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From Classical Neurobiological Conception to Quantum One. Critical Revision

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Abstract

Probably no theory in the history of science has produced such a profound cultural and scientific revolution as is determined by quantum mechanics.

Founded around 1920 by illustrious physicists, all Nobel Prize winners, it has completely subverted the conception of matter and the universe.

The theory that all matter is made up of atoms has already been formulated by Greek philosophers, starting with Democritus.

Quantum mechanics provided a description based on a new conception of the elementary structure of atoms, and formulated the fundamental laws to which atoms obey.

Quantum theory has obtained the unanimous and shared consent of the scientific world, although some aspects have not been definitively confirmed.

Strengthened by the universal acceptance of his theories, quantum mechanics claims its intellectual primacy over all the other sciences, and the scientific world seems to grant it, so much so as to archive all the knowledge and achievements gathered in its thousand-year history.

From the epistemological point of view all established theories are worthy of consideration and must be shared and accepted until proven groundless. Dating, quantum mechanics still enjoys the consent of many scientists, but this does not mean that it can claim to be the repository of all truth, based on an unacceptable and anti-scientific syllogism for which: A) all organic and inorganic matter is formed by atoms and molecules; B) quantum mechanics has founded theories and formulas to which atoms and molecules obey; C) accordingly quantum mechanics can control all universal matter.

But the presumption of its predominance goes further than willing to dominate living matter.

In this article we are going to examine with a sharp criticism, the aberrant and anti-scientific claim of this discipline to dominate not only science but also universal matter.

We propose a more moderate and considered vision of the observable natural phenomena and consider them events in continuous evolution, and to adapt our hypotheses and theories with an equal evolutionary approach.

Keywords: Quantum biology, Cytoskeleton, Synaptic transmission, Mechanic quantum

Introduction

Billions and billions of years ago in an unspecified place of space and time there was a state of everlasting perfect quiet, completely empty, silent, dark and icy.

Suddenly, as if by a miracle, an infinitely small dot of light appeared, the singularity, which freed all its strength held repressed until that moment and began to animate, take shape and substance, and increase its size, that only moments later they became so large that they were visible even at distances of billions of light years.

Thus begins, moments after the birth of singularity, a real explosive growth,

the Big Bang, which had the power to generate material particles from nothing and to increase indefinitely.

A few billion years later had appeared the first celestial bodies that with time became immense and formed stars and galaxies.

Sounds like a fairy tale, doesn't it? It is the story that astrophysics, which bases its theoretical foundations on quantum mechanics, has hypothesized for the origin of universal matter.

It all began in the early years of the last century, we are around 1920, when some illustrious physicists began to imagine what form the atoms that make up the matter and how from this would be formed the universe [1-3].

Not only that, but they managed to lay the foundations of a new conception of matter that could explain the many unexpected phenomena, inconceivable with traditional physics.

The new discipline was called quantum mechanics and completely changed the interpretation of classical physics of natural phenomena, replacing it with probabilistic, which best explained the facts observed and the results of some experiments.

The new physics produced a true cultural revolution in the natural sciences and imposed a new vision on the structure of matter and the origin of the universe.

The revolution was so vast and profound as to undermine the certainties we had about matter, and among these the cardinal postulate that matter cannot originate from nothing.

Instead, quantum mechanics had the extraordinary power to generate matter from nothing, not only that the matter thus generated demonstrated a very complex structure, formed by numerous subatomic particles linked together by mysterious forces, but able to unleash all their power in particular conditions.

The "probable certainties" advocated by his method, have fascinated the other branches of the natural sciences, chemistry and biology, astrology, etc., producing a parallel conceptual revolution even in these disciplines.

Birth of Quantum Biology

Biology has been more influenced by the new paradigm, so much to transport it from the molecular level, previously the most accredited, to the most recent quantum level, with a qualitative leap of all intermediate levels.

Eminent researchers, thanks to biology, now emancipated from the molecular to the quantum level, have finally understood what is the essence of life and the mysterious force that animates living matter.

These researchers have abandoned many of the established theories and conceptions based on antiquated molecular models, for the most reassuring quantum systems where waves and fields of immaterial consistency and evanescent substances hover, but easier to dominate with mathematical abstraction alone.

Starting from the assumption that all cells are formed by atoms and that all atoms obey the laws of quantum mechanics, quantum-biologists have obtained fundamental results in understanding some essential biological activities, among which we must point out [4-9]:

1. Chlorophyll photosynthesis;
2. The function of smell;
3. Migratory orientation of birds,
4. The functioning of neurons;
5. The origin of thought and consciousness.

According to the new conception all these phenomena would be under the influence of electromagnetic waves, which with the various expressions of resonance, entanglement, and collapse of wave function, etc., control and regulate their operation.

This theoretical setting reaches its peak in the interpretation of phenomena when describing neuronal activity and consciousness.

In the description of this mysterious function, the quantum-biologists fall into an embarrassing logical conflict between the conflicting conceptions of the individual authors, when they attribute to different cellular structures, from the cytoskeleton to

DNA, the origin of the same cognitive activities.

Let us summarize the terms of the question by examining the various hypotheses proposed for example on consciousness, each of which is based on more or less consolidated quantum bases:

• Francis Crick formulated the idea of consciousness as an effect of tuning to the same frequency as neurons that constitute specific anatomical-functional areas of the human brain: the Neural Correlates of Consciousness (NCC) [10];

• Penrose, Hameroff, Higgins, Lambert, Al-Kahalili, as we shall see later, attribute the functioning of the brain and the functions related to the activity of neurotubules [11];

•Several other authors propose alternatively that the guiding force of all cellular activities, consciousness and cognitive functions included, originates in DNA, conceived not only as a coordinating center of genetic replication and protein synthesis, but also as a center for the transmission of electromagnetic frequencies capable of directing and coordinating all cellular activities [12-14].

We close the quotations extracted from the "garden of wonders" of scientific production on the subject, citing the incredible hypothesis of Rafi Letzter reproduced in the article:

"An Ancient Virus May Be Responsible for Human Consciousness, Live science February 02, 2018"

The author argues in this article, that consciousness would originate from an ancestral virus. It obviously ignores the elementary fact that viruses, as well as first-year biology and medicine students, know, mutate and evolve continuously and with remarkable frequency, how it is possible to identify in such a wide continuum the original virus is a mystery.

The Cytoskeleton Regulatory Centre of Neuronal Activity

In this work we are going to examine one of the aspects and interpretations of quantum biology that presents many contradictions.

We refer to the supposed regulatory activity of the cytoskeleton and of the neurotubules, considered the coordinating and motor center of all nerve activity.

Thanks to the new conceptual tool of quantum biology, it is possible to explain how our brain works, and even the origin of thought and consciousness.

Well, our thought and brain activity is all enclosed in some organelles that make up the cytoskeleton.

Let's go explain it.

The cytoskeleton is the texture that forms the network present in all eukaryotic cells (they are those with nucleus) and is formed by a complex scaffold of three different types of fibrous proteins: which are microtubules, microfilaments, and intermediate filaments Fig.1.

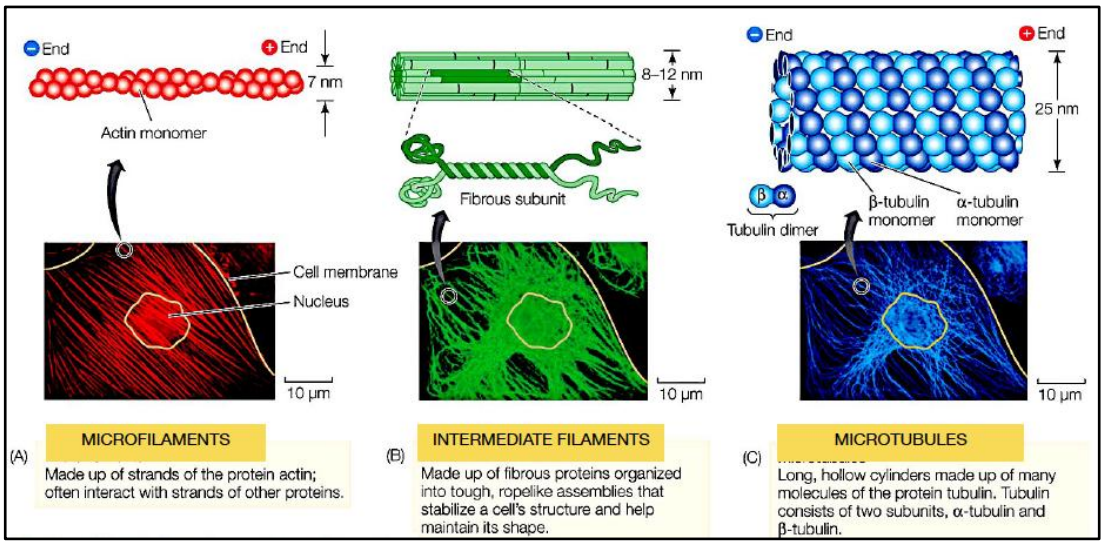

Figure 1: Graphic representation of the structure and composition of the cytoskeleton

This scaffold has a double structural and functional activity because it forms the substrate that maintains and modifies the shape of the cells and is responsible for some fundamental cellular activities.

These include the movement of intracellular organelles, cellular movements, and the control of all phases leading to cell division.

Microtubules undoubtedly contribute to the development of axonal and dendritic processes of neurons and are the basis of support for the movement of many organelles, synaptic vesicles, receptors of neurotransmitters, signal molecules, etc. However, they require the binding of support proteins, Kinesin and Dinein.

In addition, for their synthesis require the association with accessory proteins (bridge proteins), essential for the assembly of cytoskeletal structures and for their operation, Tab1.

None of the three classes of proteins that form the cytoskeleton have a stable structure but are in continuous dynamic change to carry out the specific activities necessary in the life cycle of the cells.

The description of the properties of individual proteins requires a specific and complex treatment that goes beyond the objectives of this paper.

Instead, we are going to pay particular attention to microtubules, which have been the focus of research in recent years.

The reason for this interest lies in the fact that many scientists, in particular quantum physicists have identified the structures of the cytoskeleton as the main responsible for nerve activities.

The morphological transformations, the transmission of the nervous impulse, the movement of the vesicles of the neurotransmitters, the intellectual function and even the consciousness, are all due to the presence of the neurotubules that direct the main brain functions.

According to this conception, if our brain works, we owe it to the neurotubules.

And how does this miracle happen? Thanks to the electromagnetic waves that direct the whole device.

The new paradigm of neurobiological conception has been elaborated by some eminent scholars, in particular quantum physicists, among whom stand out the names of the aforementioned Higgins, Penrose, Lambert, Al-Kahalili, etc. [8-11].

According to the explanations of this discipline, neurotubules are the only ones responsible for all neuronal activity that act under the synchronized direction of electromagnetic waves. Everything else serves no purpose [15-23], Fig.2.

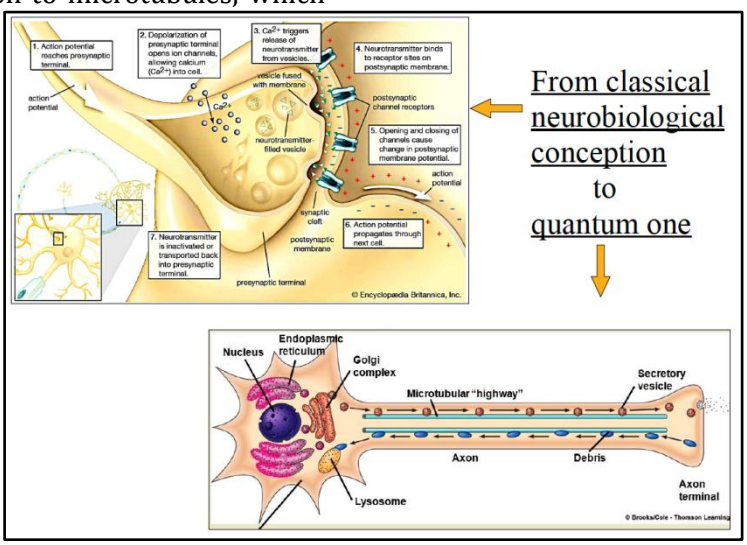

Figure 2: Scheme of comparison between classical and quantum neurobiological conception

The neurotubules are not the factotum of the whole neuronal physiology, since their assembly is the epigenetic result of numerous stages of protein synthesis of the constituent monomeric proteins, tubulins, and proteins that accompany them, and other fundamental metabolic processes.

Moreover, they act in close association with the other components of the cytoskeleton, the actins of the intermediate filaments, Tab.1.

Tab1: Proteins associated to microtubule and their function

Microtubule Associated Proteins	Function
Stathmin	Depolymerization
XMPA215	Polymerization factor
EB	Polymerization, Stabilization, Recruitment of proteins
DCX	Polymerization factor, Stabilization
CLASP	Stabilization
APC	Stabilization
mDia1	Stabilization
mDia2	Stabilization
Tau	Stabilization
MAP2	Stabilization
Spastin	Microtubule severing
Katanin	Microtubule severing
Kinesin	Cargo transport
Dynein	Cargo transport
MACF1	Actin-Microtubule interactions
Cdc42	Signaling molecule, activates PAK
Rac1	Signaling molecule, activates PAK
RhoA	Signaling molecule, mDia1
PAK	Signaling molecule, inhibits stathmin

This theoretical approach overlooks the fact that upstream of the functioning of nerve cells there are two fundamental events extremely laborious and complex: neurosympathetic transmission and protein synthesis of neurotubules and neurofilaments of actin.

But the question that arises is: even if the trigger stimulus originates from the frequencies emitted on microtubules or microtubules, from which neuronal circuits the stimuli start and to which others are then transmitted and decoded, and how they interact with the complex integrated and interconnected brain system?

We know that there are networks and nervous systems that express a different activity in specific brain areas, some are excitatory, some are motor, others are modulatory, but all depend on the fundamental function of synapses.

So that many pathologies depend on genetic defects in the synthesis of channels and ion exchange pumps present at the synaptic level, while they do not compromise the synthesis of neurotubules.

Neurobiological Bases of Neuronal and Synaptic Transmission

1. Nerve and synaptic transmission can be represented synthetically in the following phases Fig.3:

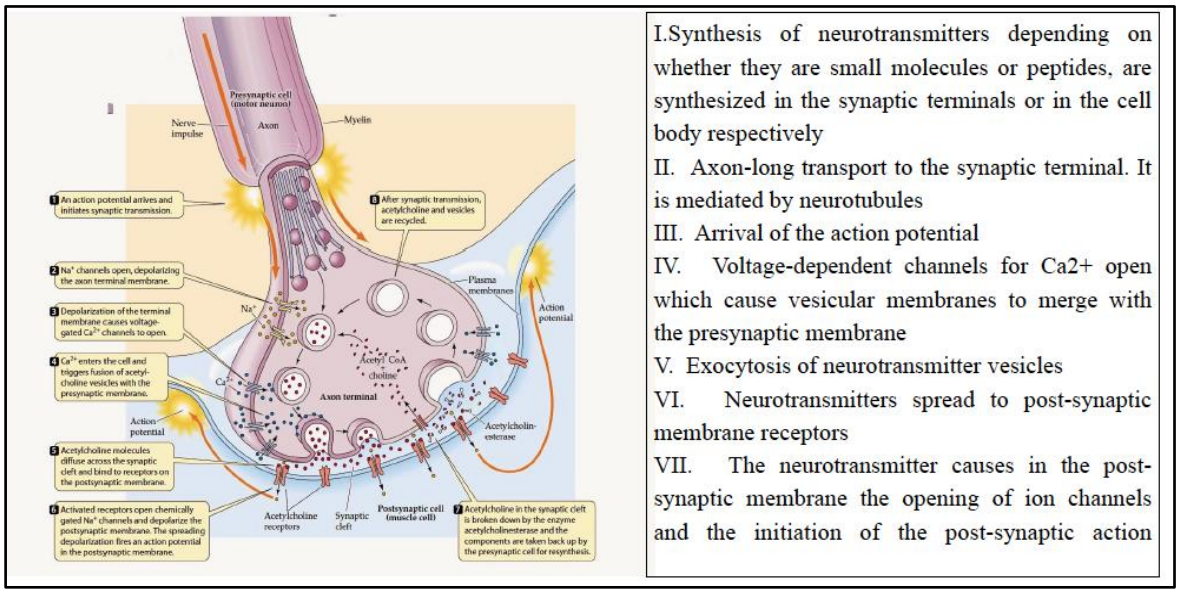

Figure 3: Sketch description of synaptic transmission

Synapses are the fundamental structures where nerve activity is processed.

They are distinguished into electrical synapses and chemical synapses. With the type of neurotransmitters that carry in the post-synaptic membrane determine the neurological effect, excitation, inhibition, modulation. They therefore represent the true effectors of neuronal functioning.

2. Protein synthesis of the neurotubules and actin filaments occurs according to the following steps Fig.4:

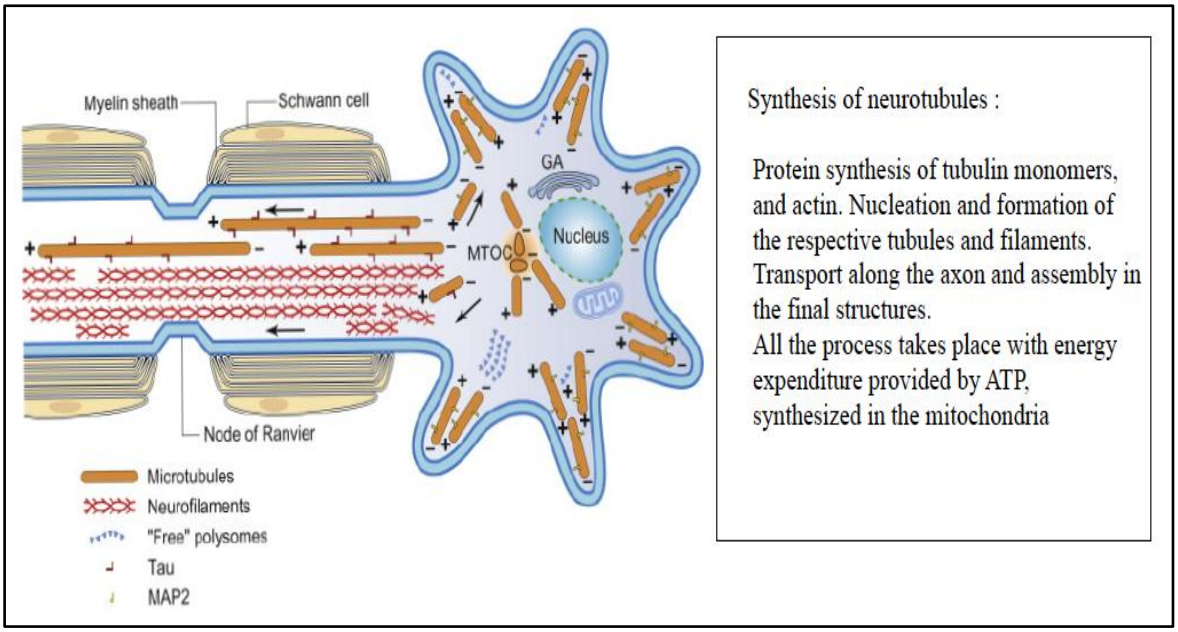

Figure 4: Scheme of protein synthesis for the formation of microtubules and actin

The protein synthesis of neurofilaments and neurotubules follows the classic rules typical of all protein synthesis, which lead to the formation of monomers (tubulin) and the control of their assembly. Therefore, the cytoskeleton is the result of epigenetic events and strictly depends on the correct procedure of all the stages leading to its synthesis.

So that it must be considered only a fundamental stage of neuronal metabolism, and not the person responsible for its functioning.

Starting from this observation, we summarize all the metabolic stages that lead to the formation of microtubules, which are not considered by the quantum conception.

Being formed by proteins, microtubules and microfilaments are subject to protein synthesis, which involves the known sequences according to the central dogma of biology: DNA-RNA-protein synthesis.

- DNA contains information that is transcribed into the mrn;
- Proteins are synthesized in ribosomes based on mrna information:
- Protein synthesis needs energy in the form of ATP, which is produced by mitochondria;
- ATP synthesis occurs in mitochondrial membranes by transport and exchange of hydrogenions and electrons linked to them, with the chemosmoticmechanism;
- In the absence of oxygen, in aerobic organisms, ATP is not formed;

Moreover, it is also essential to remember the role of the cell membrane, which ensures the exchange of substances with the outside, maintains the energetic homeostasis and the electrolytic and osmotic composition of cells, using transport structures present in the cell membrane, in the form of protein channels and receptors.

Finally, to communicate with each other neurons produce simple and complex molecules with high informational content, represented by neurotransmitters and hormones Fig.5.

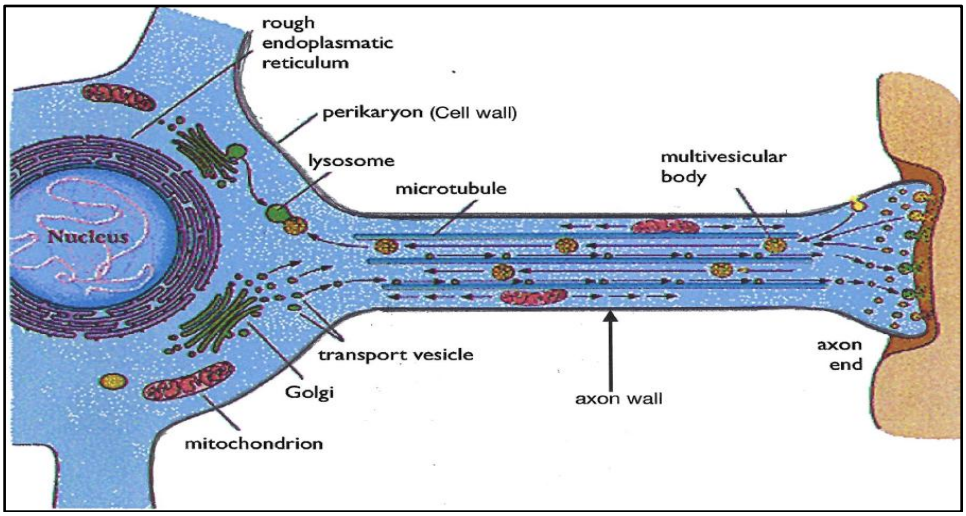

Figure 5: Function of neuron and neuron cell wall

The Cytoskeleton in Plants, Bacteria, and Protozoa

We complete the description of the cytoskeleton recalling that present in other organisms.

Plants also contain the cytoskeleton, which has some differences in structure and function compared to the animal.

Unlike the animal cytoskeleton, the plant cytoskeleton is composed exclusively of microtubules and microfilaments, which act in synergy. The main differences concern the behavior of such structural proteins that have the morphogenetic function and control of cell division. Their activity is influenced by :

• The light responses of microtubules and actin microfilaments where cell elongation is blocked in the light. Fototropism

• Gravity can induce fast bending responses (gravitropism) and slower morphogenetic responses that tune plant architecture with gravity (gravimorphosis).

• strong response of the microtubular cytoskeleton to plant hormones.

A similar structure to the eukaryotic cytoskeleton has also been demonstrated in bacteria, this has a role in morphogenetic definition. It also intervenes in reproductive multiplication, but nothing more. In any case we cannot attribute to this structure the task of center of awareness and consciousness even in microbes.

It is interesting to note the fact that bacteria also have DNA, which according to other researchers would be the true responsible and regulatory center of consciousness.

Which of the two postulates is true?

In protozoa, the structural elements of the cytoskeleton play fundamental roles: in cell division, protection, shape determination, movement, determination of polarity.

From Classical Neurobiology to Quantum One

The concept of quantum neurobiology described above reduces all neurological functions to the activity of the protein structures of the cytoskeleton or other cellular components.

The logical short-circuit thus produced greatly facilitates the description of the extraordinary complexity of neuronal networks, reducing them to elementary structures and to a circumscribed space-time phenomenon.

Many biologists have converted to the new quantum belief and have denied the classic concepts of neurobiology and have abandoned the theories that we thought consolidated not only on neurobiology but on all cell biology.

So, all the cellular structures described by molecular biology have lost their functions, and we have to think about how to relocate them into new quantum systems.

The cell membrane has lost its function due to electrical activity and nerve

transmission and the fundamental exchange of neurotransmitters at sympathetic levels.

The mitochondria and the Golgi apparatus have given up their role and have been supplanted by the cytoskeleton main creator of nerve activity.

And what will be the fate of receptors, complex transport systems and ion channels present on the cell membrane, specialized in function and arrangement?

The Central Role of Synapses

However we want to assign the priorities of the single structures, it is undeniable that the synapses are the final effectors responsible for the neuronal functioning Fig.3.

They are the regulatory center where the synthesis of all signals that are carriers of information between cells takes place and where the adaptive response to environmental stimuli is processed.

At the level of synapses occurs the expression of various systems: cholinergic, adrenergic, gabaergic, serotoninergic, and so on, which preside over the most important nerve functions.

They also represent the most important target of the pharmacological activity of therapeutic and toxicological substances.

A similar function is performed by the neuronal membrane that has the dual function of protecting the transmitting complex, forming the contact between adjacent neurons and generating the nerve conduction that frees the chemical messages at the synaptic level.

In summary, the neuronal membrane with its branchings creates contacts between contiguous neurons, generates the action potential that releases neurotransmitters in synapses, protects the thin texture of the cytoskeleton that transports and directs the traffic of synaptic vesicles Fig.5.

Instead, the cytoskeleton has the function of guiding the branches of the cell membrane, transporting the neurotransmitters and cellular organelles, which synergistically maintain the nerve function, presiding over the cell division that is almost totally absent in neurons.

In this complex organization chart in constant dynamic equilibrium each component is essential for the functioning of the whole system and there are no parts that play an indispensable primary role.

Disruption at any point of the metabolic and functional process compromises and alters the vital activity of the whole apparatus.

All the neurobiology until now considered valid and essential in the study of the brain has been overcome and replaced by the neurotubules that, according to quantum physics, have assumed the role of protagonists for neuronal functions.

The fathers of neurology Charles Sherrington, Camillo Golgi, Ramon y Cajal's, etc. were buried with a tombstone!!

But the new description presents numerous conceptual flaws, which we try to highlight.

The reductive conception that compresses the complex activity such as the nervous one, to a single aspect, is a mental deformation, which leads us to identify the complex natural phenomena, as a sequence of instantaneous manifestations each of which assumes the primary role and is held responsible for the totality of the phenomena themselves.

Whereas every single manifestation is the effect of other causes and events that have played an important role in the determinism of observed phenomena.

Only a short-sighted and reductionist theoretical conception can force the extraordinary complexity of the functioning of neuronal synapses, still not completely understood, to an elaborate molecular quantum mechanism, with mathematical formulas by suffrage.

The neurotubules thus must shoulder the heavy responsibility of making the whole brain work.

Focusing attention on these complex proteins, and their Orch-OR (Orchestrated Objective reduction) according to the theory elaborated by Penrose [11]is anti-scientific, because it does not consider the previous causes that produced them and the resulting epigenetic effects.

So that an infinitesimal event in the myriad of other activities taking place in a cell becomes solely responsible for the essence of life.

Then of all an infinitely complex process and in continuous transformation and evolution, of which it is difficult to determine the boundaries of space-time, it is examined and describes only a single instant, a frame, and then extrapolate the obtained data to the whole system in its entirety Fig.6.

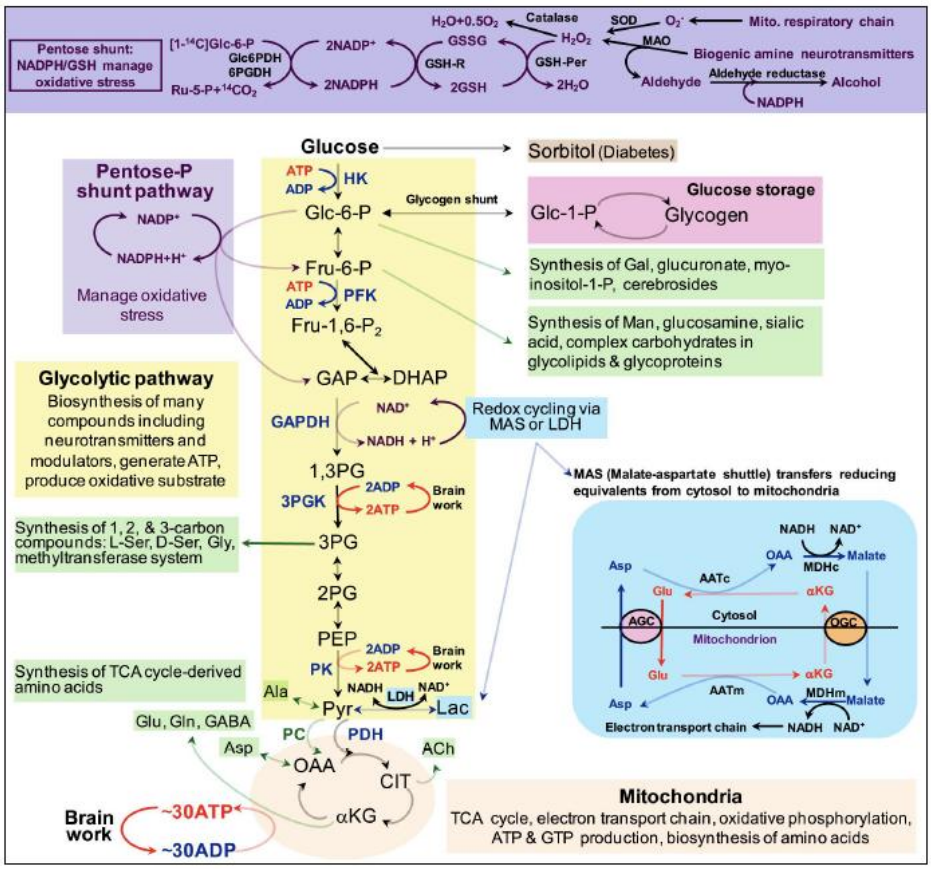

Figure 6: Scheme of Brain Metabolism: Integration of Energetics with Function

With the same logic quantum mechanics from the instantaneous Big Bang and singularity, makes all the matter of the universe derive.

For any cell to function and live it is necessary that all the structures described, plus others not mentioned by synthesis, act synergistically and synchronically in a coordinated way.

It is sufficient that any of the above processes does not work to compromise cell life and function.

Holistic Approach

If we want to interpret all the neuronal activity with a different approach from the quantum conception, we could say that the fundamental elements for the functioning of neurons, are not the neurotubules, but citing them in random sequence, the neuronal membrane, protein synthesis, the Golgi membrane, neurotransmitters, mitochondria and the flow of electrons resulting from it and oxygen their terminal acceptor, because missing this the cells die.

More realistically, every event or phenomenon that occurs in nature does not have an origin and an end, these time limits we arbitrarily assign them only by convention, but they are processes with a space-time continuum of which we often fail to delineate the boundaries.

So, if we are particularly impressed by a single aspect, we will focus our attention on that neglecting everything else.

The same selective cognitive mechanism occurs when we observe phenomena in the laboratory, decontextualizing them from their original conditions.

If we culture cells isolated from an organism to examine a particular behavior, then we can't extrapolate the results that we get to the whole organism from which they come and into which they are inseparably integrated.

Neglecting the interactions that take place between all the organisms of an ecosystem, and the effect on them produced by the ecosystem itself, means altering the natural conditions and obtaining partial results.

Because it is quite clear that there is a close bond of mutual interaction between microscopic and macroscopic ecosystems and all the agents and events in them.

Conclusion

As we have seen, neurotubules are proteins, therefore, depend on the protein synthesis that takes place in the ribosomes, and if this does not work properly these structures do not form or are defective.

So we ask ourselves some questions, hidden by the quantum conception:

Why, despite the structural uniqueness of the neurotubules preserved during evolution in all eukaryotic organisms, from protozoa to man, these exhibit completely different behaviors?

Why is one subject normal while another is schizophrenic or autistic?

What changes? The different state of aggregation of the cytoskeleton? Or more likely is different the complexity of neuronal circuits and neurotransmitters?

Neurotubules and tubulins have specific binding sites for anesthetics, so anesthesia selectively blocks their activity. Why does anesthesia only affect the neurotubules of the brain, while the other organs continue to function? Maybe the other organs don't contain the cytoskeleton?

And why do anticancers, which are poisons for the mitotic spindle and block the function of the cytoskeleton, when they are given to cancer patients, not change the brain activity of these patients?

There are many questions to which quantum biology does not give convincing answers.

The fundamental error in our opinion depends on the fragmented and sectorial vision of natural phenomena, and the disproportionate faith in the pre-ordered theories and formulas with which we want to interpret phenomena of such complex scope.

A holistic vision of nature and its many extraordinary expressions can be the only correct way to face its infinite mysteries.

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