

The Cancer Principle-II: Cancer as the Origin of All Life on Earth

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Abstract

Life is the urge for perpetuation and cancer as the agent of disorder is the force that drives this urge in the direction of unrestrained proliferation. The oncovirus strains like HPV and HCV are as old as life itself from its initial incipient stages and the evolution of such viruses has determined the course of evolution of species from within in a bottom-up manner purely through this urge for unrestrained proliferation. The cosmic ordering principle(COP) acts in the direction of arresting the increase of disorder (cancer) by evolving various cancer suppression or evasion mechanisms and thus both contribute to the evolution of all life.

Keywords: Cancer, Evolution, Oncovirus, Oncogenes, abiogenesis, cosmic ordering principle (COP) and the principle of disorder (POD)

Introduction

In the previous essay we have motivated cancer as a fundamental principle of nature that is as old as the universe itself. We wish now to establish it as an agent of the principle of Disorder (POD) that is continuously operating along with the cosmic ordering principle (COP) to give shape to all evolution^[1]. Abiogenesis of life on earth can be seen in light of the cancer principle to shade light on pre-cellular evolution. Up to the formation of methane and ammonia etc. which led to the synthesis of amino acids with the help of the energy from lightening and ultraviolet radiation or from hydrothermal vents in the primordial ocean-atmosphere system there was increase of disorder as per the second law in a global sense^[2]. But simultaneously, there was also the increase of local order in the formation of larger molecules and molecular aggregates gradually going to form the lithosphere^[1]. Wherever the conditions favored the formation of macromolecules, there was rapid growth of such formation as long as catalytic support to the reactants was there. This process could halt only if the catalysts were withdrawn or all the reactants were exhausted, assuming no other inhibiting factors. When

this primitive system favored formation of long-chained molecules such as proteins and nucleotides there were aggregates of such molecules which filled large portions of the oceans^[3].

The exact number of hydrothermal vents, the extent of oceanic surface with proper catalytic conditions are matters of debate and therefore nothing definite can be said about the locations where biomolecules came up, but the ubiquitous presence of life in the form of Archea and bacteria all over the earth points to the fact that large portions of oceanic belts must have had identical suitable catalytic conditions for synthesis of biomolecules. The recent discovery of extremophiles (thermophiles and cryophiles) in uninhabitable regions on earth, hitherto considered barren for life, lead us to propose that even prior to the formation of lithosphere the entire hydrospheric envelop was filled with such biomolecules as would support evolution of life^[4,5]. We may call it the Global Biomolecular Envelop (GBE). This GBE, regional climatic variations notwithstanding, must be taken as the basic substrate for life to manifest^[6]. Once the biomolecules started getting synthesized, there could have been no stopping of such synthesis till different regional thresholds were reached in different belts forming the GBE. The inherent tendency in the GBE to pervade ever larger regions by proliferation is the fundamental defining feature of all life^[7].

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The tango between order and disorder

Upon the emergence of membrane-bound pre-cellular organisms, this fundamental feature of life became converted to *proliferation-by-invasion*. This conversion is due to the operations of the cosmic ordering principle (COP) that tried to curb this inherent tendency of life to pervade by proliferation. The appearance of life on earth is due primarily to a cancerous disorder-producing force which has at its core the characteristics of proliferation and invasiveness and which has little concern for the consequences thereof. The COP has continuously acted to resist and to channelize such irresponsible tendencies as is evidenced by the gradual condensations, and also by the synthesis of macromolecules. These biomolecules started self-replicating under the action of the principle of disorder (POD) without any restraint. The information about interdependent proliferation (Protein synthesis by nucleic acids) of these macromolecules stored in the nucleic acids by the COP was encapsulated within proteinous or lipoproteinous membranes. But the tendencies for proliferation and invasiveness hid themselves within those encapsulated “individuals” as their core characters and these are nothing but the oncogenes in segments of the nucleic acids (DNA and RNA). The protein encapsulated nucleic acids were the viruses and those with lipoproteinous encapsulation were the bacteria and archea^[8,9].

The tendencies for proliferation and invasiveness remained most potently with the viruses but were patent in the archea and bacteria. Invasion into one another with a view to rapid irresponsible proliferation (Cancer again!) was the operating principle among them^[7]. Primordial endosymbiotic mechanisms among archea and bacteria led to the eukaryotes as the result of such invasiveness and proliferation and then on to multicellular complexity^[10,11]. By endosymbiosis the COP ensured the survival of the host as well as that of the endosymbiont.

It has been found by phylostratigraphic analysis of emergence of cancer related protein domains that there was a peak at the emergence of the first living cell corresponding to caretaker cancer genes in tumor progression^[12]. Thus it is that the Cancer principle is at the very origins of life through abiogenesis. Davies' remark, “Cancer can give us important clues about the nature and history of life itself” is thus justifiable^[13].

Origins of Oncovirus

The viruses on their part were always on the lookout for entering others to proliferate which led first to the lytic mode of virulence. Thus the fundamental traits of invasiveness and proliferation due to the POD are present in them as their such virulence factors. The COP intervened to bring about a less virulent alternative in the shape of the lysogenic mode of viral proliferation. The viruses, driven by their irresponsible core characteristic of proliferation and invasion, get attached to the DNA of the host and ensure the perpetuation of virulence^[14,15,16]. Thus the endosymbiotic compromise brought about by COP against the rampaging virulence held sway for survival of both the species. The POD then makes the endosymbiont integrate its genetic material into that of the host for its perpetual proliferation utilizing the cellular mechanisms and the resources of the host. The character of proliferation got ingrained in the organisms as the genes responsible for reproduction. To curb unrestrained proliferation the COP brought about various mechanisms such as longer duration reproductive cycles, programmed cell death and also changeover from asexual to sexual reproduction which necessitates dependence on third party pollinators in case of plants and mate availability in case of animals.

The invasiveness following from POD was initially in a highly virulent mode, but the COP made it symbiotic. It is precisely in this manner that the highly detrimental lytic mode became converted to the lysogenic mode. The cancerous urge for unrestrained selfish proliferation by invasion into other organisms is so strong in the viruses that they have co-evolved alongside all known species beginning with prokaryotes right up to the humans and there are viruses specializing in infecting particular tissues of particular species. The species have also co-evolved to counter such virulence but no species has ever been able to free itself from viral infections. Thus the entire evolutionary process can be seen to be a continuous struggle to counter the core characteristics of proliferation, invasiveness and virulence. The viral strains have evolved to adopt the most unavoidable living processes as their mode of transmission e.g. respiration, reproduction etc. which increase their virulence as well as fitness factors. The most evolved of the viruses are double stranded DNA type which can attach their genetic material to that of the host and by that ensure their proliferation. The HIV, for example, is capable of completely paralyzing the immune system as if having specifically developed the ability to target

human immunoglobulins^[17]. The oncovirus, on its part, appears to have specialized in silencing the tumor suppressor genes.

The oncovirus evolved, preserving within itself the original disorder-producing traits viz. proliferation, invasiveness and virulence all along, to finally be able to activate the human oncogene by producing mutations so that it can completely incapacitate and overpower the highest evolved species by attaching its double stranded DNA to that of the humans^[18,19]. In this perspective it is not surprising that virulence in some form or the other has always been on the rise through the entire course of evolution to achieve a sort of invincibility even in their continuous battle against human intelligence, finally landing in the genetic mode of transmission^[20].

Bacterial Origins of Cancer Cells

The fact that no exact mechanism is known behind (1) the transformation of normal cells to the primary cancer cells (PCC) that initiate cancer and (2) the transformation of PCCs to the secondary cancer cells (SCC) that are responsible for progress of cancer, has led Dong and Xing to propose the hypothesis of bacterial origins of cancer cells^[21]. They base their proposal on the fact that (a) newly formed PCC and SCC are devoid of organelles and look like bacteria (2) Organelle biogenesis of cyanobacterium TDX16 to transform into TDX16-DE by acquiring the DNA of its algal host is

similar to the transition of normal cells to PCC and PCC to SCC. The PCC are hypothesized to be intracellular bacteria that take up and hybridize the DNA of senescent or necrotic normal cells, while the SCC are proposed to be the PCC that take up such DNA and hybridize. This view supports the idea that cancer cells are single-celled eukaryote organisms, to which our above analysis does also point.

Cancer cells as a species

The cancer cell line HeLa has been observed to live in vitro for 50 years^[22] while canine sarcoma cells known as canine transmissible venereal tumors (CTVT) evolves as a unicellular pathogen outside any host and has developed appropriate immuno-resistance to survive in the wild for decades, as if these cells were a new species^[23]. Such transmissible cancers showing inter-individual metastasis prove that cancer cells are indeed living organisms having their own evolutionary adaptations for achieving maximum replication efficiency^[24]. Intra-tumor genetic diversity of the cancer cells qualifies them to be called a species rather than an individual.

This schematic figure below represents the successive actions of the cosmic ordering principle (COP) and the principle of disorder (POD) in the evolution of life and species and depicts how the latter has manifested as the cancer principle and has directed evolution all along.

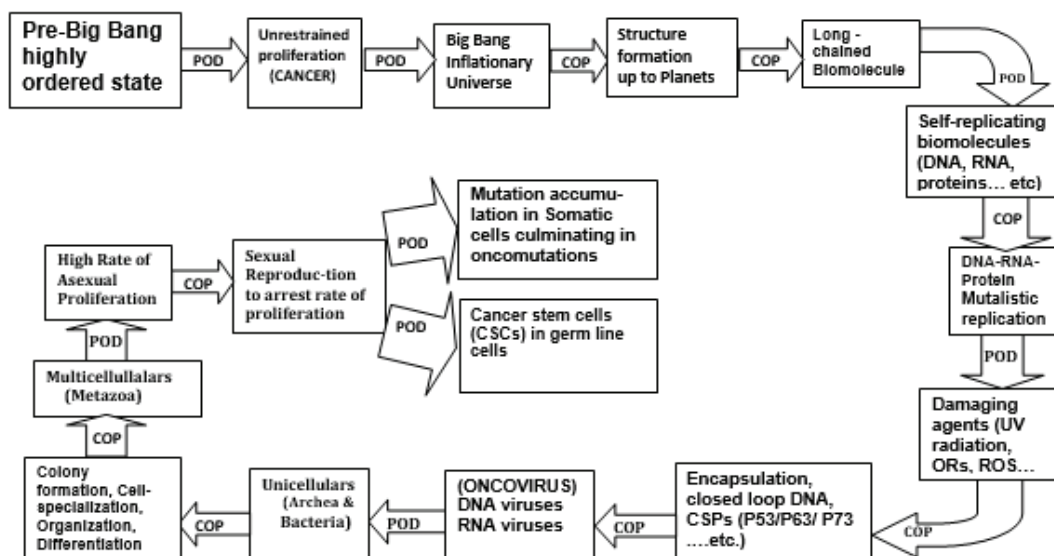


Fig.1. Schematic of Evolution from the highly ordered pre-big bang state up to prokaryotes through the actions of COP and POD

Starting from a highly ordered pre-big-bang state of the universe we have depicted the actions of COP and POD as if competing with each other, and cancer is the agent of disorder and stands for all kinds of irresponsible proliferation that is detrimental to the overall order and organization. As cancer tried to spread its deadly tentacles to engulf all life, the organisms evolved various strategies correspondingly to defend themselves against the menace. The more cancer tried to take the unavoidable routes to manifest, the more specific became the microscopic cellular defenses against it. As per the cancer principle this is the key to understanding all evolution.

Conclusion

With time our knowledge of cancer incidence and progression has entered the genetic domain and oncogenes have been identified. Some oncogenes are isomorphic to the DNA fragments of the early viral strains and which are now identifiable as either the oncoviruses or their precursors. The mtDNA as well as the vast non-coding sector of the DNA have been implicated as having the triggers for the switching on of oncogene expression by the mediation of non-coding RNAs such as mcRNA, circRNA, lncRNA, siRNA and asRNA etc^[25,26].

Thus cancer can be understood as the underlying force behind the emergence of life through abiogenesis as well as the progress of life through viral and then bacterial evolution. The road from viruses onwards can be surmised to have been a series of endosymbioses that brought about the evolution of prokaryotes and then the eukaryotes. In the third essay we will argue that it is cancer that has determined the evolution of multicellularism and of all the species. This gives strength to the hypothesis that cancer is at the origin and is the cause of evolution of life in its variety.

Also there are numerous mechanisms which seem to have been designed to limit the ability of the organism to disobey the decentralized tissue principle in order to reduce the risk of getting cancer. All these important processes in evolution can thus be seen to have come up only to resist undifferentiated cell growth, which is nothing but “cancer”. There seem to be two distinct forces pitted against each other: the force of cancerous growth versus the resistance to cancer. What we see as evolution of life is but the ongoing contest between these two opposing forces of order and disorder, each

operating to defeat the other in multifarious ways. More about this tussle will be discussed in the next essay.

The cancer principle arose out of such musings on its character as unrestrained proliferation, as an undaunted and tenacious march towards immortality as if, it alone were immortal, while all else is mortal.

Ethical Clearance- Not needed for this kind of study

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Conflict of Interest-NIL

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