

# On the Origin of Space

## Part 3B: Non-Local (Holistic) Life - Recent Evidence

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### Abstract

*Recent microbiological experiments are shown to be strong evidence of the holistic aspect of Life, betraying the role of space not covered by present classic and quantum physical approaches. Their results are evaluated through the understanding of space being built by its contents. A proof is thereby given of the existence of space manifolds sustained by living materials and connected to ordinary space. The evaluations presented here are examples of logical analyses that can be performed through the proposed physical approach to space.*

**Keywords:** holistic life, spatial organization, space manifold, quantum dynamics, biological cell, mitosis, centrosome, centriole, tubulin, actin

### Introduction - The challenge of unobservable physics

An earlier attempt at a holistic physics for the biological system Penrose and Hameroff looked at (see first part of this article) was reported by Bornens based on *observed unexplained local inertias* in the motion of biological cells.[1] Following the philosophical line of Thom,[2] the cell was seen as organized through a mechanical *gyroscopic effect* originating the inertias. A few years later, it became obvious that the system in question, the “centriole” of a cell,

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did not rotate at all.[3] On the other hand, it was confirmed since that time that dead bodies weigh less than live ones,[4] and thus the locally observed warps of space remain physically there to be accounted for.

Separately, while we gained a very detailed knowledge of the many chemicals involved in biological cell operation from the 1980s through now, we also saw a world that was operating like a magic ballet, with a priori separated large molecules localizing at specific areas of the cell as if these molecules knew the purpose or intent of the cell they belonged to, and moved accordingly. The chemists thought they could explain that strange behavior through chemical reaction “cascades” defining chemical “signal pathways” that somehow could give directions to molecules to move of their own to the locations intended by the organism as a whole, and build the complex structures we see there. A slew of “motor” proteins were identified that way, seen as coordinating their Newtonian mechanistic motions very much like enchanted beings, or, in a barely more realistic way, following a scent called a “signal,” spread by an unknown master controller of the cell, even though the cell medium does not lend itself to classical diffusion. Self-assembly of exquisitely detailed devices were observed everyday in microbiology, with molecules seen as following “tracks” like pheromone trail for ants spread by the master controller who presumably decided on the assembly. Everybody knew this was a tall tale, but nobody had a better story, so such tales were put in textbooks.

However, *even when taking the above unsubstantiated odd mechanical views, a few key happenings could not be explained.* Stearns [5] reiterated the mechanistic knowledge recently acquired on the system originally looked at by Penrose and Hameroff, admitting that “the molecular mechanism of [centriole] duplication remains obscure,” and “the significance of this unusual perpendicular orientation of centrioles to each other is still unknown” after so many years.

These mysteries, adding to the perplexing observed local inertias tied to these same centrioles, have been with us for now over 25 years, and no (classical) mechanistic answer is in sight.

## **A review of the literature**

As a result of such an impasse in the theoretical handling of microbiological phenomena, a search of the literature has been conducted to find out whether similar situations are encountered in other areas of microbiology. Many such ar-

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eas were indeed found, where the chemical approach to Life was manifestly insufficient.[6]

Recently, even more unexplained happenings were seen for the system mentioned above, [7] reporting: “When centrioles are induced to disassemble by injecting cells with antibodies to [the molecules making up the centrioles], the surrounding cloud of pericentriolar material becomes dispersed; but when the antibodies are degraded, this material once again becomes concentrated around reforming centrioles.” Not even (enchanted) helper molecules are seen around re-assembling them. Humpty Dumpty indeed appears to put itself back together in our body.

This *de novo assembly* of centrioles was confirmed in a summary review by [8], reporting numerous facts, including observation of such assembly in (1) mouse embryos, (2) some amoebae, (3) parthenogenetic species (or artificially induced parthenogenesis), as well as (4) direct re-assembly after a localized laser beam destroys the centrioles.

On top of this, *duplication mishaps* were reported in the centriole duplications, showing an even more fancy geometry with no known explanation.[9]

Finally, cell duplication *as a whole* was also found displaying a very *odd collective behavior* of the supposedly separate structural molecules in that cell.[10]

There is then no longer any question as to the presence of non-local (holistic) phenomena in Life. The question is instead turned toward the physical origin of such effects.

### **A new attempt at a quantum effect – with space now included**

Since the problems identified above all deal with spatial organization, the structural behavior of space itself must be somehow involved. [11] showed that space may be envisioned as a quantum entity, with a superposition among many spaces leading to the alternate cosmology described in [12]. Following that line of thought, we have also hypothesized in [13, 14, 15] another feature of the quantum aspect of space, but this time at the biological cell scale, where a *space dual layer* was postulated to be sustained by certain large molecules. Among several other aspects of the resulting physics, we addressed in these last references the question of the bizarre geometry of centriole duplication and its associated molecular system (microtubules). Here we will address the more recent

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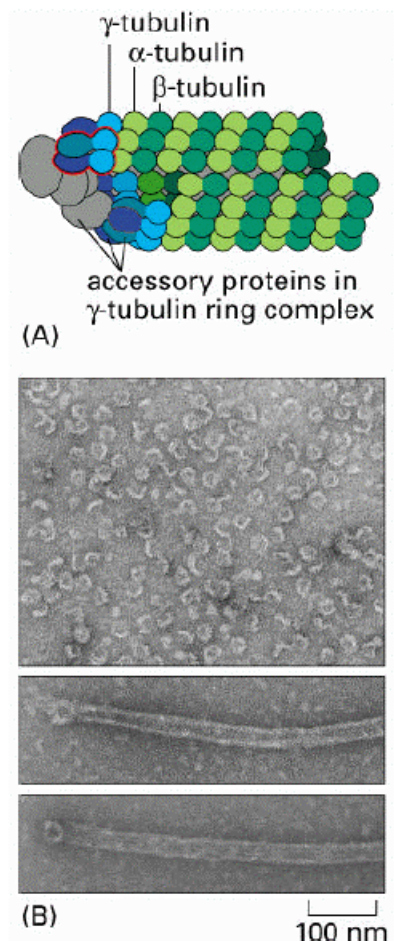
experimental findings about *de novo assemblies*, the *duplication mishaps*, and *cell odd collective behavior*, since these effects appear to be separate from the overall function of centrioles handled earlier.

### **De novo assemblies**

Knowing that (1) centrioles are cylindrical polymers of  $\alpha$ - and  $\beta$ -tubulin proteins at the base of the microtubule (MT) network of the cell,[3] (2)  $\gamma$ -tubulin is found at the center axis of the centrioles,[16] and (3)  $\gamma$ -tubulin appears in the spheroidal-looking pericentriolar material (PCM) around the centrioles (called the cell “centrosome”), we need to concentrate on the function of these newly discovered  $\gamma$ -tubulin proteins in the spatial configuration they take in this PCM. As studied through the 1990s, they have been found to build themselves into lockwasher (twisted) ring assemblies, nucleating MTs out of the PCM (Fig. 1A).

[17] described the result of reducing the number of  $\gamma$ -tubulin rings in the cell: Besides decreasing the number of MTs in the mitotic spindles, some cells lose their centrioles *as they can no longer replicate*. In fact *the daughters have been found to be no longer perpendicular to the mother*. The conclusion is that  $\gamma$ -tubulin rings are crucial within the physical space picture of the cell centriole system otherwise described in [14, 15].

The disappearance and rebuilding of centrioles is then explained by the very presence of these rings: The spheroidal shape of the centrosome surrounding the centriole is a clue on the physics when you add the image of the hundreds of rings spotting this spheroid (Fig. 1B): Geometrically, they have to be part of the parent centriole leptonic space manifold.[14, 15] So when the centriole is zapped or dissolved, the quantum evolution pattern they had from that parent is retained by them. The destruc-



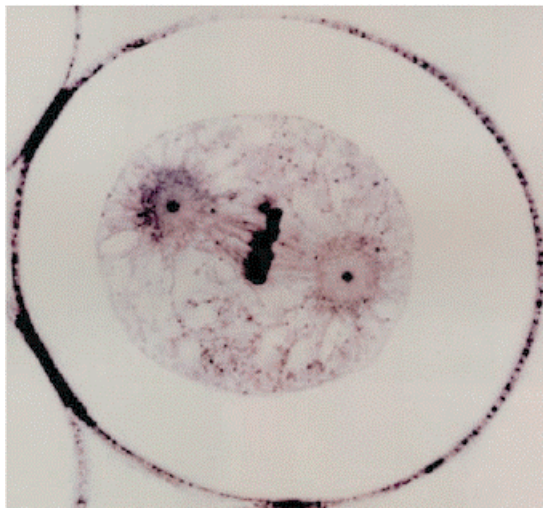
**Fig. 1 -  $\gamma$ -tubulin lockwasher rings in the PCM**

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tion of the parent is creating a void in their quantum dynamics, so that dynamics has to rebuild the parent, and this in the same way the parent generates the child as the previous reference describes.

The fact the PCM (and its rings) is tied to the parent centriole leptonic manifold is confirmed by the known description of how the PCM with its various component molecules is observed splitting between the parent and the child centriole.[18]

Separately, it has also been made clear [8] that the PCM acts as a partner of its centriole by receiving a centriole from the sperm of the partner during meiosis, thereby potentially mixing its *dynamical quantum program* with the one from its partner as part of the sexual reproduction of the organism, a potential “dynamical genes” exchange, complementary and completely separate from classical DNA genes.



**Fig. 2 - The centrosome as seen by Boveri at the end of the 19<sup>th</sup> century [20]**

The formation of the  $\gamma$ -tubulin rings and other structural material (such as pericentrin – see [19]) into a spheroid surrounding the centrioles, as Boveri saw now over a century ago (Fig. 2), may be getting at last an explanation.

The function of  $\gamma$ -tubulin at the center axis of the parent centriole remains now to be addressed. Since the spheroid called “centrosome” is centered on the parent centriole, the child centriole is not at the center of that centrosome, and thus it does not dynamically connect in leptonic space with the spheroid, only with its parent. Then  $\gamma$ -tubulin allows the proper superposition of the parent and child in leptonic space by giving a *physical axis of symmetry for the quantum dynamical evolution*. Without *physical* axes of symmetry superposing in leptonic space, the superposition of centrioles to complete the quantum dynamics can no longer happen, and thus the child can only drift away from perpendicularity in normal space, as observed.

### Duplication mishaps

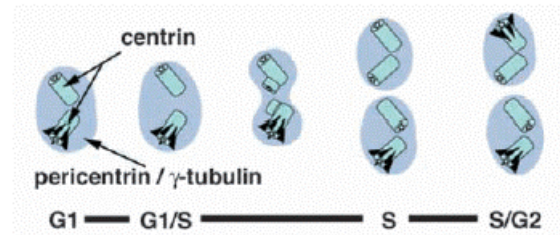
[9] show that, in the case of *Drosophila* wing disc cells, preventing the mitotic phase checkpoint signal (CDK complex) from appearing from the nucleus, randomly results in centrioles having

- (1) A daughter with lengths different from the mother, or
- (2) Two daughters, with different lengths from the mother, or
- (3) Grand-daughters.

Through the quantum system described in [14, 15], it can be seen that, if you don't act on the centriole quantum dynamical program at the times when it must be acted on, you will get the above, depending on whether

- (1) The mother program is longer than the normal mitotic phase,
- (2) The mother program is shorter than normal mitotic phase time, leading to a duplication program repeat, or
- (3) The program from the  $\gamma$ -tubulin rings in the PCM triggers a new round of duplication from the daughter.

The centriole program reaching the stage of centriolar feet (fin appendages), such as in the *mammalian* case (Fig. 3), [21] is much more sophisticated than ones leading to no feet as for the



**Fig. 3 – Mitosis with centriolar feet**

*Drosophila*, and this because the addition of feet on the daughter

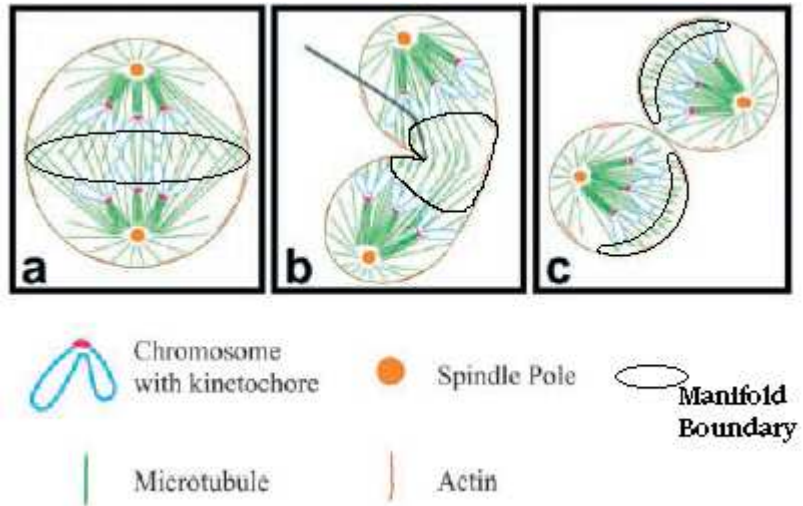
occurs then at a certain phase of mitosis (S/G2), allowing an additional checkpoint: An additional feedback from the DNA system is then provided through  $\delta$ - and  $\epsilon$ -tubulin generation by the DNA system to build the feet, and thereby the mishaps when the only independent checkpoint of the program from the nucleus is removed. (A centriole does NOT replicate in isolation without its feet, i.e. as seen from its spirochete origin, it must mature in order to have children on its own.)

[9] were looking at centrioles from an organism which, not only never gets centriolar feet, but also has only one tubule per centriole slat instead of 3 in normal (mammalian) centrioles, so their program must have less possible quantum pattern routines on which the DNA system can act.

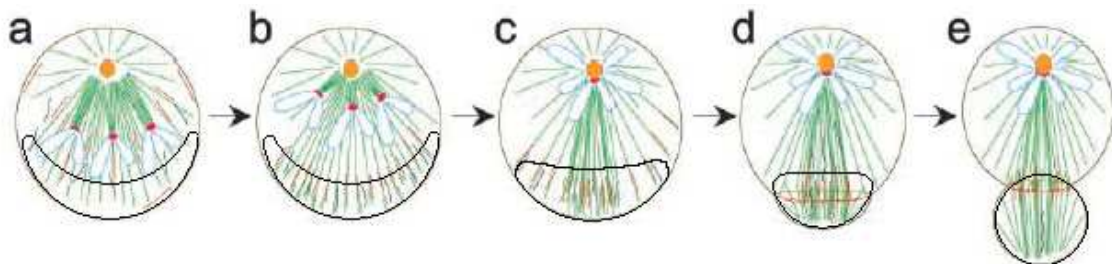
Due to the resulting mitotic instabilities, [9] state that "the possible involvement in genome *cancerous* destabilization emphasizes the importance of understanding the basis of the regulation of daughter centriole assembly." This understanding is the main goal of [13, 14, 15].

**Cell odd collective behavior**

[10] in fact goes a long way toward proving the theory laid out in [13, 14, 15]. Fig. 4 shows a cell being cut while going through duplication, giving two cells with only one spindle pole.



**Fig. 4 – Cell in anaphase being cut**



**Fig. 5 - Asymmetric furrow induction**

Then in Fig. 5, in each cell, the chromosomes con-

tinue their move poleward and actin filaments accumulate toward exposed plus-ends of microtubules (b, c). These filaments then bundle into a *contractile ring* and initiate an asymmetrical furrow (d). This furrow then *ingresses* toward (upward) the new equator of the spindle as the new bottom half-spindle of microtubules elongates, extending the cell into two bubbles (e). Per [15]:

"The final separation of the daughter cells involves the transient formation of an actin 'cleavage furrow' ring seen in the literature as 'squeezing apart' the cytoplasm. The localization of actin may be an indication this component of the cytoplasm senses inertial space manifolds connections. It then locates itself at the connection of the two cell submanifold where they form a 3D border due to their different MT dimensions, thus forming a ring in the spindle equatorial plate plane."

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This theoretical line sees microtubules are sustaining two orthogonal space manifolds (outside ordinary space) from the beginning of mitosis as a result of the orthogonal centrioles quantum dynamical evolution generating these manifolds. From its internal quantum dynamics, actin locates normally at the intersection of ordinary space with such manifolds. Here the two manifolds are artificially cut by cutting the microtubules sustaining them, evolving into connected bubbles revealing the intersection of the two manifolds with ordinary space. *The manifold sustained by the microtubules of the cut away pole is very stretched (in a crescent shape) as a result of the cut of its support, so it needs to become a spheroid on its equatorial plate side to relieve its asymmetrical curvature, forcing the observed budding (as MTs sustain that manifold). The internal quantum dynamics of actin senses the intersection of orthogonal leptonic space manifolds, so it locates there, and since we have intersecting spheroids, this spatial intersection gives the observed actin ring in normal space.* Part D of [6] gives more specific immediate evidence of such space manifolds at work.

## **Conclusion**

In spite of early thinking portraying Life as a classical physics happening, and as a result of observations from the past 20 years requiring a physically explanation of the numerous holistic features of Life, we are led now to a very different approach where *space is manipulated by matter*. [13, 14, 15] develop this approach, with here examples of recent findings being analyzed in that light to show its ability to cover detailed experimental facts that cannot be explained via present classical or quantum mechanics. In order to give a broader base for such a novel approach, other non-local physical effects found in living organisms are identified in [6], pointing out there the holistic aspect behind the very precise “coordination” among large numbers of separated elements that present mechanics, chemistry and mathematics cannot realistically explain.

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