouped tightly together, can absorb water like sponges. They have no roots, although a cell at the bottom of each sprig forms a rhizoid that clings to rocks or other surfaces. Mosses do not have vascular structures (tubes like our veins for moving fluids around the body), but they do have an effective method of reproduction called the alternation of generations. This method protects and nurtures the vulnerable *zygote***.** A zygote is the new cell that is produced from the union of the genetic material from two parents: it is the cell from which a new and unique organism will grow showing mosses found a way to keep the zygote moist and alive. The zygote grows into a structure that makes tiny spores floating away in the air and ready for reproduction processes to happen.
- **Ferns** are the plants that developed *vascular systems*. Some still have rhizoids, but they both have roots which makes them to possibly grow into large plants though they do not have true seeds. They reproduce by the *alternation of generations* and, on the underside have groups of spores that are tiny, floating away in the air and will land down on to a new place that would be favorable for them to grow. In ancient times, the species diversified and spread. Some grew into tree ferns. (Tree ferns still grow in New Zealand and Hawaii, and are sometimes seen in California gardens.)

Other groups of vascular plants that do not have seeds include moss gatherings and horsetails (whorls of small dark teeth like leaves and producing spores…). Because nourished by fluids that circulate in their bodies, the vascular plants grew and grow in size and variety particularly since the barren, rocky earth then gained another color**:** "the green ray" (ref. the green pigment chlorophyll). Ferns and mosses are still dependent on water for reproduction. Their sperm have to swim through water to fertilize the proper eggs, fertilize them as being kept damp until they grow and release their own spores. Land plants cannot always count on having water available when they need it so that the invention of seeds was a major achievement which made it possible for land plants to spread away their seeds to new niches thanks to many different means (winds, birds…), as well as other reproduction seeds such as those that mammals, including humans that are called spermatozoids and oocytes[33].

The evolutionary history of all plants was the development of seeds. Seeds provide a viable means for dispersal of offspring without the need for water. Their dispersal efficiency is large allowing plants to exist away from direct sources of water. Gymnosperms were the first plants to have seeds, meant "naked seed" because they have only a dry, thin covering instead of a sturdy protective seed coat: e.g. gingko, palm, conifers… which do not produce flowers, fruits and are pollinated by the wind.

[33] **- Oocyte:** germ cell involved in reproduction.

Pollen Is a Change in Reproduction Means: a Neighboring Systemicity

One important change in the vegetation world was the development of pollen to replace swimming sperms. By flying, it moves by winds and is not damaged by dry air. Plants produce pollen cones, with a specifically small and tough woody envelop where the female half embryo's process could be protected. Falling on these woody cones the pollen grows tubes through as to connect with ovules (eggs) for reproduction fertilization.

Such action was and still is *"the major reproduction process"* that induces to both the characterization of sexual organs evolution and the specificity how sex penetration drives a fecundation that fit with a species to survive. Relationship is together the production of biological signals proper with entities for survival as well as the sense and the verb that drive survival behavior. After eggs are fertilized, they develop and mature in the cone so that the seed that resulted could survive from major drought in a dormant state (e.g. savanna or forest fires). The seed can wait for a favorable season to begin its growth at length since it is surrounded with a good store of nutriments to live over when it germinates. These seeds are well adapted to land specificities.

Ferns and gymnosperms flourished and diversified on the earth for more than 200 million years before another innovation appeared: *plants with flowers*. During part of this time, the Carboniferous Period, the abundant plant life provided the organic matter that was later transformed into coal.

About a hundred and thirty million years ago (-130 Mo/y) a new kind of plant appeared. This plant developed two innovations:

- First, the new plants produced *flowers,* allowing them to form partnerships with insects which in exchange for pollen and nectar greatly increase the efficiency of plants' pollination.

- Second, the parent plants provided a *protective covering for the seed*. Sometimes this covering took the form of a burr or of a fruit, which improved the dispersal of seeds to other places.

Today, most of plant species on Earth are flowering plants.

Phytoplankton: A Prerequisite of Livings at Coming Out of the Water

Thus, in this theory chapter, we will only approach hereafter certain facets of "neighboring" between viruses and bacteria populations. These organisms include drifting, floating bacteria (among them photosynthetic bacteria), archaea, algae, protozoa and animals inhabiting the pelagic zone of oceans, seas, or fresh-water ponds and streams.

Scott F. Gilbert et al., 2000, said**: "**The first photosynthetic bacteria, which evolved more than 3 billion years ago, probably utilized H_2S to convert CO_2 to organic molecules—a pathway of photosynthesis still used by some bacteria. The use of H_2O in photosynthetic reactions produces the by-product-free O_2 abundant in Earth's atmosphere as a donor of electrons and hydrogen for the conversion of CO_2 to organic compounds. In the sea an adequate supply of nutrients, including carbon dioxide, enables phytoplankton and benthic algae to transform the light energy of the Sun into energy-rich chemical components through photosynthesis.

Defined by their ecological niche, oceanic phytoplankton is the primary food source, directly or indirectly, of nearly all sea organisms. Composed of groups with siliceous skeletons, such as diatoms, dinoflagellates, and coccolithophores (unicellular, eukaryotic phytoplankton) that varies seasonally in amount and formed over billions of years the deep ocean sediments.

Lands Colonized With Plants from Neighboring Dynamics

Afterwards in evolution, *with a very specific analysis and description of plants*, one will understand which of their fundamental survival behaviors, so close to human[34] sociocultural realities are observable by the "gardener of old times". Plants natural behaviors are a factual reality of all things in nature, factors that are related to or dependent upon other environmental factors: nowadays, there is a strong scientific coming back at being more realistic about human behaviors essence and their qualifications at reacting to change and evolution.

Because plants are fixed on the ground, their rooting and textures give out very interesting survival faculties and organic production functions that take into consideration how to be neighboring, what in some ways individual mobile animals do so. Vegetation is also being observed as the oldest common ancestors of the open air livings since the apparition of the "blue algae" which developed in the ocean from the fundamental faculty of cells to collect their survival energy with photosynthesis. A procedure that enables stem cells to multiply and differentiate into all sorts of cells' type as constitutive of living organs, organism architecture and survival energy.

The stromatolites (photosynthetic algae) are the expression of the first form of living species, having developed the structure of bio-mechanisms able to capture survival energy (photons) as necessary to a biological activity from interacting with light – called photosynthesis – which is, in other words, able to extract oxygen. Cyanobacteria, first life forms on the surface of the globe, have been living in the seashore waters since nearly 4 billion years occupying a large part of oceans' environment. At the beginning of the Ordovician rocks, the diversification of aquatic forms led to the first Charophytes[35], known as intermediaries between green algae (stromatolites, - 4,8 bo/y) and primary terrestrial plants (360-400 Mo/y) coming out of waters. Quite of an immense time for neighboring cells' evolution to go to develop terrestrial organisms.

These plants form some sort of a carpet with more or less species of about thirty centimeters high, occupying the coastal margins of the continents, although desert minerals were yet lacking vegetation and soil. The colonization of coastal areas' was made possible thanks to several survival key innovations:

- The ability of these plants to resist desiccation by the formation of the stomata, a cuticle and opening organ allowing specific gas exchange,

- The production and dispersal of spores resistant to drying as having a protective envelope formed of substance close to the chitin of arthropods.

- The vasculature of axels (like the blood circulation networks) which allows the movement of water and nutrients towards all parts of the plant.

These organisms being the first to come out of the water allowed zooplankton, once evolved out of their fish forms, to become the second living world to adapt out of the water. They gradually found in algae, fungi, plants, minerals and other micro-organisms, the nutrients necessary since their amphibian functions became aerobic, therefore able to absorbing their oxygen needs from the atmosphere by breathing them instead of their filtering 0_2 through their gill marine system. That became "the art" how to exploit available neighboring resources at surviving and develop evolution means.

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[34] - **Humane:** characterized by tenderness, compassion, and sympathy for people and *animals*, especially for the suffering or distressed.

[35] - **Charophytes:** a division of freshwater green algae

THE CONSCIOUSNESS OF PLANTS - NEIGHBORING TO SURVIVE

Plants show a specific intelligence perceiving their environment of which some aspects are much more similar to universal survival behaviors. Vegetation (Plants without or with flowers, trees…), in their neighborhood, has an elaborate perception around its ecosystem components, its immaterial and material milieus (e.g. lands type…), as well as perceiving the neighboring living creature's and behaviors (animals, insects…) and other surrounding plants. They are all able to be neighboring, interoperating and communicating their feelings towards each other's, having at disposal a memory, molecular languages some being audible. Highly probed botanists attribute vegetation a specific neurobiology, intelligence and an awareness as proper to assume their survival needs, such as producing serotonin, a chemical substance which acts in the animal brain like neurotransmitters"?.

Jagdish Chandra Bump, physicist and botanist (1900) developed the neurobiological foundations of plants "thinking" and assumed they permanently explore their environment (Ref. slow movies of plant stems stirring around), as able to learn and modify their behavior in order to reach their survival goals. These behaviors are processed out of their nervous system, mainly located in the phloem, the vascular tissue that transports the sap, rich in nutritive elements. Metadynamics symbiosis and systemicity allow to carrying information in an organism in form of electrical signals: for example, a wound on a tomato tissue generates specific proteins throughout the whole of its organism, at a speed that only electrical signals would be running for. One is again confronted with a major example of symbiotic x-dynamics systemicity.

Plants and Trees Perceive Information from the Neighborhood

Ten years later, Anthony Trewavas, of the Edinburgh University describes the intelligence of plants, defining their intelligence as the faculty to perceive the environment events they are adapted with as to feel danger, perceive molecules or moves as necessary to survive. By incorporating processing and sensorial data, they are able to "adjust and decide", then on adopting a consequent behavior. For example, the *cuscute*[36], a climbing parasite plant that "smells" the air around with intelligence at a survival search of a host.

Stefano Mancuso describes the behavior of plants like surprisingly intelligent: predator combatants, maximizing opportunities at finding food … an intelligence that shows their capacity to be neighboring and interoperating. Some evidence, like the ones Frantisek Baluska (2005) found as basic keys within which their survival resides in plant roots, which end in form of a "rounded cap" protecting them whereas inserting in the ground: they capture information on gravity, moisture, light, oxygen and the level at nutritive matters of high content. Going back up the root from the cap:

- The meristem is a next zone of intense cellular multiplication,
- Upper next is a zone of transition
- Upwards is the zone of elongation where cells gain in length, allowing the growth and curve of the root and stem as adapting with the milieu.

Roots process a wide variety of nutrients, water uptake, anchoring forces, mechanical supports, and also as said, are capturing a whole set of signals and physicochemical information. Plants to be neighboring are here and elsewhere to have a major survival architecture fitted with means to interact with for survival. Occupying a terrain for other animal organisms to find nutriments to appear and temporally offer surviving means, such as plant nutrients that herbivore search for, or are able to evolve, after coming out of the water. Insects appeared from finding their survival nutrients in form of pollen.

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[36] - **Cuscute:** Parasite plant with small white flowers which stem rolls around its host branches. This parasite grows haustoria (fr.: suçoirs) that penetrate the stem down to the sap driving tissues of the host.

Plants and Trees While Neighboring Adapt to Their Milieu

The "mentioned zone of transition" as bio-physiologically found within an adapting centre" is the nervous system seat of plants which, electrically and chemically active, contains the processing means of carrying hormones. In auxin, a regulating hormone of plants, is carried out by means of specific reusable structured proteins once the process gets empty: the transportation of these neurotransmitters is equivalent to that one occurring in the animal brain, including humans. It is an "energetic transition zone" with a large oxygen consuming effect, as in the human brain, which seemingly is adapting with symbiotic results from the X-dynamic symbiotic systemicity. The sensory information collected by the cap (the end of roots) is thus translated at the level of the zone of transition, sending signals to the zone of elongation adapting, a process that modifies the root behaviors. In addition, the plants produce serotonin, melatonin or the GABA[37], together with many other biochemical substances that act like hormones or neurotransmitters throughout the animal brain. Outside such process, plants get "suffering from malformations" that affect their growth even though they have no neurons but similar functions[38], showing that their gene mutations send signals and information able to happen if to cope with some signals at the level of some inducing handicap threat.

Conscious of their environment, plants are thus able to process the data signals they receive, *even much more consciously than animals* since they cannot move away from danger, but must "feel it inside their body". It shows a strategic way as to adapt to aggression, showing why they have a memory to remember past events. David Chamovitz defines such memory as the capacity "to record an event, storing and remembering it to later act" according *the sense they specifically gave to i*t. In other words, it I a matter and fitness that enable entities surviving. Frantisek Baluska goes further when describing the plants feeling pains: the "ethylene" they produce as to control many specific processes (an animal can be Ko'ed of it) is their survival scaling from their seeds germination to the ripening of their reproducing fruits. Ethylene is also released during a stress that provokes a skin injure somewhere in/on the body or as well as when a predator attack. By such, neighboring plants perceive close events and react according to the importance of the pain expressed. (Le Monde des Sciences - May 2015)

PLANTS AS NEIGHBORS ARE INDISPENSABLE TO LIFE

According to paleo-botanist Russell Chapman of Louisiana State University, the first algae that managed to gain residence on terra firma—finally kick-starting the evolution of land plants—must have been their coming out of fresh water, not of the sea. Chapman added. "This reminds people of how important algae are in general, since without that escape out of the water and its subsequent evolution, the half million species of plants that are so important to life on Earth might not exist. There would be no crops, no flowers, no fibers or foods. There would also be none of us. «Four distinct types of algae managed to come ashore, only one of them evolved enough complexity to possibly cover the land with vegetation, what we now call trees, shrubs, flowers, and grass. "Nonetheless, all four species of pioneering algae can still be found on land, he said!"

Around -410 Mo/years ago, first plants with seeds began to grow as much as creating forests. At first they were only mosses which some turned out to generate trees from at about -415 Mo/years ago. Towards the end of the Devonian, the first forests arose as stemmed plants that evolved strong,

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[37] - **GABA**: gamma-aminobutyric acid: a biologically active substance found in plants and in the brain and other animal tissues; it is a neurotransmitter that inhibits activation of neurones.

[38] - **Plant cells:** "Plant cells and neurons share several similarities, including non-centrosome microtubules, motile post-Golgi organelles, separated both spatially/structurally and functionally from the Golgi apparatus and involved in vesicular endocytic recycling, as well as cell-cell adhesion domains based on the actin/myosin cytoskeleton which serve for cell-cell communication".

with a woody structure capable of holding raising branches and leaves. Some of Devonian trees are known to have grown 100 feet (34 meters) tall.

The ancient history of land plants is becoming evidence because of recent advances in techniques for genetic analysis as it is now possible to observe individual genes' type in algae cells and higher plants and calculate their similarity. Clues to the history of such organisms lie within the chemical "spelling"—the sequence similarity—of organism genes. The closer they resemble each other, the closer they are related. "The evolutionary history of various genes can be studied within the lineage of green algae," Chapman said, and that is what offers vital clues to how the algal genes evolved to produce plants. Today's green plants are enormously diversified, from the giant redwood trees to the tiniest weeds—all vegetation that blooms, including human crops.

Plants formed the **first biomes** by sea shores: biome is a place characterized by its climate, the plants and the animals that lived or live there, further colonizing and evolving from neighboring and reproducing throughout the milieu.

Plants have various adaptation functions participating with their survival (living and growing) according to their area conditions; special features that allow a plant species or of an animal to survive depends from the environmental conditions of specific habitat structures. Plant difficulties to survive explain why certain ones are sustaining within specific areas, but not in any other one (e.g. mountains, deserts…). For example, a cactus cannot be found living in the Arctic, nor really tall trees would live in grasslands. The function of plants is therefore the major pillar and support of other living creature sustainability and of the soil nature they grow on.

- **Plants make food:** Plants are the only organism that can convert light energy from the sun into food, therefore they produce all of the food most animals, including human people, eat. Even all those species eating meat. The animals that give eating meat to humans (such as chickens and cows) eat grass, oats, corn, or some other plants and they are farmed by billions every year.
- **Plants make oxygen:** one of the molecules that plants produce while consuming energy is oxygen gas. The oxygen gas, which is an important part of the air, is the gas that plants and animals must "breathe" in order to stay alive: the air take is bringing enough oxygen such as to keep cells and organs of the body staying up working. The whole of the oxygen worldly available for living organisms to sustain comes from the reign of plants and consequently from the atmosphere and the waters.
- **Plants provide habitats for animals:** Plants are the primary habitat for thousands of other species. Animals live in, on, or under plants which provide them shelter and safety. They also provide the required dietetic species milieu as to balance their metabolism from the needed diversity of food nutrients at hand or graze. In terms of habitat, plants alter the climate. On a smaller scale, they provide shade, help ways how to moderate the temperature, and protect animals from winds. On a larger scale, such as in tropical rainforests, plants presently change the rainfall patterns over large areas of the earth's surface.
- **Plants help make and preserve soil:** In forests and prairies, the root of plants helps hold the soil together, then reduce erosion and helps conserve the soil much helping the production of soil components. Soil consists of much rock particles which are broken down into very small pieces. When plants die, their decomposed vegetation and dead bodies or other mineral remains that are added to the soil composition are helping it at staying rich with nutrients.
- **Plants provide useful products for people:** Many plants are important sources of products that people use, including food, fibers (for cloth, ropes…), and medicines. They also help provide some of energetic needs (biological gas, breastfeed…). In some parts of the world, wood is the primary fuel used by people to cook and heat their homes, which cause the

deforestation of too many large areas, inducing to animal species to disappear. Many other types of fuel used today, such as coal, natural gas, and gasoline, were made from plants that lived millions of years ago which deeply buried under terrestrial lands got physicochemical transformations.

In the world of plants, the primary vegetation is to some extent, in its form of algae species, was issued out of phytoplankton growing on energetic capture with photosynthesis. "The water-to-land come out" of aquatic creatures (the zooplankton basics), has happened only so far over tidal spaces that were permanently receiving nutrients and algae. Growing in open spots adapted to ebb tide flows, they bring nutritive resource crops, therefore energy capable of providing organism feedings for survival.

Land First Colonization by Plants

The Devonian (-420 Mo/y to -360 Mo/y) marks the beginning of extensive land colonization by plants, which through their effects on erosion and sedimentation, brought about significant climatic change.

Together with, zooplankton fishes had to gradually adapt their gills to out-of-water oxygen air-breathing lungs, returning to water until they were fitted as definitively installing on dry land. The time of adaptation was rather slow (1 Bo/y) since it became necessary at organisms, possessing a marine oxygenation to become capable having an aerobic breathing.

Coastal ecosystems thus took part in the evolution of species towards their more terrestrial autonomy, by adaptation of their survival needs and moving outfits able to rummage around a vicinity that was progressively offering more and more energy mean feedings and induce to group forming for mass reproduction. A milieu favoring diversification is the product of symbiotic survival effect moves that is the positive result of inter-dynamics involved with the phenomenon of genetic mutations like that of behavioral adaptation. Mineral molecular vicinity, such as water and other matters, also other biological left-over components of the various living species, at each ecosystem level (the mille-feuille interacting structures) strongly induce to the development of new molecules structuring other endogenous as exogenous structures.

Another phenomenon of apparitions and adaptations of livings in the bottom of oceans at the periphery of hydrothermal vents as chimneys (ejection of gas, micro mineral molecules and other chemicals) at high temperature (~345 ° reaching 400 °C [750 °F] or more) is observed surviving since they stand biochemical molecules around the chimney peripheral water at much lower temperature (effect of distance) within a 3D structuring and raised organizations (genealogical sense of the term). Our opinion is that such ecosystems are not at the origin of life, as some would like to assume, but it is only resulting from an early time when marine currents made biochemical molecules of the planktonic world "travel down and up" and their juvenile created a new adapted fauna particularly fitted as to develop in such hot environmental conditions.

EXCHANGE BETWEEN ANIMALS AND PLANTS

Exchange Between Plants and Animals Is of Specific Interactions

Plants let out a gas called oxygen which animals and humans need to breathe so to live. Animals let out a gas called carbon dioxide and plants also need to take in carbon dioxide to live. Gas exchange in plants is dominated by the roles of carbon dioxide and water vapor. CO_2 is the only carbon source for autotrophic[39] organisms, making it essential for the conversion of light into sugar during photosynthesis. Due to the high differences in water potential in the plant versus the surrounding

[39] - **Autotrophic:** an organism that produces complex organic compounds (such as carbohydrates, fats, and proteins) from simple substances present in its surroundings, generally using energy from light (photosynthesis) or inorganic chemical reactions (chemosynthesis).

air, water vapor tends to evaporate from plants. Gas exchange is mediated through pores (known as stomata and located mainly on the lower side of leaves) that underlie a complex regulatory system. As the condition of the stomata unavoidably influences both the CO_2 and water vapor exchanges, plants experience a gas exchange dilemma: gaining enough CO_2 without losing too much water.

Most plants have relatively few living cells outside of their surface because air (which is required for metabolic content) can penetrate only skin deep. However, most plants are not involved in highly aerobic[40] activities, and thus have no need of these living cells. Explain_gas_exch 20120216084513

The Art of Exchange and Generalized Changes

Generalized, it is a type of social exchange system in which the rewards an individual receives from others do not depend on the type of resources provided by that individual. The action of swapping is to exchange, barter, or trade one thing for another, and ancient and modern social custom.

Coye Cheshire, 2011, wrote, "generalized exchange can occur between people, organizations, countries, or other social groups. Participants in generalized exchange systems are not in a position to make individual rewards conditional on giving behavior. An individual may give goods or services to one or more other people, but the rewards he receives may or may not come from those people. Examples of such systems include helping a stranded motorist (who may, in turn, help someone else in the future), donating to a public good such as a community park, or passing news to others through some form of communication. In each of these examples, goods or services are exchanged indirectly between at least three or more participants.

Malinowski, 1922, found that handmade necklaces and bracelets were traded in opposite directions in a geographic ring among the various islands in the region. Thus, these exchanges had ceremonial and symbolic significance for the community even if there were no direct economic benefits to the participants. This type of generalized exchange that links individuals indirectly to one another is also called network-generalized or chain-generalized exchange. In addition, this form of generalized exchange is sometimes referred to as a gift economy. However, generalized exchange systems do not have explicit reciprocity between participants (as some gift economies do). The indirect nature of generalized exchange distinguishes it from similar forms of exchange such as reciprocal social exchange.

In all forms of generalized exchange, individuals can potentially receive benefits without ever contributing anything. Thus, generalized exchange systems contain inherent social dilemmas. In network or chain-generalized exchange, free riding occurs when individuals receive goods or services but fail to give anything to others. In group-generalized exchange, free riding occurs when individuals receive benefits from the public good without contributing to it. Much of the theory and research in generalized exchange systems deals with overcoming these social dilemmas for the benefit of the community.

Kinetic Factors and Chemical Reactions at Neighboring Levels

As Earth is an open system, it interacts with a part of Cosmos and Sun system forces such as its gravity mass and x-dynamics systemicity moves bring down enough energy-filled light rays on Earth. These retroactive effects, because of cosmic objects neighboring, are differentially influencing climate cycles and the survival potentialities of living systems. Cascading over, such

[40] - **Aerobic:** *Aerobic respiration* is the main means by which both fungi and animals utilize chemical energy in the form of organic compounds that were previously created through photosynthesis

amount of energy is minored by the dynamic balance of gravity such as that of the Moon mass effects and the atmospheric variability of pressure. However, at keeping up their way, some emergent chemical reactions get sustainability and their dynamic systemicity result from an adequate volume of energy capable of overcoming the negative effect of entropy results. As an example, "The temperature is going down", cascading in but never definitely.

To be remembered, survival mean requirements and adaptation abilities for any system are to cope with temporal periods and the permanency of environment changes. They are counterbalancing the universe environmental entropy forces and moves pressure which is a matter of keeping up the dynamic balance of the "big metabolism temporal sustainability". It is said that "chemical kinetics," also known as reaction kinetics, are how rates of chemical processes vary (from X to Y) or dynamics, or *kinetics*, which treats of simple motion as an effect of the action of forces..

Kinetic factors as decisive in multi-step processes.

From then on, the whole universe environment flourishes with physicochemical properties of which dynamics systemicity induces to develop functional replications of objects and things at evolving into more adaptive entities (planet components, biological polymers, communication means, species families...). A chemical clock or oscillating reaction is a complex mixture of reacting chemical compounds in which the concentration of one or more components exhibits periodic changes, or where sudden property changes occur after a predictable induction time. There is a class of reactions that serve as an example of non-equilibrium thermodynamics, resulting in the establishment of a nonlinear oscillator. The reactions are theoretically important in what they show that chemical reactions do not have to be dominated by the equilibrium of thermodynamic behavior.

The origin of Life was a matter of convergence and an interaction between chemical systems during interrelated processes as adequate with survival moves characteristics (e.g.: replication, photosynthesis and autotrophic capacities of cyanobacteria to assemble for). Emergent results build up physicochemical structures that are acting like proto-living systems (Archaea...), as having a chemical evolution constituting a molecular self-organization and a biological RNA architecture adapting to reproduction and milieu changes. The universal chemical environment initiated the assembly of chemical molecules that formed the first protopolymers (structural repeating units) as able to provide information for others to assemble (proto-nucleic acids) and lead to reproductive polymers and catalytic activities.

Thereby, biological evolving conditions emerged, originating different substrates (site of enzyme actions) where the RNA/DNA molecules formed and later engendered singled-cell organisms, some of them getting differentiated into multicellular systems evolving in proto-metabolic milieus. This overview of successive x-dynamics systemicity phenomena supporting for example, living systems, must be understood as having occurred during an immensely long period of time over billions of years and plus. While getting more inquisitive about the immensely long period from -4, 6 Go/years (the Earth birth) up to + 2'015 years of nowadays, in the history of Life, it becomes highly important to acquire a scientific transdisciplinary learning at understanding the universal neighboring and the natural interconnectivity of things permanently interacting as much as the moves engendering the bushy tree of life and its billions of ecosystems.

COMPETITION IS GREATER BETWEEN NEIGHBORS

Competition is a dynamic mechanism of interaction between organisms or species in which the fitness of one is lowered by the determined presence of another. Limited supply of at least one resource (such as food, water, and territory) targeted by both protagonists to be acquired is a factor of discord. Both within and between species, competition is a fundamental survival dynamic particularly in a community since, in terms of spatial and temporal scales, it includes and develops

the distribution, the structure, the abundance, the demography and the interactions between coexisting and neighboring populations. A set of two or more different species-as neighboring-temporally occupying the same geographical area forming a community refers to groups of organisms that are neighboring entities in a specific space/time lag.

Interactions between species in communities have many aspects, such as predator-prey population dynamics, succession of behaviors, and community assembly. In a social way, interactions are also those of dominant-dominated individuals.

Thus, any of one or more type of plants or sometimes animals, by virtue of their abundant population, their size or habits, exerts such important influence on the area conditions that they determine, to a great extent, other organisms survival fitness chance. The primary structure of a community resides in the interactions between neighboring populations as determined by their specific genotypic and phenotypic characteristics.

Their patterns such as variation in species richness, equitability, productivity and food network structure are, on another side, their specific behavioral processes occurring within a set of x-dynamics systemicity that rules their survival. Species less suited to compete for resources would either adapt or die out, although competitive exclusion is rarely found in natural ecosystems, since playing a very relevant role in natural selection. However, competition may play less of a role than that of expansion among wider clades since a common ancestor and its descendants form a single "lineage" or more according the "bushy tree of life" density.

Intraspecific Competition and Neighbors' Dynamic Equilibrium

The intraspecific competitions represent a set of interactions within populations, whereby members of the same species compete for limited resources. This leads to a reduction in fitness for both individuals. By contrast, interspecific occurs when members of different species compete for a shared resource. Members of the same species have very similar resource requirements whereas different species have a smaller opposed resource overlap, resulting in intraspecific competition generally being a stronger force than interspecific competition.

Individuals can compete for food, water, space, light, mates or any other resource which is required for survival. If the resource gets limited, it induces to competition but if every member of the species can obtain a sufficient amount of every resource, individuals do not have to compete and the population grows exponentially. This is illustrated with the predator-prey game effect, named "the fox and rabbit game" where none has an advantage to kill all others (the systemicity of a dynamic towards a dynamic equilibrium). Effectively, if rabbits disappear, foxes disappear. If rabbits overcrowd, they ruin the grassy area, then all die as well as foxes soon deprived of food: it becomes a systemic cycle around an equilibrium threshold (ref. to the cursor notion).

To be neighboring at a keen level for survival requires a certain degree of intuition on self-protection and self-feeding behaviors, in other terms to primarily have a certain aptitude as to "thinking" about what to do choose and decide. When resources are limited, an increase in population size reduces the quantity of resources available for each individual, reducing the per capita fitness in the population. As a result, the growth rate of a population slows as intraspecific competition becomes more intense, making it of a decreasing density well dependent on the process output. The carrying capacity of a population[41] is the maximum number of individuals who can stabilize in a population:

- The intraspecific competition doesn't just involve direct interactions between members of the same species (such as male deer locking horns when competing for mates) but can also include indirect

[41] - **Carrying capacity:** (K) is the population size that a certain environment can sustain, or "carry". The value of *K* will vary depending on the species and resources available in the habitat.

interactions where an individual depletes a shared resource (such as a grizzly bear catching a salmon that can then no longer be eaten by bears at different points along a river). The way in which resources are partitioned by organisms also varies and can be split into scramble and contest competition. Scramble competition involves a relatively even distribution of resources among a population as all individuals exploit a common resource pool. In contrast, contest competition[42] is the uneven distribution of resources and occurs when hierarchies in a population influence the amount of resource each individual receives. Organisms, in most prized territories or at the top of the hierarchies, obtain a sufficient quantity of resources, whereas individuals without a territory are not getting their part of the resource.

- The interspecific competition represents a form of competition in which individuals of *different* species compete for the same resource in an ecosystem (e.g. food, male sorting or living space). If a "tree or plant species," in a dense forest, grows taller than other surrounding species, it is able to absorb more of the incoming sunlight and underground nutriments. However, less sunlight is then available for trees that grow shaded by tallest ones inducing to then an interspecific competition. Leopards and lions can also be in interspecific competition, since both species feed on the same prey, and can be negatively impacted by the presence of others as they will have less food.

Competition is only one of many interacting biotic and abiotic factors related to each other as affecting community structures. Moreover, competition is not always a straightforward, direct, interaction. The interspecific competition may occur when individuals of two separate species share a limiting resource in the same area. If the resource cannot support both populations, then a lowering fecundity, growth, or survival rate may result in at least one species. The interspecific competition has the potential to alter the species population, communities and the evolution of interacting species. On an individual organism's level, competition can occur as interference or exploitative competition.

Direct competition has been observed between individuals, populations and species, but there is little evidence that competition has been the driving force in the evolution of large groups as, for example, between amphibians, reptiles and mammals. In a major study of competition between freshwater green algae species, the level of competition between pairs of species was found to be uncorrelated with the evolutionary distance between the pair of species. And traits that regulate competition can't be predicted from the bushy tree of Life.

THE CONCLUSION OF THIS 6TH PART

To be neighboring requires universally at least two entities nearing and interacting, an action that itself request perceiving *moving or still things*, *fluxes and moves* (climate, cosmos and landscape components, living entity behaviors) within their in-between space and surrounds.

"*Interactive perception and sense given to things"* will be the subject of a next step of the theory, its part 7 publication.

REFERENCES

References not mentioned within the above text will be completed in the 7th part of the theory.

[42] - **Contest competition** for a resource that is partitioned unequally, so that some competitors obtain all they need and others less than they need (i.e. there are winners and losers).