WHY VIRUSES ARE necessarily ANTI-CAPITAL.

The above title may appear facetious, but it is not. It is scientific. Many of the economic practices designed to maximise profits are unnatural. In terms of ecology they are discordant and as the productive capacity of capitalism grows, so the rebound effect from nature is multiplied. The coronavirus now beginning to spread globally, despite the unashamed cover-ups in the West, is such an effect. This article attempts to describe the balancing role played by viruses in nature.

Four giants stand out in the sphere of science. Newton, Darwin, Marx, and Einstein. Each revolutionised the way we saw and engaged with the natural world, with Marx being the only one to describe how humanity could emancipate itself from the inhumanity imposed by nature. All great scientists stand on the shoulders of those who came before, providing broader perspectives and the tools needed to see further, deeper and in finer detail than previously. Science like time marches on. I think Darwin would be the first to admit, that 150 years after he wrote his masterpiece, our understanding of nature is much more developed.

The materialist conception of history, in this case biological history, holds that if the conditions are right, life will emerge spontaneously. This is the polar opposite to religion which holds that life is designed by an omnipotent being. Or in two words: chance versus design. It was Darwin's book: The *Origin of Species* which demonstrated that the Tree of Life was indeed fertilised by chance. That life is random not designed.

The irony of religion is that an allegedly prefect being created an imperfect world. Hence the parody of the Garden of Eden. If we lived in a perfect world, a world of regularity, a Garden of Eden, it is unlikely humans, when becoming conscious of the world outside themselves, would have had to ascribe a personality to nature to explain its vagaries. Religion would have been unnecessary, for which content species ever needed to reach out for a god. What led to the possibility of seeing these vagaries as a matter of chance, rather than of man disappointing his god, was the growing productive capacity of society now beginning to domesticate nature, the bringing of order to disorder, humans no longer cowed by nature.

But there is more to imperfection than meets the eye. A grandeur of checks and balances, of harmony and discord, of temporary balances all too easily disrupted. It is as intricate as it is deceptive. And those who ignore these intricacies, who do not respect but seek to override these imperfections, will in the end find that the quest for profit becomes a mere chimera. Should we become too alien for our world, then it is likely that it will be us, not some mythical invader from Mars, who will be undone by the smallest of things, viruses.

The Gastro-Intestinal (G.I.)Tract, our personal ecosphere.

Western Medicine will be considered by history as unique. Hitherto all medicine was designed to bring the patient back to health by restoring function. Uniquely, big-Pharma driven medicine seeks not to restore function but to take-over function. Thus organ function now depends on drugs. In this way, by taking over function, the same tablet can be sold over and over again. This is not medicine; it is the medical colonisation of patients by big-Pharma who have turned many doctors into prescribing vending machines.

Little wonder that for decades the medical profession considered the large intestine the site where shit forms. Today that simplistic view has changed, and, the lower reaches of the G.I. tract are now considered to be a complex ecosphere. There are 30% more foreign cells present in our colon than in

the cells making up our body. https://www.nature.com/news/scientists-bust-myth-that-our-bodies-have-more-bacteria-than-human-cells-1.19136 The latest count adds up to 1952 bacterial species in our G.I. tract. https://www.nature.com/articles/s41586-019-0965-1 In addition viruses outnumber bacteria 10 to 1. Finally, we should not forget the 9 species of fungi found there as well. Collectively they weigh about 2 kilograms in an average adult male.

Our G.I. tract is where the world passes through us. Strictly speaking the interior of our tract belongs to the outside world and only that which is absorbed through the lumen of the tract becomes us. Little wonder then that two thirds of our immune system is wrapped around the intestines to protect us from that which passes through us, nutrients mixed with toxins. There is even a little brain located within the tract organising the complex process of digestion and elimination. So if anyone says you have “shit for brains”, reply, “exactly”.

It is not my intention to discuss the reciprocal relationship and function of the microbiome as it is now called. (Note 1 describes one function and its relation to the stress associated with an unkind capitalist system.) Rather it answers a bigger question. Why is the microbiome necessary in the first place? The answer is this microbiome acts as a microbial template of the outside world, the world we inhabit and have to live in. This template protects us primarily by organising our immune system, preventing it on the one hand from over-reacting, and on the other, alerting it to changes in the world passing through. This is one of the reasons we tend to get upset stomachs, as it is called, when we leave our environment and travel to a foreign one. In short, the microbiome familiarises and attaches us to the outside world.

This is the reason it is so dangerous to sterilise our world, and especially the world of the infant. Our immune system is there to protect us, we do not have to protect our immune system. A robust immune system is the key to a healthy life, and a robust immune system is one based on a healthy diet full of roughage intended not only to nourish our bodies but the microbiome as well. In addition, it means contact with the outside world unmediated by antiseptic sprays which do not stay on surfaces but ingress to change the ecology of our lungs and our G.I. tract.

These disturbances can give rise to many problems. Its all about diversity and interaction within that diversity. It is not simply a question of these hundreds of bacterial species and thousands of viral species co-existing alongside each other, having first carved out specific niches for themselves, and with their numbers controlled purely by food sources. They mingle, with viruses acting as phages herding bacteria, ensuring that populations do not explode or killing off pathogenic bacterium. Some viruses coexist in bacteria sharing genetic information. *Scientists consider the virome to be "the largest, the most diverse, and the most dynamic part of [the] microbiome," and the majority of the viruses in our guts are bacteriophages. Wherever there are bacteria, there are bacteriophages in abundance.* https://www.medicalnewstoday.com/articles/327167.php#4

The study of the virome, that is the world of viruses, their functions, purposes and interactions is still in its infancy. New discoveries are being made daily. https://www.inverse.com/article/40584-new-type-ocean-virus-human-gut It is worth pointing out that the USSR in its day was in the forefront of phage therapies because it was not corrupted by big-Pharma.

Later we will see how important this microsphere, or should we say, missing microsphere is for understanding all that is going wrong with capitalist animal husbandry and intensive farming. An excellent book: *Big Farms make Big Flu* by Rob Wallace describes how unnatural, and therefore dangerous factory farming is. Why they are medical and epidemic accidents waiting to happen, and,

at their heart are the viruses, the guardians of the ecosphere. That is why I call viruses anti-capitalist. Viral epidemics are the natural result of violating the ecosphere in which we live in the name of profit.

DNA moves in strange ways.

When the human genome was first mapped, investigators were surprised by two findings. Firstly how few genes were operative and secondly how much of the genome was filled by what they called junk. A better word would have been debris rather than junk. At first only 2% of the genome was considered active. Today that figure is up to 25% and undoubtedly will increase above that. The following link provides a useful journey to this 25% figure. https://www.newscientist.com/article/2140926-at-least-75-per-cent-of-our-dna-really-is-useless-junk-after-all/

Of course, this level of debris provided evolutionists with a decisive argument against the creationists. After all which god would design a genome with so much debris, for god is after all perfect. It seems he must have given the genome "free will" to change itself as and when. But alas, this would reduce god from being a creator to being a bystander as DNA developed a will of its own. Nonetheless we need to be humble. We do not understand the whole of the genome. It still moves in strange ways. Certainly there is debris or more precisely, the history of our evolution fixed in the genome which cannot be discarded without affecting the whole, just as a renovated house which bears little resemblance to the original still requires the same foundation. And finally, just under 10% of the genome bears witness to the encounters and collisions between our genome and viruses over millions of years.

"*The old genetics of the late 20th century was powerful enough evidence of intelligent design, with its systems of highly-accurate transcription and translation of encoded information. Now, we find that the old picture was far too simplistic. And the surprising lack of "genes" found by the Human Genome Project, feeding rumors of useless "junk" pervading our genome, is rapidly being supplanted by evidence of hierarchical codes and functions everywhere. Biologists will of course continue to talk about genes in the future. But genes will no longer be seen as the blueprint for life, even if technological and medical applications of gene technology suggest this. Instead they are increasingly seen as only one of the many resources that organisms make us of in adapting to challenges in their environments.*"
https://evolutionnews.org/2018/05/genetics-leaves-central-dogma-and-junk-dna-in-the-rear-view-mirror/

The point to be made, is that our genome is much more complex than simply a direct biological connection between genes and the cellular manufacture of living proteins.

Random mutations or epigenomics.

Norman Pillon in one of his comments on a recent article on my website guided me to a PDF article by Lawrence N. Goeller which is titled *The Worldviews of Stephen Jay Gould.* *http://www.sjgouldessays.com/content/The%20Worldviews%20of%20Stephen%20Jay%20Gould.pdf*
This is an accomplished review of the writings of Jay Gould, a leading evolutionist, incorporating the arguments, controversies and developments covering the 150 years following the publication of *The Origin of Species.*

What is of particular interest is that Gould shows Darwin not to be dogmatic. Like all great scientists Darwin recognised, that while natural selection was the primary driver of diversity, it did not explain all of the complexities of life. One of the limitations of Darwin's world historical view is its dependency on random mutations.

While mutations were random, the results were not. Only those adaptions that conferred an advantage to the organism, and which were heritable, led to the establishment of the new gene line. Those mutations, which disadvantaged the organism, led to them dying off. Adaption, or microevolution, as originally presented, required an explanation, and random mutation was that explanation.

While it is true that random mutations take place which can either confer a negative or positive change in structure, to rely purely on random mutations is to present DNA as being essentially brittle. And what applies to DNA applies to the genome. Genes and their protein expressions it turns out have multiple not singular pathways.

In fact we know today that the genome is much more plastic. It interacts with its environment to a far greater degree than anticipated by Darwin. *"Epigenetics has put an end to genetic determinism; but by no means supports environmental determinism." "The hallmark of epigenetic inheritance is its dynamism and plasticity. Epigenetics confirms that the causes of ill health are overwhelmingly environmental and social and must be addressed by appropriate policies."* http://www.i-sis.org.uk/fromGenomicsToEpigenomics.php In short our genome is more responsive and flexible than would have been considered in the 19th Century, and its range of adaption more substantial.

And again.

"*Like somatic cells, the epigenome of spermatozoa has proven to be dynamically reactive to a wide variety of environmental and lifestyle stressors. The functional consequence on embryogenesis and phenotype of the next generation remains largely unknown. However, strong evidence of environmentally-driven sperm-borne epigenetic factors, which are capable of…environmentally-driven epigenetic modifications of gametes provide a potential molecular basis to explain the transmission of developmental plasticity across generations, as well as a mechanism to understand "missing" heritability factors observed with certain diseases." "In addition to nutritional factors, numerous prominent laboratories find that other environmental factors, such as exercise, endocrine-disruptors, as well as traumatic stress, influence the developmental plasticity of phenotypes through epigenetic inheritance…"*

"The ***main difference*** between DNA sequence mutations and epigenetic modifications is that the ***DNA sequence mutations result in the changes in the genetic information whereas the epigenetic modifications result in the modifications of gene expression***. DNA sequence mutations cannot be reversed while epigenetic modifications can be reversed." *https://pediaa.com/what-is-the-difference-between-dna-sequence-mutations-and-epigenetic-modifications/*

What epigenomics has taught us is that the environment alters gene expression. And by environment we mean not only the physical environment but also the social environment and particularly stress. One of the most celebrated studies over three generations examined the effects of the deliberate starving of Rotterdam during 1944 by Germany which led to mass starvation and underweight children birthed at the time. They and there offspring were studied for three generations. It was found that the epigenetic effects persevered throughout the generations only beginning to tail off in the third generation, when fewer babies were born underweight despite the diet of their mothers. Here is an associated article of interest. https://jamesclear.com/wp-content/uploads/2015/01/tessa-roseboom-effects-of-prenatal-exposure-to-the-dutch-famine-on-adult-disease-in-later-life.pdf

Another fascinating study involved food preferences. It was found that only on the male line, via modifications to sperm, did the foods preferred by the father pass on to his offspring via a process called transgenerational epigenetic inheritance. This study gave different fathers specific foods and

then found their individual offspring expressed a preference for the foods given to their father. While this is not the link to the experiment it provides a mechanism by which this could happen. https://jamesclear.com/wp-content/uploads/2015/01/tessa-roseboom-effects-of-prenatal-exposure-to-the-dutch-famine-on-adult-disease-in-later-life.pdf

Thus even without mutations, our genes and their supportive structures in the genome are much more responsive to nature and the environment. On the positive side, they help us cope with changed conditions. On the negative side they can be destructive, impairing the functioning of the genomes of offspring.

From the Marxian perspective, that represents dialectical interaction, the movement of information, in this case chemical, from the environment which can alter the way the genome organises itself. In the case of epigenomics we are not dealing with changes to the gene itself, but merely with gene expression. The question remains, are mutations, the actual change in genes, completely random, merely a matter of chance.

A recent body of research shows, that while mutations are random they could be directed by environmental pressures. This research concerns itself with the rate of mutations and the area in which mutations occur. They show that while mutations are random, their rate is not. A number of experiments with bacteria have shown that when these bacteria were stressed environmentally, the rate of mutations increases.

At first this seems counter-productive as the more mutations, the more disorganised the genes, the more the organism is put at risk. A mind game can answer this predicament. Let us assume a room with the walls closing in reducing its volume. Survival is at risk. Change is essential. Now the more doors that open in the walls the greater the probability that one of the altered organisms will escape and survive, because each door represents a chance mutation that is unique.

What this means is that microevolution in response to changing environmental conditions and circumstances, could be much more rapid than purely random mutations would suggest. More rapid than those changes caused by radiation or faulty transcription. For a fuller explanation and description of the studies performed, follow these two links. What these studies show additionally is that these mutations are localised taking place in those parts of the DNA sequences where adaption needs to occur. They are not spread out over the entire genome. Thus instead of using the term random mutations, we need to qualify it, possibly "randomly induced" mutations describes the interaction between environment and DNA more fully. https://www.wired.com/2014/01/evolution-evolves-under-pressure/ https://nautil.us/issue/34/adaptation/does-stress-speed-up-evolution

There is further consideration. It is known that viruses are more prone to mutations. If it is the case that these mutations are impelled by changes to the environment, then it could follow that new DNA can be passed between host cells via "horizontal gene transfer". And if it confers an advantage then it will become part of the active genome. The difficulty about viral led mutations, is that hit and run viruses often do not leave any trace behind, so it is impossible to calculate how many of the mutations found in the host are due to viral involvement. Viral horizontal transfer of genes may be greater than observed. Viruses it turns out may be the great gene pollinator.

The virome.

The study of the virome is a new and exciting area of research. No doubt, following the corona virus epidemic, it will receive greater attention. More research is being devoted to the oceans than the soil, mainly because life in the oceans is far less diverse and soil conditions are far more variable than

patches of ocean. For example, viruses in soil outnumber other microorganisms 1000:1 compared to 10:1 in the sea.

Clearly diversity is associated with a greater density of viruses. *"Looking at all these examples, and the pie chart showing that more physically complex organisms host more different kinds of viruses, one is tempted to suggest that co-evolution between viruses and hosts might have helped generate physical complexity on Earth."* https://blogs.scientificamerican.com/artful-amoeba/uneven-distribution-of-viruses-suggests-surprising-evolutionary-power/

The oceanic research has yielded startling results. Five years ago 5476 new viral species were discovered in the oceans. Five years on the number of unique species discovered has leapt to nearly 200,000. *"Viruses control the structure of the microbial communities as well as their evolutionary trajectories".* **https://www.inverse.com/article/55227-ocean-virus-population-climate-change 200,000** In fact, viruses comprise 95% by weight of all the biomass in the oceans.

While it is true to say that viruses are not living organisms, it is true to say that all living organisms live in a soup of viruses. Could this mean that viruses are the bridge between inorganic and organic matter capable of reproduction. For decades the debate of the origin of life has oscillated around four major theories. One, now abandoned was called co-existence, namely that viruses and bacteria emerged together, with viruses representing fragments of DNA or RNA that escaped from bacterium to oscillate between them. "*First, the diversity of viruses far exceeds that found in cellular life. 'Where diversity lies, origin lies,' said Valerian Dolja, a virologist and plant cell biologist at Oregon State University who collaborates with Koonin. According to this perspective, if viruses developed from cells, they should be less diverse because cells would contain the entire range of genes available to viruses. It's a recurring theme in evolutionary biology "In order to move from RNA to DNA, you need an enzyme called reverse transcriptase," Dolja said. "It's only found in viruses like HIV, not in cells. So how could cells begin to use DNA without the help of a virus?"* https://www.quantamagazine.org/were-giant-viruses-the-first-life-on-earth-20140710

The second theory can easily be dismissed. That life began extra-terrestrially with comets and meteorites bringing life down to earth. This merely kicks the can up the road. It poses the same question; how did life begin out there?

The third theory also now waning provided the main area of discussion and dispute from the 1980s onwards, and it was called the "RNA world hypothesis". This hypothesis was formed by the knowledge that as it is RNA and DNA which acts as the blue-print for the production of unique proteins it must have come first. "Remarkably, all the protein in all organisms is made by the catalytic activity of the RNA component of the ribosome, the cellular machine that reads genetic information and makes protein molecules. This observation suggests that RNA dominated an early stage in the evolution of life." https://www.scientificamerican.com/article/how-did-life-begin1/

But that hypothesis begged the question, what produced or synthesised RNA, a complex molecule, in the first place. Really the chicken and egg conundrum. Clearly, given the complexity of RNA with its sugars, there had to be intermediate steps. *While we don't know precisely how life got its start on Earth, most scientists accept what's called the "RNA world" hypothesis, which posits that RNA molecules kickstarted the process by acting as both catalysts and genetic material. This does, however, leave an awkward question: how did proteins get involved?* https://arstechnica.com/science/2015/07/repeated-drying-cycles-can-form-protein-like-polymers/

While we are 20 to 50 years away from a definitive description of the steps needed to be taken by inorganic matter evolving into reproducing organic matter, views are firming up. The best explanation is that before biology there was chemistry. The landmark 1953 Miller study on the production of amino acids shows how likely it was for amino acids to form spontaneously under the conditions that prevailed over 3.5 billion years ago. Since then experiments with variations to the Miller one have shown the probability that amino acids formed spontaneously.

A recent study has also shown that the building blocks of amino acids, called aminonitriles can build peptides directly. Peptides are a collection of between 2 and 50 amino acids. Thus there could have been the parallel production of peptides and amino acids leading to the assembly of larger proteins. https://www.medicalnewstoday.com/articles/326701

Amino acids are the building blocks of life. In differing combinations they form peptides, proteins and enzymes, the machinery and structure for all cellular life. Amino acids are amazing compounds. They all have the same molecular backbone. The only difference between them is the R side-group. That is why it can take only 4 base pairs in triple combination (called a mRNA codon) to code for a specific amino acid.

All proteins are built from specific combinations of amino acids. Unique combinations of amino acids give rise to proteins of a specific shape. As shape determines function, specific shapes can in turn give rise to the functions needed to provide the stepping-stones leading to simple bacterium. Here is a useful article describing how the folding of proteins can become self-replicating. *"It puts in doubt the vision of the origin of life that is based on the RNA world hypothesis," said Andrew Pohorille, director of NASA's Center for Computational Astrobiology and Fundamental Biology. To him and some other scientists, proteins seem like a "more natural starting point" because they are easier to make than nucleic acids." https://www.scientificamerican.com/article/life-rsquo-s-first-molecule-was-protein-not-rna-new-model-suggests/*

Thus it is likely that over tens of millions of years, born of random collisions and reactions speeded up or damped by temperature variations, amino acids gave rise to folding proteins which gave rise to RNA which gave rise to viruses. Simple viruses are mere envelopes of RNA with a protective protein coat. It is likely that when proteins started to shield themselves by creating an internal environment, it became necessary to evolve a genome because replication depended on perpetuating this internal world. Clearly, having a controlled inner world conferred evolutionary advantages in terms of longevity and the conservation of energy, but it now required cell division in order to achieve replication.

These elementary viruses may have been produced by broth-like conditions and could have multiplied and survived for significant periods of time because of prevailing conditions. They may not have needed a host in the first instance. Today it well documented how long certain known viruses can exist outside a host. Additionally giant viruses have been discovered, some of them bigger than small bacteria. They include the mimivirus and mamavirus spawning a new term "giruses". https://www.americanscientist.org/article/giant-viruses They blur the sharp distinction between viruses and cells. Thus viruses could have grown in complexity and function prior to the evolution of cells.

As with all new discoveries, controversy has raged. Are these giant viruses a mosaic of captured DNA strands from repeated and consecutive invasions of host cells, or, are they ancient? In reality we simply do not know how complex viruses were at the dawn of evolution. Perhaps complex enough to knock on the door of life itself by forming elementary reproductive machinery themselves. And equally

important, becoming capable of synthesising lipids, the stuff of life, semi-permeable encapsulating membranes.

Once RNA encapsulated itself, it was inevitable that proteins would end up building cells via the route of viruses. Only later would viruses have become parasitic as this was the most efficient way of replicating themselves especially if climatic conditions changed or these forms moved further out from their point of origin. Perhaps it is only then that the existing relationship between cells and viruses that we know today, come into being.

Of course this is mere **conjecture,** but it is likely that some time this century the sequencing of life will be established.

Conclusion.

The purpose of this article is less ambitious than explaining the meaning of life. In so far as it examines current thinking on this subject it does so in order to establish the importance of the virome at a time when capitalism is toying with it. The virome, it appears has three main purposes as far as macro life is concerned. Firstly, to help with adaption. Secondly, to promote diversity. Thirdly, to protect diversity. We are thus discussing complex systems, but not designed systems. Systems that have evolved interactively allowing life to flourish. Over time we may learn that the micro-environment plays as important role as the physical environment in the emergence of species, which is why the tree of life is best described as a bush, comprising both independent vertical branches and horizontally connected branchlets.

Unlike animals who live within nature, humans modify nature. Capitalism is society's first industrial society. In the pursuit of profit it has damaged both the micro and macro ecosphere. Intensive monoculture, factory type animal husbandry and pollution are rebounding on human existence. If there is no fundamental change, capitalism could cost us the earth.

In his book *Big Farms make Big Flu,* Rob Wallace draws attention to the viral ticking time bombs comprising the huge concentrated factories where chickens and pigs are grown. These emporiums of death breed unhealthy animals relying on sterile conditions for their survival. They are completely divorced from the outside world that is until the sterile boundary is breached by viruses in the form of a bird dropping or a wind blown dust particle. When that happens they become a deadly breeding ground because their populations have limited immune system and no protective eco system. Recently we have seen how the plague of African Swine Fever has decimated pig farms around the world.

But it is not only the animal world that has been put at risk, it is also the plant world. *The past two decades have seen an increasing number of virulent infectious diseases in natural populations and managed landscapes. In both animals and plants, an unprecedented number of fungal and fungal-like diseases have recently caused some of the most severe die-offs and extinctions ever witnessed in wild species, and are jeopardizing food security. Human activity is intensifying fungal disease dispersal by modifying natural environments and thus creating new opportunities for evolution.* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3821985/ For example two fungi are threatening to wipe out the world's coffee and banana crops because of their lack of diversity.

The study of the soil microsphere is still in its infancy. "*Despite the apparent abundance of mycoviruses in nature, research on these infective agents is relatively scarc*e." However, as fungicides fail, and not only fail but lead to fatal fungal resistance in humans, attention is switching to the use of mycoviruses as a method of controlling uninterrupted fungal invasion of living plants. Mycoviruses are those viruses

adapted to invade and control fungi via a process called hypovirulence which reduces the activity of fungi. " …researchers *discovered the potential use of these viruses in biocontrol, with special attention given to mycoviruses that confer hypovirulence (weakened state) in their pathogenic hosts."* https://www.sostenible.palencia.uva.es/system/files/publicaciones/munoz_etal_mycoviruses_2016_0.pdf

It is clear that overthrowing capitalism and introducing the second industrial society, communism, allows us to work with nature rather than against it. This we must do. Capitalism is exhausting this planet through plundering it, disturbing its micro and macro spheres and heralding the mass extinctions of fauna and flora. Through these disturbances and unnatural behaviours, capitalism invites viral retaliation as we have seen with the corona virus and seasonal flu which is growing more virulent because of egg grown inoculations. Viruses, the primogenitor of life, will continue to exact a high price for this arrogant disregard of our planet.

Note 1. Stress affects the microbiome deleteriously. Only two days of constant stress can deplete precious bacteria in the gut. This outpouring of adrenaline and cortisol reduces blood supply to the intestines. This can lead to necrosis. Additionally, there is no mechanism in the intestines to promote new arterials to provide more blood to the tract. This signalling is instead done by the beneficial bacteria. Thus this combination of lack of blood supply caused by stress and stress acting on the beneficial bacteria can and will lead to structural issues with the intestines such as colitis.

Brian Green 16th February 2020.