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## **Dancing with the Bacteria**

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### **ANNOUNCEMENT**

- The 2017 International Conference on Quality of Life was held in Penang Malaysia on August 20<sup>th</sup>-21<sup>st</sup>.
  - Proceedings as well as photos and other information from past conferences can be found on our website.
  - More information at <http://as4qol.org/icqol/2017/>
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**Wisdom (Philosophical) Note:  
As I Was Passing ...**

## Dancing with the Bacteria

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Many years ago when my daughter was just eight years old she sprung a surprise question on me. ‘Papa’, she asked, ‘who are we and where does everything in the Universe come from?’

Not a light theme to tackle any time of the day and certainly not just before she was supposed to go to sleep that night. I was desperate to come up with a short but clever answer and I said, “Well, you and me lying on the bed here right now are both bacteria in the stomach of a giant monster’.

Her response was of course one of great skepticism. ‘Oh yeah?’ she snorted before falling asleep. She was young, but obviously not stupid.

It was I who kept awake for hours that night wondering, ‘What if my answer was the correct one?’ How do I really know I am not a bacteria in a monster’s tummy?’

Honestly, even today I don’t really have the right answer as it is a conjecture I cannot prove, but cannot disprove either. The entire episode however helped give me a sense of perspective about who we humans really are – in terms of the scale of things in the Universe.

From the viewpoint of a bacteria for example the human body would appear to be an entire planet or even a solar system on its own. The bacteria has no idea that there is a human body at all with its various organs and functions. As far it is concerned it is trying to survive on a vast open terrain with mountains, forests, rivers, deserts and the sky itself.

Now if we look at the human body from the perspective of our planet or the Universe it is obvious that we ourselves are really microscopic. For Mother Earth we are the microbes. So, the human being is thus both planet and microbe at the same time, depending on who is looking!

Which brings me to the central theme of this presentation. What on Earth are human beings really? What are we made of and how are we related to everything else in the world around us? Where did we come from and where are we going?

These questions are not new at all and have been asked by philosophers, theologians and the lay public for millennia. The answers to these

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questions- different in every era of history - are important because they define how we approach everything around us – law, governance, economies, culture and of course concepts of health and medicine.

The answers are not as obvious as most people assume they are. They are always in for a surprise as from time to time the continuous accumulation of knowledge and human experience challenges everything they think they know about the world and themselves.

What is interesting today is that, though the details are different, in the answers to these questions emerging from modern science the perspective merges with many of the world's spiritual and religious philosophies. It turns out that everything on Planet Earth is not just deeply interconnected and part of larger ecological cycles but every fragment also contains within itself the entire Universe.

## 1. Traditional vs. Modern

A little digression about the debate between categories like 'traditional' and 'modern' is due here as these are a source of much semantic confusion. For example, while traditional and modern 20th Century medicine are often painted as being diametrically opposite to each other the truth is more complicated. What is called 'traditional' today was essentially 'modern' yesterday and the rapid changes in human understanding of medicine will make today's 'modern' knowledge 'traditional' tomorrow.

There is much continuity between the two knowledge systems than is generally acknowledged. A lot of modern pharmacology for example is based on traditional medicine's experiments and information over the centuries about the utility of plant and animal extracts in treatment of various ailments.

Where modern medicine does score over traditional medicine is in the field of surgery, with the latter not offering such an option at all. Modern medicine is also more systematically organized and documented than traditional medical systems, giving it the advantage of easier replicability – though this by itself does not prove it is better or more effective in any other way.

There is one however one important difference between traditional and 20<sup>th</sup> century modern medicine, where the former is distinctly superior. Traditional medicine correctly views the human body as a porous, open-ended system, constantly affected by a wide variety of ecological factors. The ancient Indians, Chinese and Greeks for example believed that the body was a self-generated combination of the five elements: earth, water, fire, air and space or aether.

Modern science, with its more analytical methods, focuses on breaking the body into its various components and studying the parts in isolation, often down to the molecular and even sub-atomic levels. This method brought great insights into the functioning of the human body, our understanding of disease and development of new methods of treatment, but missed out on the big picture of how we are interconnected with other species or even the elements of Mother Earth.

Louis Pasteur's germ theory of disease two centuries ago was a major advance in our understanding of the human body as it rightly linked infectious diseases to the actions of other living species, using the newly discovered microscope. However, given the intellectual and political climate of Europe at that time, an era of warring nation states fighting for territory, it mistakenly evoked the metaphor of war, with the notion of a pure and pristine human body being invaded by 'bad' bacteria. All that was needed was strong medicine and methods of hygiene to keep the trespassers out - dispelled like enemy soldiers or illegal migrant labour - and everything would be well.

When antibiotics were discovered, they became the 'magic bullets' that could instantly dispel these bacterial invaders forever. Today with the rise of antibiotic resistance, we realize there is something wrong with the way we have imagined the human body and its relation to the bacterial world.

Over the last decade the rise of microbiome research has brought spectacular insights about the role of invisible microbial species in the evolution and functioning of our bodies. It turns out bacteria, popularly perceived as dangerous, disease-causing agents are like an organ of the human body and essential to the survival of all life forms on Earth. Bacteria are responsible for everything from the functioning of our human cells to the regulation of oxygen in our atmosphere. Our planet is ultimately a planet of the bacteria, with human beings a very recent arrival and with a very uncertain future.

## 2. Denying the Ecological Cycle

With the emergence of the new religion of ‘progress’ and ‘development’ in the nineteenth century, a big casualty in our understanding of the human being, was the erasure of the idea that we are individually and collectively part of larger ecological cycles of birth, death and renewal. In other words, that we are clearly perishable, biological goods.

Historically, many philosophers from Pythagoras to the Buddha had seen the human body as part of an eternal cycle of nature. Indigenous people around the world saw themselves as the children of Mother Earth - brought to life by Her in birth and taken back into Her arms through death. Even the resurrection of Jesus Christ, a central tenet of Christianity, is a metaphor for the concept that nothing ever lives or dies permanently, it transforms constantly from one state of being to another.

Through industrial technology and new resource management systems, however societies have attempted to turn these cyclical processes common to all living organisms into a straight, linear path in the pursuit of endless consumption and illusory immortality. The traditional wisdom that viewed resources involved in these cycles as finite was also jettisoned, replacing it with the false promise of infinite abundance.

As far as the human being was concerned, around the time of the industrial revolution in Europe – the body was viewed as a stand-alone machine, that could be repaired at will through technical or chemical interventions. The ailing human organ needed to be isolated and treated, if necessary surgically removed and replaced too. Disease was viewed as a defect threatening an otherwise perfect device.

This approach became dominant as it also fit very well into the new economic, political, social and cultural trends that emerged with the industrial revolution. Engineering, the technique of manipulating dead objects became the most prestigious among all knowledge systems and the cold but predictable, efficient machine was celebrated as humankind’s greatest achievement.

This together with the fact that in the modern economic system, the mechanical time of the clock became equated with money, the human body could not be given the luxury of operating according to the rhythms of biological and ecological time. Together with biology, culture, spirituality took a backseat and the long term health of both humans and the Planet Earth were sacrificed at the altar of the modern economy and lifestyles.

## 3. Reconnecting with Nature

The biggest challenge to this atomized and mechanized view of human beings came over a hundred and fifty years ago from Charles Darwin’s theory of evolution. It connected the human being back to all other species and the history of the planet itself. Evolutionary theory also highlighted the dynamic nature of life and the role of environmental factors, including chance, in shaping our health and well-being.

Half a century ago, the discovery of DNA, as the common building blocks of all life and responsible for passing on biological characteristics across generations, also consolidated the idea that all living organisms are born to a common ancestor.

Thanks to the evolutionary process of inheriting characteristics and traits from successive generations there are an enormous amount of traits that humans and animals share. Everything from eyes, jaws, nervous system, heart, lungs and so on had precursors in other species before coming to us, particularly life forms that emerged in the oceans. All organisms also share a similar genetic machinery and certain biochemical processes common to their metabolism.

While chimpanzees are the closest living species to humans, sharing 98% of our genes, the common mouse has 92% percent of our genes. Even the rice we eat has 25% of our genes – eating rice is almost like eating a distant cousin! In that sense what we do when we consume or destroy any other species is also a form of cannibalism or at least fratricide. There is nothing inherently right or wrong about this process as this is how we have evolved and historically we are also meant to be eaten by other species<sup>1</sup>.

The question we need to ask really is while we human beings have taken generously from Mother

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1. This is relevant to the beef controversy in India.

Earth, what have we given back in return, except toxic wastes? While for a very long time we could never consume more than what Nature could replenish, for a couple of centuries or more now we have been literally eating the future of the Planet itself. The process of taking endlessly without concern for the world around us lies at the heart of our multiple problems today.

#### 4. Born of the Earth

In more recent decades new research in origins of life studies, geology, environmental science and evolutionary biology has once again challenged the assumption that we know who we really are. It turns out that our ancestry is linked not just to the first single cell bacteria but also to its precursors such as retroviruses and the various inorganic minerals and elements that played a critical role in the emergence of the fundamental processes of life.

The traditional human belief in the sanctity of soil is today being validated in science by new research that shows that the ubiquitous clay<sup>2</sup> all around us, could have provided the scaffolding for the formation of the first forms of life and living cell on our Planet<sup>3</sup>. Other ideas being investigated include the possibility that life may have begun in the hot environment around hydrothermal vents at the bottom of the ocean.

Overall, the origins of life in the ocean, amidst volcanic activity and the critical role of clay and minerals explains the composition of the human body today. We human beings are made up of or made possible by the same basic elements that constitute our planet and rest of the Universe.

Roughly 96 percent of the mass of the human body is made up of just four elements: oxygen, carbon, hydrogen and nitrogen, a lot of that in the form of water. The remaining 4 percent of our body is made up of over 60 elements from the Periodic Table, very small in quantity but critical to the maintenance of life<sup>4</sup>. These nutrients perform various functions, including the building of bones and cell structures, regulating the body's pH, carrying charge, and driving chemical reactions.

We are in other words, a miniscule replica of Planet Earth itself, with geology playing as big a role in our existence as biology. What we do to the Earth through our various activities ultimately affects our bodies and its well-being – there is no escape.

#### 5. The Anthropocene Age

The human being, like all other living organisms, has been in search of physical security but unlike other species has been spectacularly successful. The last 10,000 years of our Planet's history has been part of the geological epoch called the Holocene, a period when the Earth's climatic conditions have allowed a great expansion of human civilization. The coming of settled agriculture ensured a steady supply of food to human societies enabling them to move from being nomadic tribes to city and town builders.

This process brought great stability to the lives of millions of people but it came at a great cost to other species on the Planet and also us as individual human beings. With change in habitat, diet and lifestyle new diseases and ailments too emerged. In more recent times, our activities have created a grave threat to the survival of our own species as well as others.

The impact of human intervention in the Earth's metabolism over the last ten millennia has been so significant that this period has been renamed the Anthropocene age. The release of carbon dioxide, methane and sulphur dioxide in large quantities through industrial and also agricultural activities has initiated climatic processes that would normally have taken thousands, if not millions, of years to happen on their own.

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2. Anderson, Robert S.; Anderson, Suzanne P. (2010). [Geomorphology: Tuhe Mechanics and Chemistry of Landscapes](#). Cambridge University Press. p. 187.

3. Clay is technically defined as soft, loose, earthy material containing particles with a grain size of less than 4 micrometers and formed as a result of the weathering and erosion of rocks containing the mineral group feldspar over vast spans of time. Feldspar, which forms around 40% of the Earth's continental crust, is a typically colorless, rock-forming mineral consisting of alumino-silicates of potassium, sodium, and calcium.

4. <http://www.livescience.com/3505-chemistry-life-human-body.html>

## 6. Suicide by Development

Global warming however is only the most explicit symptom of what is really wrong with the world. Today, the richest 1% own half of the world's wealth, and the richest 50% own over 99% of the world's wealth<sup>5</sup>. 62 billionaires own the same amount of wealth as 3.5 billion people who make up the poorest half of the world's population.

The net result of such concentration of wealth is that the people at the bottom of the hierarchy are unable to live up to even their normal biological potential – a fundamental right that all human beings are born with. For example:

- Two billion people in the world suffer from various forms of malnutrition<sup>6</sup>. Malnutrition is an underlying cause of death of 2.6 million children each year – a third of child deaths globally.
- Undernutrition accounts for 11 per cent of the global burden of disease and is considered the number one risk to health worldwide.

Resources essential for the sustenance of life are depleting at an alarming rate. 85% of the world population lives in the driest half of the planet and 83 million people do not have access to clean water. Almost 2.5 billion do not have access to adequate sanitation<sup>7</sup>. Six to eight million people die annually from the consequences of disasters and water-related diseases.

We have also poisoned the air we breathe to a point where it is estimated that more than 2 million premature deaths can be attributed to indoor and outdoor air pollution<sup>8</sup>. On top of all this is of course the spread of toxics through activities such as mining, production of industrial chemicals and pharmaceuticals that has significantly impacted food safety and increased the health risks for all species on our planet.

## 7. Planetary Health

While the environmental movement and indigenous people have championed such a concept for long, in recent years the link between the health of individuals and Mother Earth is being recognized in more formal and mainstream circles too. In 2015 the Lancet together with the Rockefeller Foundation, put together a Commission to elaborate on the concept of Planetary Health<sup>9</sup>.

In its first report the Commission clearly points out that the continuing degradation of natural systems threatens to reverse the health gains seen over the last century. According to the Commission<sup>10</sup> the world's trajectory of economic growth has failed to account for future health and environmental harms over present day gains, and the disproportionate effect of those harms on the poor and those in developing nations.

There is today a consensus building up that given the dependence of human well-being on planetary health the future of our world depends on sustaining Holocene-like conditions, such as a stable climate, clean air, a protective ozone layer, thriving biodiversity, and healthy oceans. This is in turn linked to addressing the deep inequalities—of income and wealth, of exposure to risk, of gender and race, and of political power—both within and between countries.

## 8. Conclusion

While we are indeed made up of the material elements of the Earth, human beings are not only about dry facts and scientific truths. Human consciousness and culture are very big drivers in the evolution of human societies, facets that define us as creatures willing to rise above our material needs and selves again and again in the pursuit of the common good.

5. [https://www.oxfam.org/en/research/economy-1?utm\\_source=oxf.am&utm\\_medium=Znhx&utm\\_content=redirect](https://www.oxfam.org/en/research/economy-1?utm_source=oxf.am&utm_medium=Znhx&utm_content=redirect)

6. <http://www.gainhealth.org/knowledge-centre/fast-facts-malnutrition/>

7. <http://www.unwater.org/water-cooperation-2013/water-cooperation/facts-and-figures/en/>

8. [https://books.google.com/books?](https://books.google.com/books?hl=en&lr=&id=7VbxUdlJE8wC&oi=fnd&pg=PR9&dq=air+pollution+global+health&ots=w1a4wKS4we&sig=dRBYlcnRUsap-NOXSus5dV76aYNE#v=onepage&q=air%20pollution%20global%20health&f=false)

<https://books.google.com/books?hl=en&lr=&id=7VbxUdlJE8wC&oi=fnd&pg=PR9&dq=air+pollution+global+health&ots=w1a4wKS4we&sig=dRBYlcnRUsap-NOXSus5dV76aYNE#v=onepage&q=air%20pollution%20global%20health&f=false>

9. <http://www.thelancet.com/commissions/planetary-health>

10. <https://www.rockefellerfoundation.org/report/safeguarding-human-health-anthropocene-epoch/>

At the same time our consciousness is also the seat of deep-seated anxieties that drive our decisions and actions on a day to day basis. Our search for permanent security and predictability and the need to master or control Nature, it seems, has turned the world into the most dangerous and uncertain place. The more we protect ourselves at the cost of other living organisms in nature, the faster we are bound die.

It is time to step back, reflect and ask again and again the questions: who or what exactly are human beings, how we should live in this world and where we should go? We are today at one such moment in human history where these questions need to be asked afresh and with a completely open mind – for this time the very survival of the human species may lie in getting the answers right with great honesty.