

Working principles of life

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Working principles of life *An analysis of the processes of living matter*

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“la vie est l'ensemble des fonctions qui résistent à la mort.” (Life is the set of functions that resist death.) *Xavier Bichat 1771*

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Every human in the world is a part of the magnificent life. Mostly this life feels normal, common and good, but it can also be magnificent, majestic, occasionally boring, surprising, sometimes shitty, and overwhelming. But most of all life feels elusive. If you take some time to study simple matters like grass in a meadow, you easily discover that lots of complex events and chemistry are taking place and are responsible for the existence of each plant; it's formation and its growth. Off course you can also just lie down on it, and enjoy. My whole life I have had the luxurious of taking time to observe things sparked my interest. A phrase I often used at the age of 9 was; “Though God created the universe and all of its life in just 6 days, He never spoke of any hurry.” This formed the basis of one of my life's standards: take it easy.

In the loving family I grew up in, my parents gave me a great platform for being an amateur scientist. Blowing up stuff in the shed, opening up a safe, shooting

numerous birds and doing some autopsies to obtain the cause of death. My father was not very amused when he would come home to find that I had disassembled the telephone, television or some other irresistible machinery. He would have to drive out of his way to find a discarded radio or combustion engine to bring me, just to prevent me from molesting our stuff at home. My mother was always enthusiastic about my findings and in a way even encouraged these destructive investigations. She had only one important rule; be home at six for supper. Thanks Mom and Dad; you did a great job raising me and my brothers and sister!

My formal studies in the field of biology and my mostly self-studies in physics have provided me with the basic knowledge necessarily to come to the results you are about to share. One particular event in my life prompted me to make the first wobbly attempts at this work. It was a tragedy that couldn't have been prevented, the death of my third

child, Laura. In her brief existence she made it clear to me that a life doesn't have to last for seventy years to be of great value. In a free country with knowledge as a common good and with the means for creativity to deploy it, it would only be a matter of time before the work you that are about to read, would originate in the line of expectations. Since I was given this idea and the ability to share it, I feel honoured and humbled.

If you have any suggestions for this book to improve it in future editions, or if you have other comments, I would like you to send me an email. You can contact me at; D.S.J.Fennema@gmail.com Douwe S.J. Fennema Starlings swarm Living matter and lifeless objects

My reason for writing this book is to provide you with an answer to a very old question. What is the reason for life; is there a real meaning, is there a purpose; does it have a direction? The first attempts one makes to really good think clearly about the subject can already give a one a hint at the answer. Many people wonder if only human ask this question about life? Grasses in a meadow and crows in a tree don't seem to bother and just enjoy the ride of life. That puts into perspective the fact that the question is raised from the human point of view. However I have tried to give an answer from the point of view of all living things. So I started to look at a tree as an equal type of living thing as a cow. At first glance there doesn't seem to be much similarity in their morphology. So I tried to look at their functional resemblance. The tree has a surface to protect it from dehydration just like the cow has its skin. The cow breathes with its lungs, the tree with its millions of stomata underneath the leaves. The tree drinks with its roots, the cow with its mouth. The cow's blood is pumped through veins to provide the cells far away from the digestion system with food; the tree has its phloem and xylem tubular system. If you understand how similarly they work it is impossible to stop recognizing their similarities in numerous situations. This became clear to me while my wife was pregnant and we were visiting the birth attendant in the final stage of her pregnancy. The attendant told my wife; "your amnion isn't ripe yet." I suddenly realised I was imagining my unborn baby dangling from a tree hanging like a immature apple, waiting until the moment the stem is broken by the weight. For me it became clear that due to the similarities that exist among all living things, removing the name of a particular organism or species (such as humans) and replacing it with the term „system“, would be a better approach to understanding the meaning of life.

In the footsteps of Sir Sadi Carnot, who was the founder of thermodynamics, I intended to look at the subject of life from a simplified point of view. The development of his scientific formula concerning heat theories was preceded by a simple question. In his case he wondered why the English industries grew richer from their steam engines than the French did. To find an answer he empirically studied the work of James Watt to understand the process of energy conversion to work.

From his results he formed a theory that was able to predict the maximal efficiency of heat engines. The method he used to understand of the process of energy conversion was what enabled him to form his theory.

In my case a simple question was also put forth: Does every living organism do something different from non-living objects and does life have a specific purpose? The ancient question of the meaning of life, not from the point of view of humanity, but the universal appearance of what we define as life, has intrigued me for years. After decades of thought I slowly recognized a pattern.

What is a difference between a piece of rock and a living organism, for example a bird? An easy answer would be that a rock doesn't move and a bird does. But what about the difference between a rock and a mussel? Upon close inspection, you see that the mussel moves. Although it is different from how a bird moves, surely it is moving. Movement is a commonality among mussels, plankton, worms and even plants. But do coral or fungi move? Aren't there also immobile components in living organisms, such as bone, tooth or cellulose? Don't these components resemble the inert mineral matter? You could say that a living organism is born, ages and dies, while a stone remains unchanged for a 1000 years. Though it is certainly true that rocks do not change quickly by human standards, geologists know that rocks are formed and transformed, both physically and chemically, for example by radioactive decay. Over millions of years, there are also oxidation and reduction processes that change rocks. From the point of view of a chemist there is no difference between living and lifeless matter. Living beings are composed of the same elements as the atmosphere and the rocks. These elements, such as carbon, hydrogen, oxygen, nitrogen, etc., sometimes form simple molecules, for example water, from which 70 to 95% of a living cell is constructed. All organisms do have just one little thing in common; they seem to be capable of increasing improbability. Later on in the book this increase of improbability will be explained thoroughly but for the moment it is only necessary to know that a plant for instance needs energy to sustain its growth and morphology and otherwise like entropy it will collapse and fall into miniscule pieces. Using an amount of numerous unrelated elements, living organisms fulfil a duplicate function. First they bind these elements together and thereby in plants can increase their potential energy by using kinetic energy from the sun's rays. Secondly, animal life forms then reuse this converted energy. After an organism's death this bonded energy is reused again before decay by protozoa and fungi so little loss occurs. This process has been taking place for millions of years and, as a result, the biomass which more likely is to fall apart (or improbability) is growing. Still, in my opinion only this preference of increasing improbability for living matter (biomass) is not a satisfactory answer. If Earth had always been a lifeless planet, would there have been a difference? Definitely. As previously stated, rocks would have oxidized, formed and deformed, especially their upper layers. However these changes are small compared with the changes that living organisms have made in a short amount of

time. Various kinds of life forms have been struggling through soil, rock and water, and ploughed the earth in search of food and shelter. They have created different gasses and made new life forms possible, which in turn created new circumstances. These altered

circumstances made the adaption of new life forms possible. These changes have been occurring especially rapidly during

the very short existence of mankind. Man has dug for coal, gold and raw materials, entered the deepest trenches, reached the highest mountains, and found a way to survive in the harshest environments. Man has even had a great impact on the natural layering of the Earth's surface and atmosphere and has subsequently accelerated reactions. For all living things, worms, plants, bacteria and millions of other organisms, extinct or unknown, this simple working principle is uniform. Thus life could be described as a catalytic. It speeds up natural processes, without taking part in them it itself, acting like an enzyme. Besides that living matter grow in mass, in this way life could be better understood as a fire, which grows if provided with the right circumstances. If fuel and the right temperatures are available, enzymes are able to interact; and if oxygen and carbon dioxide, or another gaseous intermediate oxidizer, are available then the circumstances are right for the growth of a living organism. A by-product of this growing process of life is natural transmutation. Nuclear transmutation converts one chemical element into another. For centuries alchemists looked for a way to change lead into gold. However, transmutation does the opposite in a natural way through nuclear physics changing elements from a lower to a higher atom number. In the universe this type of chemical decay happens continuously. This decay has been found to occur in two ways, through radioactive decay and in nuclear reactions. One example of this is found into decay of carbon-14, providing scientists a very accurate way of measuring the age of previously living organisms.

But for what reason does life do things like speeding up processes and catalyzing? Does it all have a direction? In the next chapters I will guide you through an analysis of several common phenomena and outline my reasoning and show you how this leads to my conclusion. I will discuss where life is now, where life came from and where it is going. As a human being I understand the specific eagerness to know in more detail how Man is involved in all of this. Do we have a purpose? What pushes us, is this called to be unique for all life forms? How do we operate and what provided the basis of our success? I will do my best not to disappoint you in this quest and I will spend an entire chapter on this subject. To give you a little clue already of our involvement on matter the periodic table underneath. The contents of the periodic table have been altered by humans. Only the first 94 elements are

found

naturally

on Earth. The last 24 (95 – 103) have been produced artificially and are all radioactive. To whom it may concern

While writing this book I repeatedly questioned myself as to how to structure it. At first it seemed obvious that I should use a scientific setup, but on the other hand, it was my intention to reach a broad audience. Gradually I discovered that writing on a simple level, that would be accessible for a large audience, would be an almost impossible task; this is because the book does not handle simple concepts. In addition, the empirical nature of a book lacks the possibility for a complete overview of a subject since every argument needs to be justified by facts and sources. Too many details need to be clarified in this book to be classified as an absolute scientific work. It is not my purpose to convince readers by giving the details of these insights, but merely to give them an opportunity to see the consistency of the general overview of my ideas.

The first description of plate tectonics, which was written by Alfred Wegener in 1909, uses information from a variety of scientific fields accumulated to explain to people the process of tectonics. The first reaction of the established scientific world was, "Wegener? Isn't he a meteorologist?" Everyone was very sceptical and it wasn't until the 1960s that his theory was widely accepted. A similar response, based on my background as a biology teacher, is also expected. However, I refuse to let myself get bogged down and slowly sink in a pool of tarlike details, and to let my ideas, like an ancient species, be left behind.

Like Wegener there were plenty of scientists who have gone before me to pave the way towards the direction of my ideas. For example, I owe a great debt to Charles Darwin, whose evolutionary theory shows great vision and a passion for accuracy. His strong character also helped him wrestle against the tide of scepticism that his theories faced for much of his life. Without Darwin's masterpiece this book would never have existed. As Darwin's theories had in his time, my theory also has the potential for being controversial. Not everyone is eagerly waiting for a sobering revelation that will cause the basic principles of many cultural

and religious

foundations to seem to disappear. It is absolutely not my intention to offend or in any manner whatsoever to do evil. However, I do think it is important and in everyone's interest, now and for the future, that every human know what his place is in the world, in life, in time and thus in the

future, and especially for each person to know what

mechanism lies

behind this

placement. It is

everyone's right to know, but whether they acceptance or rejection this

information is their decision. Introduction

Many books have been written about the meaning of life. However, in each case the perspective of the author, his angle of approaching the subject, severely limited his

conclusions. Preconceptions

blurred the authors' objective

view by making use of the

standard matrix of culture and

society. The fact that the

author was himself human

biased the facts so that they

were entangled with

emotions. In addition, over time humans have been exposed to metabolic (doctrine of changes) and successive influences. In other words, every human is a child of his own time and therefore each period interprets facts in a different way. An example of this is the successive reinterpretation of the human brains. Around the year 3000 BC, during the Egyptian

empire, the brain was given little value. In the mummification process the heart, kidneys and other organs were carefully removed, while the brains were roughly beaten to a pulp with a hook and left the head as a fluid through the nasal cavity. Around the year 335 BC the brains were, for the first time, suspected as being the seat of the soul by Aristotle. Theories that viewed the brain as being of central importance, which were mainly based on the work of Aristotle, were, in the 17th century, rejected and replaced by Descartes philosophical system. This system provided the basis for empiric research. By this new scientific method research was given a tool to start obtain insights of the operation (functioning) of the brains and spirit. He was the originator of the adage winged words; "I think, therefore I exist." Since the 17th century there has been much insight into the functions of the brain. Research using psychoanalysis and MRIs has produced especially interesting

results, but a clear understanding of brain function is still lacking. Rather controversial tests performed in Russia in the late 40s, among others, clearly show that the head of a decapitated dog was able to continue living and responding to stimuli from the vicinity for a certain period of time. From these studies it became increasingly clear that what we consider as being alive is spiritual in character. Therefore the body, or soma, was considered to be merely a functional relocation mechanism, or a food-processing object, and was viewed as less important. The functional value of the brain tissue nowadays is so highly regarded that quite a lot of people are willing to pay thousands of dollars to have their head cryogenically stored after their death, with *

This books gives a description of the origin of life, what life is and what it will lead to. It is not written specifically about humans, but for all living matter. However one chapter is dedicated to the role of humans. The reader will find out that live as we

know it, is of far greater extent as we thought of. It is necessary to understand that before life emerged on earth, the planet was sterile, so other mechanisms were active.

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