



The relation between Thermodynamics and Information Theories part II: The case of COVID-19.

Dimitrios Samios

Universidade Federal do Rio Grande do Sul, Instituto de Química, Dep. de Físicoquímica.
91501-970, Porto Alegre, RS, Brasil.

ABSTRACT: The pandemic caused by COVID-19 was analyzed as a case of Enmophy. The notions Matter-Energy-Entropy are considered to describe thermodynamically the reality of the natural sciences. According to Information Theories, the notions of Matter-Information-Enmophy describe the Extended Reality (XR) which includes the technologies of Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (RM). The mathematical definition of Enmophy is given in this article. Enmophy is related to Information in the same way as the Entropy is related to the Energy. Enmophy is related to disorder as a consequence of the created order. Different aspects were evaluated considering the disorder, the disaster and the catastrophe caused by pandemic COVID-19. This article concludes that the virus COVID-19 is a product of natural evolution effect, involving the processes related to DNA and RNA, from the point of view of thermodynamics the Matter-Energy-Entropy and from the Information Theories the concept of Matter-Information-Enmophy.

KEYWORD: Matter-Energy-Entropy, Matter-Information-Enmophy, Covid-19.

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I. INTRODUCTION

Clausius [1-4] added the term Entropy to the terms Matter and Energy, regardless of the dynamic aspect. In this case, the dynamic aspects are considered related to kinetics of chemistry and other areas related to different disciplines. From the other side, the generalized information theory must include, in addition to matter, and the information (related to structure, order and organizations) a new term, namely, the Enmophy term [5]. The information, (the parallel notion to energy) is plausible and well acceptable. Energy is needed to create information. By information is meant the existence of a structure or organization of non-random pattern of particles, energy fields, or other sub-units comprising a system. According to Szilard L [6], "any action resulting in a decrease in entropy must be preceded by the acquisition of information". This is exactly the role of information in creating order, structure and organization. Similarly to the energy, the information can include different and various forms of information expressed as organization, as structure, as order. The notions Matter and Information are completed by the term Enmophy, composed of the phonemes: en (Greek εν) and morphe (Greek μορφη) and means "turn the appearance (the morphe) inward", in the same way that Entropy means "turn the energy inward". Both terms include the meaning of loss of property. In the case of Entropy, there is a loss of Energy within the system, while in the case of Enmophy there is a loss of Information in terms of structure or organization or order within the system. The term Enmophy in spontaneous processes tends to increase. The mathematical definition of Enmophy to be given, eliminates the isomorphism question of the Shannon's theory [7,8,9]. **The centrality of the energy is substituted by information and finally the notion of the Boltzmann- Gibbs or von Neumann [9] Entropy is completed by the notion Enmophy.** The proposed concept creates a new conceptual basis, namely, that of Matter-Information-Enmophy, parallel to the Thermodynamical conception of Matter-Energy-Entropy. By integrating time as a parameter in the conception of Matter-Information-Enmophy, it is possible to evaluate aspects of processing, dynamics and kinetics. A kinetic-dynamic case [10] was evaluated according to the conception of Matter-Information-Enmophy, for information processing.

II. WHAT IS THE ENMORPHY?

Let us start with the mathematical definition of Entropy and then follows the definition of Enmophy.

$dS=dq/T$, dS is the Entropy, dq is the heat, T the temperature. (1)

$\sum_i P_i = 1$ (2), P_i is the probability.

$$S = -K \sum_i P_i \ln P_i \quad (3), \quad K \text{ the Boltzmann's constant.}$$

$$S = -K \langle \ln P_i \rangle \quad (4),$$

$$S = -K \Omega \left(\frac{1}{\Omega} \ln \left(\frac{1}{\Omega} \right) \right) = -K \ln \left(\frac{1}{\Omega} \right) = K \ln \Omega \quad (5)$$

Ω is the thermodynamic probability which can be defined as the number of possible ways, in other words the arrangements, which can assume the system.

Stonier [11,12] considered the work of Schrödinger "What is life" [13], specifically chapter 6, Order, Disorder and Entropy, concluded that the order times the disorder is equal to unity, ($Or \cdot D = 1$). Or: is the order and D: is the disorder.

The theory of Stonier can be resumed as follows

$$-S = K \ln Or = K \ln (1/D) \quad (6).$$

Considering that not all of the Information (I) can be transformed into the Order, the proportionality factor c was introduced.

$$I = c Or \quad c = [0 - 1] \quad (7), \quad \text{and considered that disorder is } D = 1/Or = c/I \quad (8).$$

According to our theory, we introduced in the formula of Stonier for the disorder: a function $f(\xi_i)$ defined as integrating factor of Enmorphy which must include two variables at list: the temperature and the time. Then, the mathematical definition of Enmorphy (Enm) is given by the following equations.

$$Enm = K f(\xi_i) \ln D \quad (13) \quad \Rightarrow \quad Enm = K f(\xi_i) \ln (c/I) \quad (14).$$

According to this definition: the proportionality factor c is defined as the part of the information that has not been transformed into order or structure and the integration factor Enmorphy $f(\xi_i)$ must include at least two parameters, Temperature and Time, among others. The integration factor $f(\xi_i)$ needs to be discussed and this will be addressed in the future.

It is the time, not only to discuss the order created by information, but to discuss about the disorder, disorder as a consequence created by order.

III. THE DISORDER (DISASTER AND CATASTROPHE) CREATED BY THE COVID-19.

The pandemic caused by the Corona virus - COVID-19 is incomparable to other disasters, such as tsunamis, hurricanes, earthquakes, volcanic explosions, epidemics, human conflicts within or between countries, etc., nor comparable to the First and Second World Wars. Disasters - related to the disorder - have been divided into two types: natural disasters and human conflicts. In the first type, authorities or international organizations need to take care to recover from the effects of the catastrophe. However, human conflicts can have different reasons, such as: ideology, religion, economic system, economy, etc. During Second World War, the Allied forces fought against the forces of Germany, Italy and Japan. The enemy, in this case, was evident. Many countries do not participate in the SWW. As we are going to see later in this article, the origin of the Covid-19 was explained "as a natural product" and for this reason the Covid-19 belongs to natural disasters. In this case, the pandemic COVID-19, there is no visible enemy and the enemy attacks the extreme majority of countries. The enemy is invisible, is a virus on a nm scale, invisible to the human eye. Natural disasters and human conflicts were described in a previous publication [14]. Some of the characteristics and why pandemics are catastrophic for humans, specifically the case of COVID-19, are described below.

The curve that describes the evolution (cases and deaths) of the pandemic disease over time is a church bell curve with an asymmetry similar to the Maxwell-Boltzmann distribution. Many theoretical discussions are presented in the literature [15-18]. The curve increases exponentially, passes through the maximum, remain at this maximum for short or long period and then decreases asymptotically. The curve has a start and an end point that is only predictable during the evolution of the curve. There are different factors that affect the evolution of the curve, among them: population of countries and cities, strong or mild or ever no measures for social isolation, pre-existence of vaccines and medicines and the Fakes (disinformation), among others.

The absence of vaccines and drugs, as in the case of COVID-19, the way to control the exponential increase in the curve is a strong social isolation. If this is not possible, the curve increases very rapidly, exponentially, and the social and private health systems are overburdened and collapse. The death toll is increasing exponentially; nothing can be done in a collapsing health system. The reality is a large number of deaths, the consequences of those deaths and the collapse of the economy. However, it depends on politicians' sensitivity and real (and not fake) information to shape the reality of the situation and act accordingly. The exponential growth curve must be flattened until it reaches the capacity of the health system to treat all patients without exclusion. If it reaches the situation of exceeding the capacity of the health system, it will certainly lead to decisions that depend on the political and social orientation of the government.

In the absence of vaccines and drugs, the consequences for the economy are very bad. This reflects the unemployment rate in the country, the activities of industry, services, the third sector, the deterioration of the country's infrastructure and the Gross National Product. The collapse of the economy can lead to social problems, such as authoritarian measures and even coups. It is like the Homeric myth when Odysseus (Ulysses), trying to move on with two monsters blocking his path, namely Scylla and Charybdis. For the oncologist [19], this is the dilemma, choose cancer or Covid-19 and, for the governments of the countries, choose between Health or Economy. Simultaneously with the start of the pandemic, authorities need to take measures, not only to prevent the collapse of the health system, but also of the economy. Of course, saving lives that have absolute priority, then comes the economy .

The situation is to believe that the true era of globalization began with the arrival of COVID-19 (20,21). The results and consequences of COVID-19 affected the entire planet Earth. There are few occasions when the earth was shaken; an example is World War II, but never through a pandemic. The world's politicians will be forced to accept some new principles of obvious truth.

At this point, the concern is expressed for the world's incipient preparation to face pandemics such as this one of the covid-19. It is affirmed that the humanity is not prepared to face pandemics. The desire is expressed for a Central Health System under the World Health Organization (WHO) and more investments in health, education and science.

Concluding this part of the article, the relationship between COVID-19 and Enmophy, as defined at the beginning of the article, is proven. Now let's address the question: what caused SARS-CoV-2, known as COVID-19?

IV. A PLAUSIBLE CAUSE OF SARS-COV-2, KNOWN AS COVID-19.

So far, the scientific explanation of COVID-19 needs to be further discussed. The first focus of virus was announced in Woham-China. The theories of the origins can be resumed as follows. According to K. G. Andersen and co-authors [22], they express the opinion that SARS-CoV-2 is unlikely to have arisen through laboratory manipulation. These authors, using scientific data, observed that the RBD of COVID-19 is optimized for binding to human ACE2. In addition, if genetic manipulation had been carried out, a variety of reverse genetic systems would be available in the event that beta-coronavirus was used. "However, genetic data show irrefutably that SARS-CoV-2 is not derived from any previously used virus backbone". They proposed two scenarios in order to plausibly explain the origin of SARS-CoV-2: (i) natural selection in an animal host prior to zoonotic transfer; and (ii) natural selection in humans after zoonotic transfer. They discussed also the selection during the passage could have caused SARS-CoV-2. "These two features of the virus, the mutations in the RBD portion of the spike protein and its distinct backbone, rules out laboratory manipulation as a potential origin for SARS-CoV-2". They conclude that "the virus is the product of natural evolution," Goulding adds", ending any speculation about deliberate genetic engineering" [23]. In this case, we have to ask, what is the meaning of "the product of natural evolution"? Leave as return to the Szilard L back in 1929 [6], he proposed that "any action resulting in a decrease in entropy must be preceded by the acquisition of information, which process is invariably associated with production of an equal or greater amount of Entropy". We transform the expression of Szilard to this. "Any intelligent or no intelligent action of the inhabitants of the earth (maybe the universe) in order to reduce entropy needs acquisition of Information, which process consequences is invariable the production of Enmophy". Szilard expressed himself incorrectly when he compared energy to entropy with the expression "... equal or greater amount of entropy". The amount of energy is measured in units of energy (example: cal and other units) and entropy is measured as the rate of energy over absolute temperature. Living organisms are built with matter. However, viruses have no life characteristics and according to others, have limited life characteristics. Viruses contain nucleic acid, DNA or RNA in the nucleus and a layer of protein that surrounds the nucleic acid. Some viruses are also bounded by an envelope of fat and protein molecules [24-30]. But the virus has the ability to interact with humans, animals and plants when ingested or in simple contact with them. How? With the inclusion of your RNA or DNA in the organism's DNA, modifying the genetic information and that leads to the collapse of the host cell and the multiplication of the virus. However, there are many theories explaining the creation of virus, but theories. The evolutionary history of viruses is interesting and fascinating. No clear and simple explanation for the creation origin of viruses exists. Every kind of life possesses an elementary intelligence. This fact is explained by the DNA, which includes previously defined information and other behavioural factors. A plausible theory that explains the existence of viruses, not the history and origin of creation, follows as it is.

All processes related to DNA for all species living in the earth (estimated number 8,7 millions [31]), namely, duplication or replication, repair, recombination, metabolism and damage and others, depend on the participation of RNA [32-36]. The RNA after a number of participations in the process loses its ability to process the DNA and produces a faulty DNA. RNA and DNA are subject to cleavage by enzymes and the reuse of parts useful for the organism. During the process, fragments of DNA or RNA or large parts of them, those

are not useful for the organism, from the nanostructures of viruses with the structure explained above. As we have seen in the theory of the Entropy and Enmorphism, the Entropy is defined according to equation (5) and the Enmorphism by the equation (13). In this case Ω is the thermodynamic probability which can be defined as the number of possible ways, in other words arrangements, which can assume the system. Let's see, if nature uses processes and defines conditions (constrains) to create a species through evolution, the same nature works according to Thermodynamics respecting Entropy and the Information Theory respecting Enmorphism. And that is the case, the set omega, Ω , defined as the maximum number of possible arrangements which can assume the system, is greater in comparison to the set "of conditions and constrains" creating the species. That justified the words "product of natural evolution".

Life is a miracle, but, from time to time, a random event occurs, respecting omega Ω (defined in eq.5), like the appearance of COVID-19, and can cause major problems and great consequences. Life is wonderful, but, it is sometimes threatened by an invisible virus, an invisible nanostructure monster, and that can result in loss of life. In other words, the Covid-19 is a product of natural evolution effect, involving the processes related to DNA and RNA, involving Thermodynamically Matter-Energy-Entropy and from Informatics Theories Matter- Information- Enmorphism.

V. CONCLUSION

This article includes a theoretical fundamental part of "what is Enmorphism". The mathematical definition of Enmorphism was given in this article. The notions Matter-Energy-Entropy are describing thermodynamically the reality of the natural sciences and according to Information Theories the notions of Matter-Information-Enmorphism are describing the Extended Reality (XR) which includes the technologies of Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (RM),

Different characteristics and aspects were evaluated considering the disorder, the disaster and the catastrophe caused by COVID-19. It is affirmed that the humanity is not prepared to face pandemics. The desire is expressed for a Central Health System under the World Health Organization (WHO) and more investments in health, education and science.

This article deals with a plausible explanation of the cause of SARS-CoV-2, known as COVID-19. The question of, what is the meaning of "product of natural evolution?" is elucidated. Different theories and arguments were presented. We conclude that Covid-19 is a natural evolution effect, involving the processes related to DNA and RNA, involving Thermodynamically Matter-Energy-Entropy and from Informatics Theories Matter- Information- Enmorphism.

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