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Chapter

Thermodynamic Aspects of Homeopathy

Mihael Drofenik

Abstract

The well-known definition of disease, which Samuel Hahnemann presented in a tentative theory for his new science and art of healing, is used as the starting point for the thermodynamic model of homeopathy. The *Le Chatelier principle* was applied to the biochemical equilibrium compartmentalized in the individual human cells of an ill person to explain the curing based on the re-establishment of the starting equilibrium of a healthy person when using a remedy. It is revealed that a high dilution accompanied by succession is required to release the remedies to their constituent molecular species in order to increase their activity when taking part in the biochemical equilibrium that is essential for healing. In addition, a single remedy reaction-product species, when it is in excess, as well as satisfying the kinetic equilibrium, is a necessary and sufficient condition to force the new biochemical equilibrium in the direction of the basic original equilibrium associated with a healthy state. In addition, homeopathic aggravation is considered on the basis of the Law of Mass Action and the role of the small remedy concentration in some high-profile models is revisited. The second elementary law of homeopathy, the Law of the Infinitesimals, was explained based on a kinetic model. When a remedy occurs in the human cell of a healthy person and forms a reaction product (Simillimum) that induces the finest medical symptoms of an ill person, then remedies entering the cell of the ill person will form identical Simillimum molecules and re-establish the initial equilibrium of the healthy state and cure the ill person. However, this will also induce a molecular crowding in the cells of the ill person. For kinetic reasons, this will aggravate the re-establishment of the initial equilibrium and consequently worsen or even interrupt the medical treatment. At a low remedy concentration, the molecular crowding becomes negligible while the formation of the Simillimum and the re-establishment of the initial equilibrium will take place continuously and cure the person who is ill. The final understanding of the Simillimum in the thermodynamic model was illuminated and wide-opened its duality with the ill person's key compound.

Keywords: homeopathy, thermodynamics, aggravation, Le Chatelier, Simillimum

1. Introduction

Homeopathy has been a medical phenomenon since the beginning of human history. It was positively considered during different periods of our development in a non-optimal form when the therapy had not yet been optimized. After Samuel Hahnemann [1] described the routine of homeopathy in the late 18th century, this activity has continued in an optimized way up to the present day. Today it works as

a result of Hahnemann's ideas and experiments developed in the late 18th and early 19th centuries and spread to different continents and was preserved in the same form for about 200 years. Despite the great advances in instrumental engineering and the basic science available in the field of biochemical research, there is still no scientific explanation for homeopathy.

On the other hand, due to the increasing use of homeopathy (it is now used by over 30 million people in Europe), studies of its medical effectiveness and the theoretical basis of its action are important. Not least because it is central to the social and economic development of society [2].

The entire scientific development of homeopathy is related to the ancient empirical observation that a disease can be cured by a substance (known as the remedy) that produces similar medical symptoms in a healthy person. The amount and the delivery of the medicine can be varied; however, its fundamental importance to homeopathy is critical.

The empirical observation of homeopathy (in Greek "homeo pathos") is the way of considering "like cures like"; the phenomenon that a sickness can be healed by an ingredient that produces similar symptoms in a healthy person. This is the primary axiom of homeopathy, often referred to as the "Law of Similars." It dates back to Hippocrates (460–377 BC) and even as far back as mankind's early development and was accepted very early by the ancients and perhaps even before those times. In other words, this axiom is a phenomenon that has been part of human history from the very beginning and was used in various periods of our development, and continues in a similar form to the present day [3].

Today, the literature covers a lot of research related to the scientific validation of homeopathy and to technical issues related to a comparison of this discipline with pharmacology. In particular, the physicochemical nature of homeopathic medicinal products obtained by the sequential dilution method is often the subject of research.

Investigators have produced many explanations related to the mechanism of homeopathy and its impact on treatment, depending on the concentration of low doses of the drug in the human body. Among them, the clarification of "water memory" has often been the topic of publications [4–12]. In addition to these evaluations, several models have been published: quantum mechanical entanglement [13, 14], quartz crystals and the structural concept of glass [15], electromagnetic activities [16], biological signaling [17], the nonlinear dynamics of complex systems [18, 19] the stress-effect model and hormesis [20, 21], the biopsychosocial model [22] and the thermodynamic model [23–25]. Bell and Koithan recently published an extensive article reviewing the results of key publications [26], and Vithoulkas published a book [27] covering scientific explanations and the practical application of homeopathy.

2. Law of Similars

We will begin with the well-known explanation of disease presented by Samuel Hahnemann when he tried to make a preliminary theory available for his new science and the art of healing. He said, "Illness is the destruction of the life force." On this basis, a cure would be "to return the reduced life force to its original state of tuning" [1]. Here, we will interpret this statement with the basic principles of chemical thermodynamics and use the term "basic biochemical equilibrium," associated with a healthy state, and the term "new biochemical equilibrium," with an unhealthy state. So, curing would be the return of the new biochemical equilibrium to the original biochemical equilibrium.

In other words, he was of the opinion that the disease in patients is a retreat from the tuned state and healing is associated with the establishment of the basic state. This idea is upgraded here with the basics of chemical thermodynamics, which was not available in his time. La Chatelier's (1850–1936) principle appeared after Hahnemann's (1755–1843) scientific work.

So, this thermodynamic model, which explains in detail what is happening in homeopathy and explains the core of homeopathy, the "Law of Similars," using the chemical equilibrium, is the result of scientific development created after Hahnemann's research work in the field of homeopathy. Thus, the basis of the Law of Similars is associated with the thesis "when it is possible to establish a healing process in which a drug that causes the same symptoms of disease in a healthy person can cure a sick person, then the only possible explanation for such a treatment (in today's understanding of the matter) is the presence of a suitable biochemical equilibrium." As a rule, all biochemical equilibria are subjected to the basic thermodynamic principle, the so-called Le Chatelier principle, which has been known in chemistry for more than a century and is thermodynamically well founded: if a chemical system experiences a change in concentration, temperature or even pressure, equilibrium will shift so that these changes are minimized.

This principle makes it possible to predict the shift of any equilibrium in a chemical reaction. However, it is much more general and can be extended to all processes in which a kinetic equilibrium is the essence of the process. According to this thermodynamic principle, biochemical equilibrium will alleviate any disturbance by moving the equilibrium in the direction that it will alleviate. So, when a remedy that causes the same disease symptoms (disturbance) as the original disturbance that moves the equilibrium from the initial equilibrium to the new one that causes the disease, enters that system (the human body), it will be, in light of the Le Chatelier principle, the new biochemical equilibrium that alleviated this disturbance and shifted the equilibrium in the direction of the initial equilibrium related with the healthy state. This is the basic thermodynamically grounded mechanism of the healing principle of homeopathy and covers the "Law of Similars" and follows Hahnemann's definition that the "detuned state" will return to the initial "tuned state," representing a healthy person.

When we apply this phenomenon in clinical homeopathy and consider homeopathic curing in the above concept we are confronted with three mutually connected and clinically supported processes: (i) the appearance of the specific illness symptoms of the targeted disease in an ill person, (ii) the appearance of identical illness symptoms when a healthy person digests a remedy (a remedy is a substance that induces identical illness symptoms in a healthy person) and (iii) the disappearance of similar illness symptoms in the course of curing when an ill person digests a remedy. In particular, the appearance and disappearance of illness symptoms, i.e., between (i) and (iii) processes are decisive. Namely, when we equalized the illness symptoms with characteristic biochemical reactions, then the appearance and disappearance of the illness symptoms mean direct evidence for the re-establishment of the initial biochemical equilibrium when consuming the remedy, which must take place, as the basic natural principle, the Le Chatelier principle, and demonstrates the Law of Similars, which acts as the basic natural law.

The Le Chatelier principle can be considered in a more quantitative way and interpreted using basic thermodynamic values. Thus, in an ill patient, the overall biochemical equilibrium deviates from the healthy state. This new equilibrium state then regulates the status of the ill patient; however, in such cases, visible signs of the patient's behavior and appearance indicate that the expected medicine is a deviation from the norm and/or a healthy condition. Thus, the patient's behavior is indirectly related to the important biochemical reactions and/or reaction products

of the new equilibrium state. The same status can be achieved if a healthy person takes the remedy.

We will consider the biochemical equilibrium between the healthy condition [A] = $\Sigma\nu_{na}A_n$ (which determines the status of the healthy patient) and the diseased condition [B] = $\Sigma\nu_{nb}B_n$ (which determines the status of the ill patient). Here, ν_{na} represents the number of vital molecules A_n maintaining the healthy state in the human body before the onset of the disease. On the other hand, ν_{nb} represents the number of molecules of B_n reaction products formed during the disease's progression. We can present the biochemical equilibrium for the time when it is considered in the form:

$$\textbf{vital molecules} \leftrightarrow \textbf{reaction products}$$

$$[\mathbf{A}] \leftrightarrow [\mathbf{B}]$$

and the corresponding equilibrium constant: K = [B]/[A]

When a disease-related biochemical reaction (the driving force) takes place, the equilibrium shifts to the right due to the formation of reaction products that cause disease-related deterioration. When an ill person digests the remedy, the concentration of the total molecules of the reaction products [B] increases.

The above considerations (equilibrium constant) can be connected to the Law of Mass Action, which implements the restoration of the equilibrium. In chemistry, the Law of Mass Action is the proposition that the rate of a chemical reaction is directly proportional to the product of the concentration of the reactants present in the system, i.e., the cells of the human body. Precisely, it indicates that for a chemical reaction mixture that is at equilibrium, the ratio (K) between the concentration of the reaction products [B] and the vital molecules [A] is constant. Therefore, the Law of Mass Action when the equilibrium constant is considered, i.e., K = [B]/[A], literally means that an increase in the concentration of the reaction products induced by the uptake of the remedy [B] will increase the percentage of vital molecules [A] in the system. So, at biochemical equilibrium the percentage of vital molecules [A], which are the holders of the healthy state, increases at the expense of the digested remedy. So, for an increase in [B] there will be a strong increase in [A]. This is tightly connected with homeopathic aggravation, as explained below.

3. Homeopathic aggravation in light of the Law of Mass Action

When Hahnemann began using drugs with the accuracy required by his method, he found that the usual doses worked strongly and greatly aggravated the symptoms before the treatment could occur. He then reduced the doses in steps until he found that he could achieve a healing effect without aggravating the medical symptoms. In some cases, he found that the attenuating process had actually increased the healing power of the remedy. The method he introduced was to dilute tinctures in the ratio of 1 to 99 rectified spirits and grind insoluble substances with sugar of milk in the same proportions. For the higher attenuations the process was repeated, and with the same proportions being observed at each stage. This all began because he wanted to decrease the aggravation of the patient's symptoms, obtaining the remedy in ordinary doses. In Hahnemann's centesimal scale, each step of the process divides the original quantity by 100, and hence each higher number represents a higher degree of attenuation. He also pointed out the phenomenon of the asymptotic

dilution when he stated: "But the attenuation is so progressed that, no matter to what extent it is carried out, something of the original substance must remain, though it may be beyond the power of chemistry to detect its presence" [28].

Here we will explain the origin of the aggravation of medical symptoms in homeopathy when the patient digests the prescribed remedy [B]. Now we must be aware that in reality the essential molecule when treating the thermodynamic models of homeopathy is Simillimum. This is the reaction product induced by remedy (B) in a healthy person. However, we manipulate, in a clinic, homeopathy exclusively with the remedy, we dilute end successes the remedy, due to that we must also use the (B) remedy in the formal equilibrium equations. Simillimum is a component that occurs as the reaction product in human cells and we cannot physically manipulate with it. However, it is the key component in the considered chemical equilibria. Here, during the presentation of the phenomenon we use (B) "representing" the Simillimum, which is in fact the reaction product of the remedy. The actual role of Simillimum is considered in the last paragraph of the paper.

In the body of an ill person the equilibrium [A] ↔ [B] governs the illness. The starting composition of the system in the human body is then [A] + [B]. When we add to the system (human body) ordinary doses of remedies, for example 2[B], then we obtain a composition in the system [A] + 3[B]. This is then the composition before the re-establishment of the initial equilibrium. Here, we increase the amount of remedy and accordingly its reaction products, Simillimum, which increases the symptoms of the illness. So, this stage, due to the increase of (disease-making remedy reaction product) Simillimum before the action of the Law of Mass Action, causes homeopathic aggravation, the intensity of which depends on the remedy dose. This was Hahnemann's original concern when he started to "dilute tinctures in the proportion of 1 to 99 of rectified spirit."

After homogenization of the Simillimum in the human body, the chemical equilibrium starts to work, associated with the operation of the Law of Mass Action. Here, one [B] changes to [A], with respect to the constant K, and we obtain the final chemical composition 2 [A] + 2[B] in the system. Thus, after the working of the Law of Mass Action, during the re-establishment of the initial equilibrium associated with the healthy state, the true previous composition of the [A] + 3[B] system changes to the final composition of 2 [A] + 2[B]. So, in system [A] it increases by 100% relative to [A] → 2[A], while [B] decreases by 60% 3[B] → 2[B].

This is the confirmation of the strong increase in vital molecules [A] and the strong decrease of [B] in the system at the expense of the added remedy [B]. And consequently, this is associated with improving the health or the disappearance of adverse medical symptoms. We can see that the thermodynamic model accurately forecasts the aggravation before the healing starts. This aggravation can be severe, as first reported by Hahnemann, who started the process of dilution when he, by degrees, reduced his doses until he found he could obtain the curative effect without aggravating the illness.

What is also interesting is that he noted that even at huge dilution, to some degree the original substance remains and cannot be detected with chemical analyses. This observation is also relevant in today's reconsideration of some models, i.e., the water memory and the silent communication, also mentioned in this paper.

4. The role of the small remedy concentration in most exposed models

When Hahnemann's optimizations reach very low therapeutic concentrations, researchers believed that they had pure water as a drug-free solvent, and suggested different models that would clarify the treatment process under these conditions.

During the development of homeopathic remedies, the preparation process involves very strong mechanical mixing (succession) with lactose and serial dilution in an ethanol-water solution, usually in glass containers. The concrete significance of this process is to break the physical bonds of the molecular aggregates and to chemically activate them. At high dilutions, these molecules will not be able to re-associate, but will physically associate with the sugar-lactose molecules, which are in large excess. The sugar molecules will be digested in the human body and the chemically activated remedy molecules will remain suitable for targeted biochemical reactions in the healing process, i.e., the formation of Simillimum and re-establishing the initial equilibrium associated with the healthy state.

When Hahnemann's optimizations reached very low therapeutic concentrations, researchers believed that they had pure water as a remedy-free solvent, and suggested different models that would clarify the medical treatment under these conditions.

They suggested curing in the absence of healing substances in the frame of the model called the "memory effect of water," which was very popular in the 1980s [3–11]. In some cases, homeopaths were convinced that, after successive dilution, the solution/water no longer contained the active compound (remedy) molecules; however, the effects were still observed. Based on such examples, the "memory effect of water" was proposed, according to which water "remembers" the properties of the substance originally contained and retains the healing effect of the solution, even when it supposedly no longer contains the active substance. Recent studies, which showed the substance molecules in extremely diluted medical preparations [29, 30], have excluded this model [4].

One of the models addressed today by homeopaths concerns the use of the concept of the "Vital Force," as Hahnemann called it. According to this model, at very high dilutions combined with succession, we can no longer speak of "substances" in solution, but only about "fields of forces." In the same way we cannot talk about the organism that the remedy acts upon on a biochemical basis, but only about the energy part of the organism, i.e., the "Vital Force." So, we have an interaction of forces, not biochemical agitations. The "fields of forces" (electromagnetic wave interactions, $h\nu$) is an extensive property not dependent on the mass of the remedy. On the other hand, the amplitude is an intensive property and is dependent on the mass. So, a zero-remedy concentration must exhibit zero amplitude and cannot upgrade anything concerning common electromagnetic effects, i.e., resonance, synchronization, reinforcement and interference, and cannot take part in the interaction of the "fields of forces." On the basis of the above-mentioned facts, it is to be expected that homeopaths will always deal with a tiny amount of substance.

How difficult it is to eliminate the impurities and/or clean a contaminated solution was also observed by Hahnemann, and which we also stated when considering homeopathic aggravation.

5. The origin of the Law of Infinitesimals

Here we will start from the thesis that if it is possible to establish a healing fact in which the success of a therapeutic treatment is impaired by increasing the content of the added drug (remedy), then the most likely explanation for such a treatment (in today's understanding of the situation) is that this phenomenon is related to the kinetics of biochemical reactions in human cells.

Processes involving homeopathy take place at the molecular level, which divides in the human cell, where equilibrium regulates the biochemical status of the cell in an ill person. In the human body there are biochemical reactions in human cells,

where a huge number of highly sensitive, fine-tuned and regulated biochemical reactions take place at any time in a single cell. To begin the healing process, the remedies must flow into the cells of the ill person.

After increasing the initial drug concentration at the entrance to the cell, the drug molecules use passive diffusion and cross the cell membrane in the direction of the concentration gradient. The remedy creates a reaction product in the cells of a healthy person, Simillimum, which will cause a complex of symptoms that are almost close to the cure for the disease in question. These Simillimum molecules are already present in the cells of the affected person and cause the disease in question (as will be explained in the last paragraph). When the remedies go into the cell of an infected person, they will form the same reaction products, i.e., Simillimum molecules, as in the cell of a healthy person and increase the concentration of Simillimum molecules in the cell of the infected person. After the Simillimum enters the cell equilibrium of the diseased person, it will restore the initial equilibrium of the healthy state and heal the ill person in accordance with the "Law of Similars" described above. The remedy as a molecule is not in itself a critical issue, but the reaction pattern developed by each individual remedy molecule that enters the diseased person's cell and forms reaction products during the formation of Simillimum molecules that enter and shift the chemical equilibrium and heal the ill person.

However, the healing is associated with molecular crowding, due to the formation of reaction products that accompany the Simillimum formation, which aggravates the re-establishment of the initial equilibrium and consequently curing for kinetic reasons, as will be considered below. The chemical reactions in human cells are in the steady state under the suitable conditions and given enough time, distinct biochemical reactions carried out in a test tube will sooner or later reach equilibrium. Within cells, however, many reactions are related to pathways in which a product of one reaction serves as a reactant in another pathway, or is driven out of the cell. In this more complex situation, when the rate of formation of a substance (the reaction products) is equal to the rate of its consumption, the concentration of the substance remains constant, and the system of linked reactions for producing and consuming that substance is said to be in a steady state. One consequence of such linked reactions is that they prevent the accumulation of excess intermediates, caring cells from the harmful effects of intermediates that have the potential to be toxic at high concentrations [31, 32]. The remedies that enter the cells of an ill person are determined to synthesize the reaction product, i.e., Simillimum, after an identical procedure occurring in the cells of healthy people. So, there cannot be any linked reactions that might prevent the accumulation of excess intermediates formed during biochemical reactions in the cells of the ill person. Therefore, the remedy's influx will cause biochemical reaction products and induce molecular over-crowding. For this reason, the kinetics of the biochemical reactions taking place after the entry of the remedy into the cells of an ill person will be heightened. From the kinetic point of view [33], in a human cell, molecules move and collide, and their bonds vibrate and rotate. When molecules collide, there is the possibility of a reaction taking place, but only if the colliding molecules have enough energy and are aligned correctly.

Collisions in a liquid solution are regulated by diffusion instead of direct collisions, so diffusion takes control of the frequency of collisions. Direct collisions between two target molecules no longer predominate, as each molecule must collide with a large number of cytoplasmic molecules and other molecules before it can find a suitable molecule with which to react. Instead of a direct collision between the target molecules, we must use a diffusion-controlled collision frequency [34]. A larger influx of drugs increases the concentration of the reaction products and, consequently, molecular over-crowding occurs. The effects of molecular crowding

strongly reduce the rate of intercellular diffusion and the reaction. The cytoplasmic network leads to a decrease in the mobility of the molecules [35]. Before a successful collision, there will be a series of collisions (ineffective collisions) with other molecules, and the concentration will increase with each arrival of the remedy molecule. Each molecule of the remedy makes a number of molecules of reaction products that can be considered as obstacles to effective reaction collisions and will interfere with the reaction kinetics and aggravate the curing, since the re-establishment of the initial equilibrium of the healthy state will be strongly delayed. To prevent such over-crowding and enhance the healing process, we need to reduce the concentration of the remedy. To address the "Law of Infinitesimals" at very low concentrations, we need to consider two key statements.

(i) It has been shown that medicinal products diluted and hand-successed to 30 or even 200 C retain the original materials [30] and that the drug component in the solution decreases asymptotically during serial dilution [31], mainly due to the fact that the air-liquid phase boundary formed during succession behaves as an impurity snare and retains the diluent molecular constituent species, so that contamination of the solution with the remedy can be expected, regardless of the dilution protocol, and second, (ii) in theory every single molecular constituent species (Simillimum) being in excess while re-establishing the equilibrium is a necessary and sufficient condition to trigger the equilibrium restoration. Considering the above, in extreme dilution, we are convinced that a typical homeopathic remedy does not guarantee that any of the remedy molecules are present (in potentiated and diluted solutions). A small number of remedy molecules can, through the process of "infinite dilution," form a small number of Simillimum molecules and restore the equilibrium and allow the patient to heal, which is observed in clinical homeopathy. In this case, the status of the medicinal solutions in question can be taken as "infinitely diluted" and thus the minimum concentration level in the concentration range covered by the "Law of Infinitesimals," i.e., "infinitesimal dose." This is the most characteristic feature of modern homeopathy.

The increase of the curing efficiency with the strong decrease of the remedy concentration is to be expected, and is also confirmed in clinical homeopathy.

On the other hand, as already pointed out, a relatively high concentration of remedy can even block the healing process. In homeopathy, we have two concentration extremes, i.e., the high and low concentrations, and in between there remains a constant increase in curing efficiency.

In pharmacy, the drug is a conventional solution of an active ingredient that cures and is compatible with a dissolved and diluted chemical drug in bulk in a true solution that can only act pharmacologically with a linear dose-response relation diametrically different from homeopathy.

6. The role and significance of Simillimum in the thermodynamic model of homeopathy

Simillimum is a compound that forms when a substance (remedy) is given to a healthy person that triggers the most similar symptoms of the disease that is being considered. A large number of substances are usually tested in order to find a suitable remedy, whose reaction product in a healthy person has the properties of the Simillimum.

Simillimum is a compound that acts as a medicine when it enters the ill person's cells. Its mechanism of action is connected with the re-establishment of the initial chemical equilibrium associated with a healthy state during the action of the Law of mass action. Simillimum is the key equilibrium molecule included

through (B) in the equilibrium constant. With increasing the remedy (B) and consequently Simillimum concentration we induce the well-known homeopathic aggravation. After the onset of the working of the Law of Mass Action and the shift of equilibrium, the healing begins as described in the section on homeopathic aggravation.

Namely, for the application of the Law of Mass Action the compound that increases the "mass" (concentration) in the equilibrium's re-establishment must exhibit the same chemical composition as that governing the ill person's equilibrium, otherwise the thermodynamic model is out of functioning and the homeopathy cannot be explained in the frame of this model. So, this is the main argument, supported by the natural law, the Law of Mass Action, that both compounds must exhibit the same chemical composition.

In essence, Simillimum must always occur in pairs for every disease and Simillimum has its "shadow," i.e., parallel compound in the ill person, which is the driving force of the current disease and governs the "new equilibrium" which Hahnemann described as the "detuned state."

According to the same symptoms, the Simillimum "recognizes" its contra part, the key compound in the ill person, which must exhibit the same chemical composition. However, the same chemical composition is associated with the same electromagnetic resonance spectra. Resonance response spectra in diseased individuals and in provers must exhibit the same resonance frequency. Since the spectra are confined to the chemical composition it can be taken that there are same chemical compounds in diseased individuals and in provers. This is the crowning proof that both compounds have the same composition.

Besides, we must not overlook the reinforcement of the electromagnetic spectra of both considered compounds, i.e., the remedy (Simillimum) and the disease-forming compound.

The electrodynamic field is the interrelationship of particles that are affecting each other through charge and movement, which are definable in terms of the oscillation and movement. So, the compounds must have their own resonance spectrum, which is compatible with its composition, i.e., the same composition exhibits the same resonance spectrum.

As stated above, both compounds, Simillimum and his contra part, in diseased individuals must have the same composition in order to make possible the equilibrium restoration via the activation of the Law of Mass Action. The same composition makes possible the electromagnetic reinforcement of the spectrum of the ill person when adding the remedy (Simillimum) as a medicine to cure the patient.

One of the basic properties of electromagnetic spectra lies in its principles of synchronization resonance, harmony, reinforcement and interference. So, this would be a possibility to identify an electromagnetic reinforced response of key molecular species in ill persons with the addition of a remedy (Simillimum). When we add to the ill person, exhibiting normal electromagnetic spectra induced by the disease-making compound, a defined amount of remedy (Simillimum), then the amplitude of the spectra should increase due to the reinforcement of the spectra or, in other words, by increasing the concentration of the "common compound" (exhibiting the same composition) the intensity of the spectra must increase.

This agrees with the statement of Vithoulkas [27], i.e., "If a substance is capable of producing a similar symptom picture in a healthy organism, then the likelihood of its vibration rate being very close to the resultant frequency of the diseased organism is good, and powerful strengthening of the defense mechanism can occur through the principle of resonance." This statement supports the conclusions of this model, i.e., the same frequency, same composition and optimal healing ability. Namely, the similar spectra demand a similar composition and the thermodynamic model covers the above statement.

After the addition of the remedy (Simillimum), the therapeutic agent, the intensity of the electromagnetic spectra must increase due to the increase in the concentration of the electromagnetic-spectra-emitting compound (reinforcement of the both signals). Thus, the sudden increase in the electromagnetic signal is associated with homeopathic aggravation.

After the operation of the Law of Mass Action and the decrease of the concentration of the remedy (Simillimum), the amplitude of the spectra must have decreased, revealing the healing. So, the characteristic spectra of the remedy and that in the ill person's body must be identical and subjected to reinforcement, which would be a direct proof of this thermodynamic model and is also in agreement with statement made by Vithoulkas [27]., i.e., "In this sense, the "shape" of the remedy and of the disease can be understood as having the same "resonant frequency" and further "the resonant frequency of a particular pattern of symptoms in diseased individuals and in provers. It is this matching of symptom-pictures that is the primary task of the homeopath in prescribing a remedy."

The definition of Simillimum in the thermodynamic model lies in its duality with the ill person's key compound, i.e., the same composition, the same medical symptoms, the same electromagnetic response and the same biological origin (the human body). This duality can be considered as one of the most relevant properties of homeopathic science.

7. Conclusions

The thermodynamic approach to explaining the most important phenomenon in homeopathy reveals that the key condition for its successful interpretation must be the assumption that the chemical composition of Simillimum in healthy persons must have the same chemical composition as in diseased individuals. Namely, this assumption is supported by all key homeopathic phenomena that are clinically sustained and are also consistent with common electromagnetic spectra induced in diseased individuals and in healthy persons.

The most certain proof that the thermodynamic model works is the Law of Similars and the homeopathic aggravation. Both phenomena are essential in healing and can be precisely explained by the thermodynamic model. In addition, the same electromagnetic spectra and the same composition also support the results of the outcome of the thermodynamic model.

So, the utmost exclusive statement of homeopathy, that similar medical symptoms are associated with the similar composition of Simillimum, can be confirmed by these phenomena and is the realm of homeopathic science.

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