Star dust, we are all connected.

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«You are nothing but ashes and dust... They forgot to tell me that they were dust of stars.»

Hubert Reeves

Thank you for taking the time to read me, any reaction is welcome.

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Introduction

«The body cannot survive without the spirit, but the spirit has no need of the body.» Érasme de Rotterdam

In “The Mind This Enigma”, we support the existence of a quantum component in the brain, interacting with the memory, the consciousness and the unconsciousness partially delocated.

More and more work rejecting the thesis of a consciousness reduced to intracerebral physiological reactions.

The sciences study the manifestations of the mind through thought, memory, emotion or the different stages of awakening:

- In neurobiology, consciousness is described as an intrinsic property of the brain.

- In psychology, it refers to mental processes.

- Freud distinguishes preconscious, conscious and unconscious.

- Jung talks about collective unconsciousness leading to our consciousness images that do not belong to ourselves.

But what could be the ultimate nature of the mind?

- Bohr sees in the random and non-mechanical nature of the quantum physics the origin of consciousness.

- Penrose and Hameroff say the brain hosts delocated electrons behaving like quantum objects.

- Beauregard, Ransford and Van Lommel defend the theory of the delocalization of consciousness, outside our space-time.

In order to better understand the structure of the mind, we will study here the emergence of the consciousness and the memory in the course of the evolution and even more in detail in man:

- How did the nervous system develop?

- How does build the human brain?

- When did consciousness and memory emerge?

- Why talking about non locality of the mind?

- Does our brain have a quantum component?

We will then look at the consequences of a delocalization of the mind out of our space-time:

- Does it involve communication between minds?

- Is there a pre-birth and an afterlife?

- What about the human individuality?

- What might be the origin and the form of a non-local mind?

For each theme, we will limit ourselves to the works of main authors, presented in publications intended for the greatest number.

- First, we will study the development of sensory systems and the emergence of the consciousness and the memory.

- Then we will recall the points in favour of the delocalization and the quantum nature of the mind.

- We will then move on to the individuality and communication between individuals, involving or not our 5 senses.

- We will then present the principles of the space-time, the data transmission and the complex systems.

- Finally, we will highlight the main clues supporting an after-life but also a pre-birth.

By linking these different points, we will be able to propose a broader vision of the mind and its meaning.

By focusing on the spiritual communication, the individuality-globality relations and the continuity of spirit.

We wish you enriching and why not challenging moments during your reading.

Chapter 1: Biological senses

"Perception of events matters more than facts."

Napoléon Bonaparte

From the very first organisms, an adequate perception of the surrounding environment is essential. It gradually led to the development of the human brain.

We will first analyze the evolution of the nervous system from invertebrates to humans.

We will then present the human brain in a few figures and briefly describe its architecture.

A study of the brain formation from the embryo to the adulthood will follow.

We will conclude with an analysis of the tools developed by plants to explore their environment, to adapt and communicate.

1.1 Animals

A draft of the nervous system appeared very early in evolution, allowing organisms to react quickly to any changes in the environment.

Bacteria

Through a recognition and counting system, bacteria can communicate and align their individual behaviour.

Quorum sensoring

This synchronization mechanism, called quorum sensoring* or quorum detection, is based on the exchange of a chemical messenger between individuals.

(words marked with an * are repeated at the end of the lexicon)

The bacteria can thus carry out common actions, promoting

their survival, such as the production of a development support or toxin release:

- In Vibrio fischeri, this synchronized behaviour is based on the synthesis of a specific molecule (AHL*) and a protein sensor (LuxR*).

The disseminated molecule penetrates its neighbors and the quorum reached, triggers a bioluminescence.

- In sufficient numbers in one host, Staphylococcus aureus causes various infections up to septicemia*.

- Pseudomonas aeruginosa is responsible for secondary infections in patients with cystic fibrosis.

The quorum sensoring regulates the formation in their lungs of a biofilm stimulating their growth.

Invertebrates

Placozoans

Small marine organisms, placozoans are the simplest known animals. They are devoid of nerve or muscle cells, nervous system or internal organs.

However, they can synchronize their movements to perform more complex actions, such as climbing on marine rocks to feed on seaweed.

D.Fasshauer's team highlighted intra-cellular communication, ensured by the transmission of small peptides* coordinating the different parts of their body.

Thus the origin of the nervous system goes back at least to that of placozoans, more than 600 million years ago.

Sponges

Sponges are a bag-shaped fixed marine animal, supple and supported by a limestone or silica structure.

Their cells communicate with each other through the transfer

of calcium ions, allowing them to harmonize their body movements to feed.

The proteins responsible for this ionic flow are encoded by the same genes as those involved in nerve transmission in humans.

Hydras

The hydra is a small animal living in fresh water, able to regenerate the amputated parts of its body or reproduce by budding.

Its rudimentary nervous system consists of a diffuse network of sensory nodes, it is decentralized and distributed uniformly throughout the body.

Earthworm

Earthworms are small terrestrial animals with ringed bodies, playing a major role in soil fertilization.

They have a primitive brain, formed of cerebral nodes, extended by a ventral nerve cord from which come out at each segment small sensory endings.

In response to perceived stimuli, these transverse nerves allow a coordinated muscular contraction of their body.

Arthropods

The nervous system of crustaceans and insects consists of a brain and ganglia connected by a ventral nerve cord.

Arthropods equipped with sensory organs, benefit from vision and olfaction, essential to their social life.

Vertebrates

Thanks to the development of new areas and connections, the vertebrate brain is experiencing impressive growth.

The peripheral nervous system appears, allowing to connect the central nervous system to the whole body.

Fish

The brain* combines the signals of the sensory organs with those of the internal ones, improving the adaptation to the surrounding environment.

The developed cerebellum* allowing fish to control their movements and measure pressure variations.

Amphibians

The size of the forebrain largely increases, exceeding that of the cerebellum.

The amphibian brain is covered with a nerve tissue, analysing information from the olfactory bulb*.

Reptiles

Compared to fish, the base of the forebrain continues to grow, but the olfactory bulb retains a major role.

The reptilian brain or ancestral brain controls the innate behaviours and corresponds to the brainstem* and cerebellum of our brain*.

Birds

The brain of birds is close to that of reptiles with 3 differences:

- Its cerebellum is larger, controlling balance and flight,

- The existence of a single cerebral structure, the caudolateral nidopallium*, considered to be the analogue of the primates prefrontal cortex.

- The density of neurons* in the avian brain is much higher than that of other vertebrates.

Mammals

The appearance of the cortex*, an external layer covering the cerebral hemispheres and interconnected to the limbic system*, allows a better processing of information.

The limbic system develops further, it is involved in olfaction but also memory and emotions regulation.

The cortex is particularly well developed in dolphins, elephants and humans.

Man

The human brain is distinguished primarily by the size and structure of its cortex.

The frontal lobe is large, hosting thought, consciousness and metacognition*.

Summary

Starting with the first organisms, an internal and external analysis system takes place, leading gradually to the brain.

Bacteria communicate by diffusion of a chemical messenger, allowing them to adjust their behaviour.

The first pluricellular animals synchronize their cellular movement through the exchange of small peptides or ions.

A rudimentary, decentralized nervous system appears in hydra consisting of a diffuse network of nerve nodes.

Worms, crustaceans and insects have a primitive brain, formed of cerebral nodes, prolonged by a nervous cord.

The evolution of the brain in vertebrates still accelerating:

- Fish associate signals from sensory organs with them from internal ones.

- Amphibian telencephalon is covered with nerve tissue.

- The reptilian brain controls innate behaviours.

- The mammal cortex, interconnected with limbic system, improves information analysis.

1.2 Human brain

The human brain is the most sophisticated organ known, its functioning still unknown to a large extent.

It continuously coordinates the adaptation of our body to changes in the environment and plays a major role in the manifestation of consciousness and memory.

Throughout life, physical and mental activities change the structure of the brain.

Some figures

- Our brain alone accounts for 20% of our energetic need, for only 2% of our body weight.

- 1 billion signals pass through it per second at a speed of 432.000 km/h.

- Like any living cell, neurons are regularly replaced, their number decreasing by 5% over the course of life.

Anatomy

The encephalon* is composed of the brain stem, cerebellum and brain. The cortex covering the brain is divided into lobes separated by convolutions and grooves.

It consists of external lobes: frontal (cognition, motor skills, writing), temporal (hearing, smell, reading), occipital (sight) and parietal (taste, touch) and limbic and insular systems (olfaction, memory, emotion).

We distinguish the primary areas, sensory or motor, from the associative areas that integrate the information of the primary adjacent areas.

Brainwaves

5 types of brain waves are measured: gamma: intense mental activity, beta: active awakening, alpha: light relaxation, theta: hypnosis or meditation and delta: deep sleep or meditation.

Thus, in addition to the flow of biochemical messengers, the

brain is also crossed by electromagnetic waves.

1.3 Brain construct

The construction of the brain starts at the beginning of the gestation and continues during 25 years, it can be divided into five successive stages.

Before birth

About 20 days after conception, a neural plate appears on the back of the embryo. A week later, by folding it turns into a neural tube*.

Acting as a neural factory, it manufactures 3.000 cells every second and is at the origin of the spinal cord* and the brain.

After 7 weeks, the neural tube divides and the main brain structures are differentiated. At the 17th, the brain, the cerebellum and the brainstem are formed.

At birth, the brain is operational but its structure still has to evolve, its cortex already has its pleated appearance and it weighs 400 g.

Childhood

After birth, the brain continues to develop rapidly, creating more than a million synapses per second, connecting the different neural zones together.

This important growth leads to an excess of brain connections, resulting in their pruning and only the most regularly solicited will be kept and reinforced.

At 2 years, the functional architecture is emerging, first by integrating the areas involved in the perception of oneself and the environment and then those of motor skills.

The visual cortex pruning is complete at 3 years, that relating to spatial orientation, the language one spreads until puberty.

In children under 4 years, hundreds of thousands of synapses

are replaced every second.

At 6 years the brain reaches 90% of its adult size, its structure and cortex continuing to evolve significantly.

Adolescence

From puberty to adulthood, the adolescent's brain experiences a second period of intense restructuring. At 16 years only 50% of the initial synapses have been preserved.

These changes mainly concern the epiphysis* regulating sleep, the limbic brain controlling emotions and after 20 years, the prefrontal brain involved in decision-making and planning.

At puberty, the production of testosterone amplifies the neuronal plasticity, which can lead to emotional instability, increased impulsivity or reckless risk-taking.

From 10 to 20 years, the deposition of myelin* around the axons* intensifies, optimizing the conduction of nerve impulses while strengthening communication between the cerebral hemispheres.

Maturity

The brain still evolves after its maturity, new synapses are formed, its architecture is modified according to circumstances and activities.

In adults, the neurogenesis* takes place exclusively in the hippocampus where a third of its neurons will be replaced over the course of life.

This structure plays an essential role in learning new skills and creating memories.

The prefrontal cortex is the last region to mature, around 25 years the myelination* of its nerve fibers ends, making it 100% operational.

The maturation of the frontal cortex completed, the integration of information from other brain areas is optimal, leading to a

complete vision of events and better judgment.

Senescence

The brain experiences a slow natural cognitive decline. Its weight and volume decrease by 5 to 10% and anatomical changes are observed.

The adoption of a healthy lifestyle and the regular practice of physical and mental activities slow down the process.

If the number of neurons decreases by less than 5%, their myelin sheath and their connections gradually slim down.

Most of the neural circuits being preserved, our brain retains its ability to adapt. Mental functions can also improve and new ones develop.

Such as the appearance of new connections between the motor and auditory zones by playing piano or the involvement of new ones compensating the deficits of those of the language.

Summary

Building the brain is a complex 25-year process. This is a permanent reconfiguration of the brain connections, renewed regularly.

With the exception of the hippocampus, the synthesis of neurons stops in adulthood, yet its total number only decreases by 5%.

The brain gradually declines beyond the age of 60, but different mechanisms are being put in place to remedy this, a healthy lifestyle and various activities strengthening them.

1.4 Plants

Plants also have sensory, communication and defense systems, all the more important because they cannot move to feed, reproduce or flee.

Five senses and more