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ORIGINAL PAPER

# Identification of Unknown Homeopathic Remedies by Delayed Luminescence

**Karin Lenger · Rajendra P. Bajpai · Manfred Spielmann**



**Abstract** A quality control method of highly diluted and potentized homeopathic remedies is important for curing patients applying homeopathic therapy. Lenger detected photons in highly potentized homeopathic remedies by delayed luminescence. The photons of Argentum metallicum 100MK and Cantharis 100MK magnetically bound to their carrier substances ethanol or saccharose were separated by their resonating magnetic field of about 2.06 MHz. The photons of these 100MK potency levels and of their reference substances were determined to be standard values calculated by the $B_2$-values of Bajpai's equation derived from the Hamiltonian equation. The stability of ethanolic Argentum metallicum 100MK and Cantharis 100MK declined to 1/3 of their photons within a month in contrast to saccharose globules with Argentum metallicum 100MK having been stable during the period of these investigations for almost 1 year. Some remedies delivered as CMK potency had been proved to be ethanol. The testing amount of high ethanolic potencies is limited to 40 µl because 80 µl resulted in an attenuation of the photons; 40 µl equal 16 medicated saccharose globules. Six unknown homeopathic remedies could be identified as increasing potency levels of Argentum metallicum from 100MK to 1.000MK which indicates a calibration curve. The homeopathic factories having sent the unknown remedies confirmed the measurements. A quality control of homeopathic remedies is possible by comparing the different $B_2$-values of the remedies and their carrier substances.

**Keywords** Delayed luminescence · Homeopathic remedy · Degree of a homeopathic potency · $B_2$-coefficient · Resonance frequencies of homeopathic remedies · Quality control of homeopathic remedies

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## Introduction

### Homeopathy—A Placebo Medicine?

Homeopathy is very often criticized by the public to be just a placebo medicine. This opinion is also indicated in a statistical evaluation by Egger and his group [1]. They report on different kinds of homeopathic experiments and their results.

In consequence of all these errors, uncertainties, and the missing evidence, so far, there is much doubt about the possible healing power of those remedies. Since nobody knows or really understands how the healing process of homeopathic remedies works, people turn away from that, doubt or even start to attack the whole system. For those reasons it is not surprising that many influential organisations and individuals try to abolish it. Result: there is a great need for information and evidence in this field, it is absolutely essential for the long overdue recognition and success of this effective energy medicine.

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## How Does Homeopathy Work?

Samuel Hahnemann (1755–1843), founder of homeopathy, was the first to find out the efficacy of homeopathic remedies. He published his findings in the form of his Law of Similars: S*imilia Similibus Curentur* (Similar can be cured by similars) in 1796. This means that the symptoms of a sick person are compared with those being caused by a distinct poison in a healthy person [2]. Whenever a healthy person takes a certain poison, this will cause mental and physical symptoms of illness which is called a symptom-picture. The remedy with the most similar symptom-picture then is chosen in a very high potency for curing the patient.

## What is a Potency?

The substances are extracted from plants, animals, or minerals in high alcoholic dilution, such as for instance, 87 %, when extracting Cantharis (Spanish fly). There are three main methods to produce homeopathic potencies.

These are:

(a) potencies according to HAB, Hahnemann's prescriptions [3]
(b) potencies according to Korsakoff (K-potencies) [4]
(c) potencies according to Fincke (f-potencies or FC-potencies) [4, 5]

### *Hahnemann's Potencies*

There are three different forms of administrations: ethanolic dilution, medicated saccharose globules, and triturations with lactose from which tablets are made.

Consecutive dilution 1:10 (D-potencies) or 1:100 (C-potencies) of the ethanolic mother tincture or of 1 g substance, according to HAB [3], points out that the concentration of molecules after reaching C 12 or D 24 is far beyond the Avogadro number as shown:

1 Mol substance contains $6.2 \times 10^{23}$ particles, e.g., 1 Mol NaCl = 58 g, 1 g NaCl = 0. 017 Mol corresponds to $1.7 \times 6.2 \times 10^{21}$ particles. After every single dilution the liquid has to be succussed (shaken) 10 times by hand [3].

After having diluted 22 times 1:10 or 13 times 1:100 and succussed means that there isn't any molecule left in the dilution. This procedure is called several vessel method. For each dilution step one vessel is needed. This way potencies are being produced.

Medicated saccharose globules are produced in the following way: the desired ethanolic potency is poured onto pure saccharose globules in a ratio 1 g:100 g saccharose globules and then air-dried.

Another sort of potencies are the triturations, e.g., 1 g substance with 9 g lactose are triturated to a distinct size (D1), then a repeated 1:10 dilution and trituration to a distinct smaller size (D2) follows and so on and on and on.

### *Korsakovian Potencies*

The procedure of Korsakovian potencies [4] (K-potencies) needs only one vessel for the procedure of the potencies and starts with a C3. The dilution is discarded after ten succussion steps. Then only a "drop" (random concentration) is left in the vessel. It is refilled with ethanol to the original volume and succussed again 10 times by machine instead of by hand. Practising this method very high homeopathic potencies as e.g. 50MK, 100MK, or 500MK (e.g., 50MK means an abbreviation for 50,000 dilution steps and 50,000 × 10 succussion steps) can be produced no longer containing any molecule.

### *Fincke Potencies*

Another sort of potencies called, e.g., 100Mf are produced according to the continuous flux method [4, 5]. A special vessel contains the solubilized mother tincture being stirred (3,000 rev/min) with a glass stick. Continuous dilution takes place by an inflow of the carrier substance, e.g., purified water or ethanol. High potencies can be produced very quickly that way. Only one vessel is needed.

## Evidence of Homeopathic Efficacy

Although, homeopathic remedies having almost no molecule in the dilutions or on the medicated sugar globules many clinical tests [6–10] give evidence of the great healing power. Even in bioassays [11–18] also a great efficacy is reported. Mostly these remedies had been produced using water instead of ethanol [19–22]. That does not correspond to Hahnemann's original prescriptions (HAB) [3] for the production of homeopathic remedies. Many scientists developed an aqueous model of homeopathic function depending on special water structures. The memory of water was frequently discussed [23, 24]. Popp created a physical model of homeopathic function [25, 26]. He assumed homeopathic remedies to be energy and to work accordingly to the physical resonance principle. Popp tried to prove homeopathic efficacy by an experiment with volunteers [26]. After having given them homeopathic remedies in low potencies (D6, D12) Popp tried to measure their emission of photons by using photomultipliers. He failed.

## Lenger's Proof of Photons in Homeopathic Remedies

Nobody had been able to specify the quality of this "non-material information" in homeopathic remedies till Lenger,

Bajpai, and Drexel [27], had shown that high homeopathic remedies can be identified by physical qualities. Lenger [27, 28] detected photons with frequencies in the MHz-region using highly succussed remedies on sugar globules by two magnetic resonance methods (a) by the Tesla-flat-coil system [28] and (b) by the measurement of delayed luminescence signals applying a modified photomultiplier [27].

*The Tesla-Flat-Coil System*

There are two different Tesla-flat-coil systems [28], each consisting of a primary and secondary coil. Depending on the number of windings of the coils one of them had a frequency at 6.9 MHz and the other at 2.06 MHz. The oscillator was adjusted to give either 2.06 or 6.9 MHz to the primary coil. By Faraday induction the magnetic field was separated from the electric field on the secondary coil. The magnetic field was measured by using a magnetic probe and the electric field by using an electric probe. Where the magnetic field has a maximum the electric field has a minimum and vice versa. Placing Argentum metallicum and Cantharis 100Mf globules [4, 5], into the magnetic fields of 6.9 or 2.06 MHz their attenuation took place through magnetic resonance measured by a H-loop antenna connected to a spectrum analyzer. Their frequency spectra [28] (Argentum metallicum or Cantharis) could be measured by placing (=stimulating) them on the Tesla-coil of 2.06 MHz and measuring the spectrum at about 6.9 MHz. Furthermore, the degree of the potencies could be measured. A distinct electromagnetic field, consisting of the resonance frequency of the remedy and a distinct voltage (μV), is characteristic for each degree of the potency to separate the photons from their carrier substance. Increasing potencies need increasing magnetic fields confirming the assumption of the homeopaths that the succussion steps are more important than the exact concentration steps.

*Measuring Delayed Luminescence Signals of Homeopathic Remedies Applying a Modified Photomultiplier*

The second method for proving photons in homeopathic remedies is measuring their signals of delayed luminescence [27]. To separate the photons from the remedies Argentum metallicum and Cantharis in 100MK or 100Mf, the measuring chamber of the photomultiplier was twisted by a copper coil of 20 windings connected to an oscillator generating the resonating electromagnetic field of 2.06 MHz/50 V. The delayed luminescence signals of the remedies' photons were calculated as $B_2$-values describing the number of photons, according to Bajpai's equation [27, 29–31], originally developed to describe the emitted photons of living organisms and human beings in squeezed states by $B_1$-values [30–38]. The $B_2$-values describe the emitted photons of non-living systems, dead matter such as homeopathic remedies [27]. Although many homeopathic mother substances are ethanolic extracts of living organisms such as Cantharis (Spanish fly) or Apis mellifica (honey bee) homeopathic remedies are regarded as dead matter. It was found that the $B_2$-values characterize the potency of a remedy. $B_1$-values and $B_2$-values describe photons of coherent quantum character. The signal of delayed luminescence is expressed by four parameters $t_0$, $B_0$, $B_1$, and $B_2$.

Intention of this Study

This study reports on quality control of highly potentized homeopathic remedies, the first experiments in homeopathic research by measuring delayed luminescence of the remedies' photons using a modified photomultiplier. The different $B_2$-values of the photons being separated from the remedies and their reference substances give a possibility to discriminate them from each other. To allow comparisons, standard $B_2$-values of CMK potency levels of Argentum metallicum and of Cantharis are shown together with those of ethanol and pure saccharose (=reference substances). The height of $B_2$-values indicate the degree of the potency. Stability investigations of ethanolic homeopathic dilutions and remedies on saccharose globules showed a big difference between both of them. The remedies in ethanolic homeopathic dilutions only remained stable for 1 month, whereas those on saccharose globules kept their stability during the whole period of the investigations lasting for almost 1 year. Even CMK-potencies of Argentum metallicum and Cantharis could be proved to be ethanol. After all it was possible to identify six unknown homeopathic remedies by applying a quality control using delayed luminescence.

## Materials and Methods

Homeopathic Remedies

Different batches of Argentum metallicum 100MK and Cantharis 100MK as alcoholic dilutions of 18 % ethanol and as sugar globules were purchased and measured at different times: March, April, and September of 2009. The batches of remedies were purchased from C.E.M.O.N (Centro di Medicina Omeopatica Napoletano, Naples, Italy, http://www.cemon.eu/store.php), because they sell these high Korsakovian [4] potencies in alcoholic dilutions and in saccharose globules. The last batches in September 2009 were donated by C.E.M.O.N.

The following unknown remedies had been sent to be identified

These globules had been labeled as:

1. Argentum metallicum 35K in March
2. Argentum metallicum 35K in April
3. Argentum metallicum 6K in April
4. Argentum metallicum 200K in April
5. Cantharis 35K in September
6. Unknown homeopathic remedy from Heel-Belgium (info@heel.be) in September, a donation

## Reference Substances

### *Reference: Saccharose Globules*

Pure saccharose globules, size 3, had been purchased from Heel-Belgium, produced according to HAB (prescription 10) 110–130 globules/g. Weight of one globulus is 8.3 mg consisting of 100 % pure saccharose officinalis, pharmaceutical quality. In this way it is assured that the reference saccharose globules are not contaminated by homeopathic remedies.

### *Reference: Ethanol*

The ethanolic references, 18 % ethanol, were diluted from 96 % ethanol (LABORCHEMIE Apolda GMBH, leading-monographie PH.EUR 7.0) with purified water (AQUA purified corresponding to Pharmacopoe Europaee 7.0, Fa. Fagrom) by Paracelsus-Apotheke, Kaiserstr.28, DE-63065 Offenbach, Germany. Therefore, it is assured that the reference ethanol (18 %) is not contaminated by homeopathic remedies.

## Measurements of Homeopathic Dilutions and Globules by Delayed Luminescence Using a Modified Photomultiplier Developed by Lenger [27]

The measurements were performed using the photomultiplier system at the International Institute of Biophysics, Kapellener Strasse, DE-41472 Neuss, Germany.

### *Measurements of Ethanolic Dilutions*

The remedy was placed in a cuvette in amounts from 40 to 160 µl of the ethanolic dilutions and filled up with 18 % ethanol to a total volume of 1 ml.

### *Measurements of Saccharose Globules*

16 globules of the remedies or of the reference, pure saccharose globules, were put into a cuvette, as Lenger has described [27]. The cuvette then was placed in the approximately 20 × 20 × 20 cm cubic measuring chamber (Faraday cage) with a quartz window and a photomultiplier detector. All measurements in the sample chamber were performed at constant 25 °C.

### *Exposure to Visible Light (380–790 nm)*

The quartz cuvette containing the remedy was placed in the dark for 5 min before exposing it to visible light for 10 s. The delayed luminescence signal was measured for 5 min.

### *Exposure to the Electromagnetic Field of 2.06 MHz/50 V*

A copper coil of 20 windings encircling the measuring chamber was connected to an oscillator generating the resonating electromagnetic field of 2.06 MHz/50 V.

Prior to the start of a measurement the cuvette containing the remedies or references was excited by the field of 2.06 MHz for 5 min in the dark. The delayed luminescence was measured for 5 min.

The delayed luminescence signal of each remedy and of each reference was measured: once by stimulation with visible light and once by stimulation with the electromagnetic field of 2.06 MHz/50 V.

## Calculation of the $B_2$-Coefficients

Delayed luminescence is the phenomenon of photon emission by a complex system after its exposure to visible light for a few seconds or to an electromagnetic field.

The signal of delayed luminescence is recognized by its characteristic shape that has two regions, a small decaying region followed by a long and almost non-decaying region. The character of the decay is not exponential but is probably hyperbolic. Such a shape of decay cannot arise in a conventional model of photon emission. The decay shape indicates definite correlation among photons emitted at different times. Another name of this correlation is coherence in time in the photon signal. Popp [31] concretised the time coherence in a model that attribute decay shape to dynamical behavior of photons given by a frequency stable damped harmonic oscillator with time dependent damping and mass terms being provided that mass $m_0 = m(t = 0)$ is taken as one (unit mass). Popp suggested the following Hamiltonian for the dynamics of a photon field [31]:

$$H(p,q) = \frac{p^2}{2(1+\lambda t)^2} + \frac{1}{2}(1+\lambda t)^2\omega^2 q^2$$

where $p$ and $q$ are the usual canonical conjugate variable of electromagnetic field of mode frequency $\omega$, $\lambda$ is the damping coefficient, and $t$ is time. The amplitude of its

classical solution decays hyperbolically with time and its energy is proportional to the square of its amplitude. Bajpai et al. [29–31] solved this problem in the quantum framework and found that quantum state of the above oscillator is a squeezed state that evolves in time. The number of photons in the squeezed state in small interval $\Delta t$ around the time $t$ is equal to $n(t)\ \Delta t$. The calculated value of $n(t)$ in the quantum dynamics [29–31] is:

$$n(t) = B_0 + \frac{B_1}{(t+t_0)} + \frac{B_2}{(t+t_0)^2}$$

where $B_0$, $B_1$, $B_2$ are coefficients representing definite analytical expressions and $t_0$ is the inverse of damping coefficient. The coefficients depend on initial conditions and parameters of the Hamiltonian. The coefficients and $t_0$ characterize a delayed luminescence signal and can be determined from the observed shape of a signal by non linear minimization. Quantum nature of the signal implies quantum nature of the coherent structure. The four parameters of the signal are related to some attributes of the coherent structure.

All these parameters were determined by least square minimization of an observed signal. The unit of $n(t)$ is (count/s) and of $t_0$ is (s). Both determine the unit of other parameters, e.g., the unit of $B_2$ is (counts s). The four parameters characterize different aspects of the sample of a remedy. The parameters $B_1$ and $B_2$ form the decaying part of the shape. The parameter $B_2$ is particularly significant to describe the potency of a remedy [27], and therefore only its values are taken in the measurements shown.

However, all the four coefficients were calculated for each measurement to get the so called "fitting curve" (Fig. 1), which describes in each case the shape of the delayed luminescence signal of a homeopathic remedy or its reference. A typical delayed luminescence signal of a highly potentized homeopathic remedy (Argentum metallicum 100MK) (="fitting curve") is shown (Fig. 1). The parameters are calculated with an iterative algorithm in MatLab 7 using the number of counts per bin (5 min) from the measurements.

## Results

The delayed luminescence signals calculated as $B_2$-values characteristic for homeopathic remedies are obtained by exciting Argentum metallicum and Cantharis in high potencies by their resonating characteristic field of 2.06 MHz and by visible light. In the following results only the $B_2$-values of the remedies and their reference substances excited by the field of 2.06 MHz are explained. The values obtained by excitation with visible light can be neglected here. These are usually lower than those obtained by stimulation with the characteristic resonating field of 2.06 MHz. The fact that the excitation by visible light also separates photons from the remedies let conclude that in the broad spectrum of visible light there are also resonance frequencies of the remedies. However, it is not clarified which frequency of it is characteristic for one remedy. So it becomes evident that the remedies also have resonance frequencies in the region of visible light. The homeopathic remedies are produced by extracting plants, animals and so on… These organisms are visible in the spectrum of visible light. How can the resonance frequencies of these substances be raised into the MHz region?

This can be performed by dilutions and succession steps. Depending on the number of dilutions and succussion steps high potencies with resonance frequencies from the visible region of light up to the MHz region are achieved then.

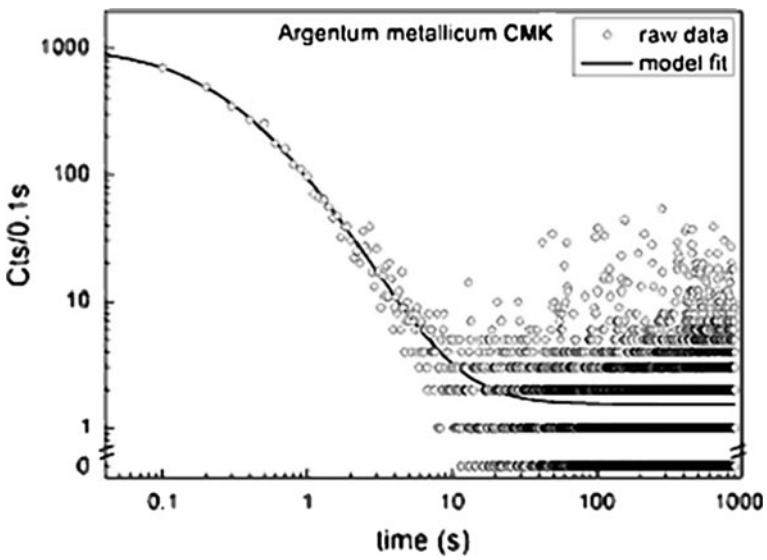


**Fig. 1** A delayed luminescence signal of Argentum metallicum 100MK on sugar globules. The raw data for 900 s with a bin size of 0, 1 s are shown. This shows the fitting curve of the observed data. The photons had been separated from the Argentum metallicum 100MK sugar globules by applying their resonating electromagnetic field of 2.06 MHz

Standard $B_2$-values of the References and Homeopathic Remedies

*Reference: Pure Saccharose Globules*

Pure saccharose globules (16 globules) produced, according to HAB 10 [3] serving as reference and carrier substance of the homeopathic remedies, had been stimulated by visible light and by the electromagnetic field of 2.06 MHz. The separated photons were then measured by delayed luminescence and calculated as $B_2$-values (counts s), according to Bajpai's equation [29–31] using Matlab 7 program. The average $B_2$-values of 41 measurements (Fig. 2) are 351 (counts s). The error of standard deviation is 30, thus it is very low. These reference values of pure saccharose globules had been determined for a period of more than 3 years. The repeated measurements always resulted in the same average values. The $B_2$-values (counts s) of the reference pure saccharose globules were considered to be comparable values for our following measurements.

Homeopathic Remedies on Saccharose Globules

Argentum metallicum 100MK and 100Mf on saccharose globules (16 globules), Cantharis 100MK and 100Mf (16 globules), had been exited by their resonating field of 2.06 MHz [27, 28] and by visible light (Fig. 2).

Compared to the $B_2$-values (counts s) of the reference pure saccharose globules the $B_2$-values (counts s) of Argentum metallicum and Cantharis are very high: a difference of 1.600 for Argentum metallicum 100MK, a difference of about 2.500 for 100Mf. Argentum metallicum 100Mf has higher $B_2$-values (counts s) than a 100MK. But considering the standard deviation both the 100MK-potency and the 100Mf-potency levels seem comparable. The 100Mf-potency has been measured more than 50 times, the 100MK-potency 12 times as shown in this publication for the first time. In the case of Cantharis 100MK (12 measurements) there is a difference of about 1.600 between reference and homeopathic remedy. In the case of Cantharis 100Mf (30 measurements in the course of 3 years) the difference is about 1.500. Both potency levels of Cantharis are comparable with each other in relation to their error of standard deviation. As for low $B_2$-values (counts s) of the reference pure saccharose globules and very high $B_2$-values (counts s) of the remedies a discrimination of both is finally possible by using delayed luminescence. The $B_2$-values (counts s) of Argentum metallicum 100MK and 100Mf are in the same range (Fig. 2). Therefore, the $B_2$-values (counts s) of the reference pure saccharose globules and the 100MK and 100Mf-potency levels of Argentum metallicum and

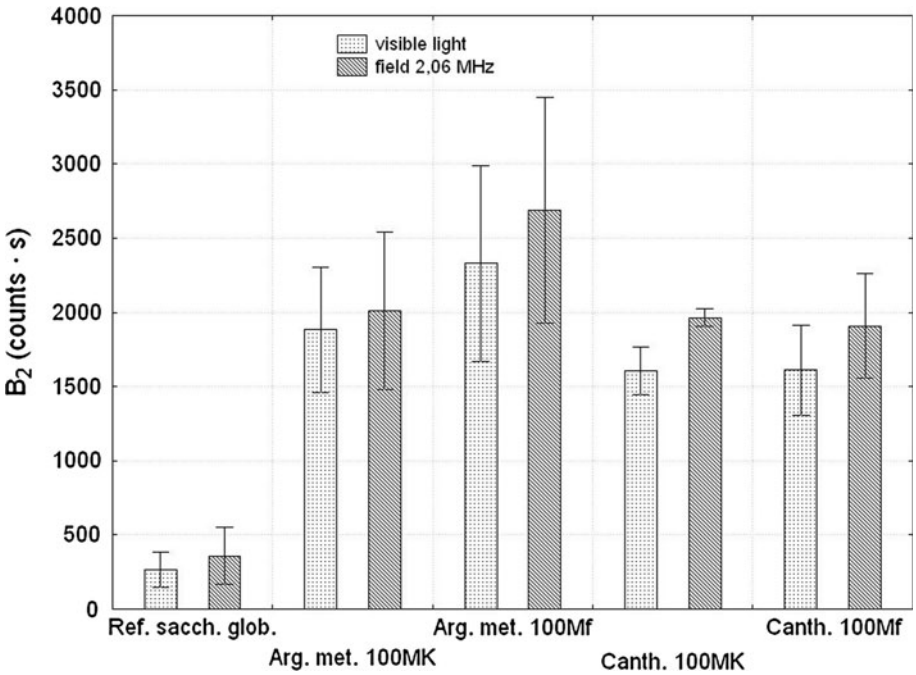


**Fig. 2** Standard $B_2$-values of the reference pure saccharose globules, of highly potentized (100Mf, 100MK) Argentum metallicum and Cantharis on saccharose globules. For each experiment 16 globules were used. At first the reference and the remedies were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. *Error bars* of standard deviation derive of 41 measurements of the reference pure saccharose globules, of 24 measurements of Argentum metallicum 100MK, of 51 measurements of Argentum metallicum 100Mf, and of 24 measurements of each Cantharis 100MK and 100Mf. Important: different batches of the remedies had been ordered and used for the experiments over the years

Cantharis could be taken as comparative values for the following experiments.

## Standard $B_2$-values of the Reference: Pure Ethanol (18 %) and Ethanolic (18 %) Argentum metallicum CMK

### *Reference: Pure Ethanol (18 %)*

Ethanol (18 %) as a carrier substance of homeopathic remedies had been produced by dilution of 96 % ethanol with purified water, according to the leading-monographie Pharmacopoe Europaee 7.0. This way it is reliably made sure that such ethanol (18 %) is not contaminated by a homeopathic remedy.

The $B_2$-values (counts s) of 40 µl ethanol (18 %) are about 1.350 (counts s) (Fig. 3) after having excited them by visible light and by the electromagnetic field of 2.06 MHz. Since 12 measurements have been performed this time, the error of standard deviation is acceptably low. The reference $B_2$-values (counts s) of ethanol (18 %) are only little higher than those of pure saccharose globules.

### Homeopathic Remedy in Ethanol (18 %)

The $B_2$-values (counts s) of 40 µl ethanolic (18 %) Argentum metallicum 100MK (12 measurements) are higher after excitation by the resonating field of 2.06 MHz than those of the reference ethanol (18 %) (Fig. 3). The difference of their $B_2$-values (counts s) is about 1.500.

The $B_2$-values (counts s) of 40 µl ethanol (18 %) Argentum metallicum 100MK on 16 saccharose globules and in ethanol 18 % correspond to each other. Argentum metallicum 100Mf and Cantharis 100Mf were not available in ethanol (18 %) at that time.

## Comparison of the $B_2$-values (counts s) of 40 µl Ethanol (18 %), Ethanolic (18 %) Argentum metallicum 100MK, and Cantharis 100MK Obtained in April

The $B_2$-values (counts s) of 40 µl ethanol (18 %) are compared to those of ethanolic (18 %) Argentum metallicum 100MK and Cantharis 100MK obtained in April (Fig. 4). After excitation by the resonating field of 2.06 MHz and by visible light, too, it can be observed that the $B_2$-values of ethanol (18 %) and of the 2 homeopathic remedies are completely in the range of ethanol (18 %) (Fig. 4). The result is that the ethanolic remedies Argentum metallicum and Cantharis in 100MK obtained from the factory in April are just ethanol (18 %). This fact had been confirmed by the factory later. So a quality control of remedies was performed for the first time.

## Decline of the $B_2$-values of Ethanolic (18 %) Argentum metallicum 100MK

The difference of the $B_2$-values of 40 µl ethanolic (18 %) Argentum metallicum 100MK measured in March and of pure ethanol (18 %) is about 900 (counts s) after excitation by the resonating field of 2.06 MHz and by visible light.

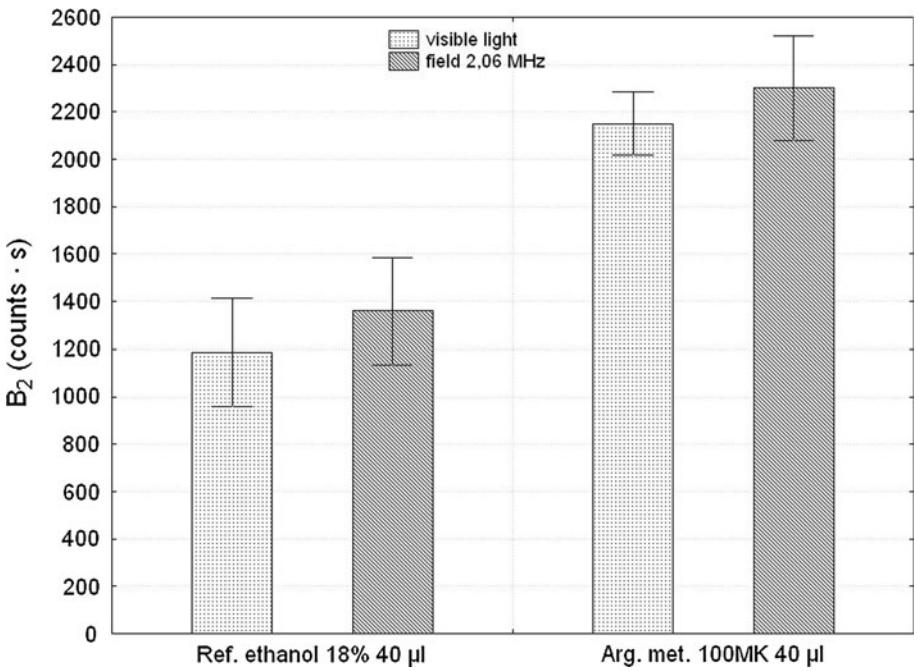


**Fig. 3** Standard $B_2$-values of the reference pure ethanol (18 %) and of ethanolic (18 %) Argentum metallicum 100MK. For each experiment 40 µl of pure ethanol (18 %) and ethanolic (18 %) Argentum metallicum 100MK were used. At first the reference and the remedy were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. *Error bars* of standard deviation derive of 12 measurements of each pure ethanol (18 %) and of Argentum metallicum 100MK

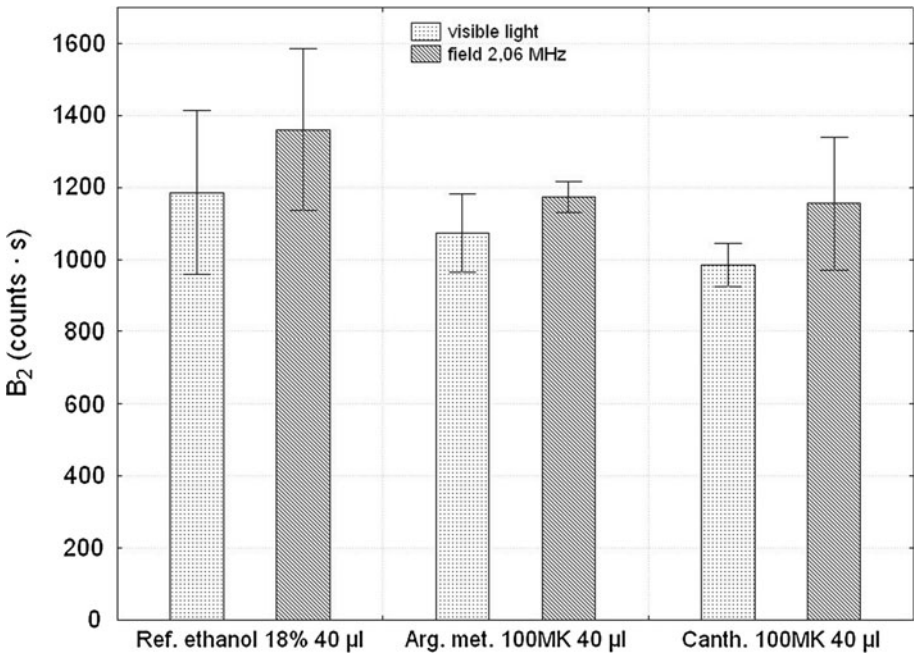


**Fig. 4** Quality control of ethanolic (18 %) Argentum metallicum 100MK and Cantharis 100MK. The remedies sent in April were compared with the reference ethanol (18 %). For each experiment 40 µl were used. At first the reference and the remedies were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. $B_2$-values of the ethanolic (18 %) remedies and of pure ethanol (18 %) are shown. *Error bars* of standard deviation derive of 12 measurements of each

One month later this remedy was measured again (Fig. 5). Now the $B_2$-values of ethanolic (18 %) Argentum metallicum 100MK were in the range of pure ethanol (18 %), which means that the photons had gradually been emitted from the carrier substance ethanol–water within 1 month.

### $B_2$-values of Increasing µl of Highly Potentized Argentum metallicum Obtained in September

An ethanolic (18 %) highly potentized Argentum metallicum was obtained in September. Before any measurement of homeopathic remedies, the reference substances, ethanol or saccharose globules have to be measured each time. In this case on day three of the measurements the remedies examined had emitted a lot of photons. The room was filled with them and so was the measuring chamber of the photomultiplier. Therefore, it is understandable that the $B_2$-values of the reference ethanol (18 %) and those of the remedies enhanced simultaneously. The difference between the $B_2$-values of reference and remedy remained constant. These facts had already been observed by Lenger before [27, 28].

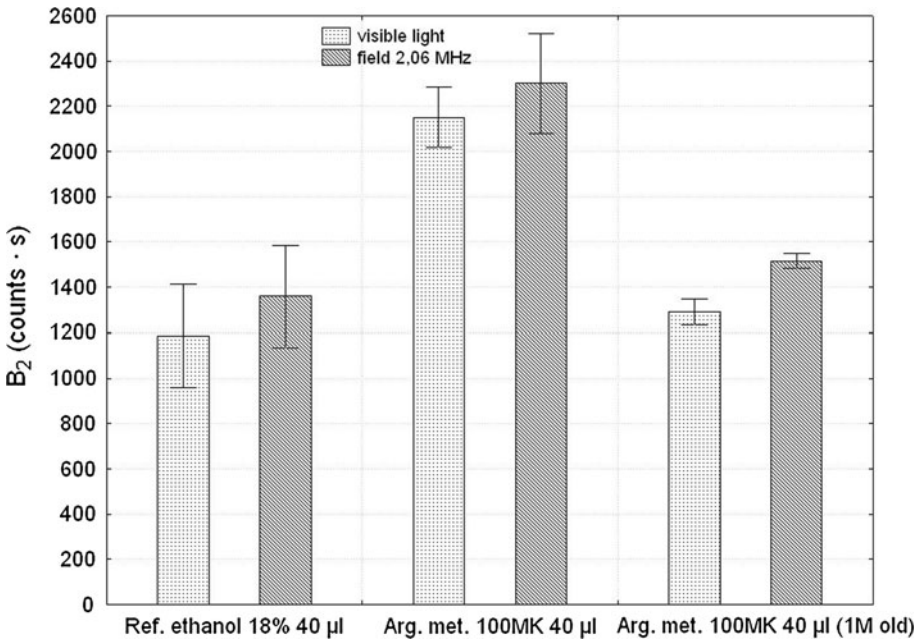


**Fig. 5** Loss of photons of ethanolic (18 %) Argentum metallicum 100MK within a month. For each experiment 40 µl were used. At first the reference and the remedies were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. The $B_2$-values of 40 µl pure ethanol (18 %) are compared with ethanolic (18 %) Argentum metallicum 100MK measured in March and remeasured in April (1M old). *Error bars* of standard deviation derive of 12 measurements of each

The $B_2$-values of ethanol (18 %) are about 4.800 (counts s) after stimulation with the electromagnetic field of 2.06 MHz and about 4.200 (counts s) after excitation by visible light (Fig. 6). The $B_2$-values of 40 µl ethanolic highly potentized Argentum metallicum are about 8.000 (counts s) after excitation by the resonating field as well as by visible light (Fig. 6). There is a difference in $B_2$-values of more than 3.000 (counts s). Regarding the $B_2$-values of a usual ethanolic (18 %) Argentum metallicum 100MK of 1.000 (counts s) and of about 1.600 (counts s) of Argentum metallicum 100MK on saccharose globules. This Argentum metallicum cannot be a 100MK-potency although having been ordered. The conclusion is that this ethanolic (18 %) Argentum metallicum has to be a much higher potency level than 100MK. Increasing µl of this remedy resulted in some lower instead of expected increasing $B_2$-values (Fig. 6). Using increasing µl of a high potency resulted in a kind of inhibition effect. This "inhibition" or attenuation can be explained by a resonance effect in the measuring chamber.

### Identification of Unknown Remedies on Saccharose Globules

The 6 unknown remedies named Argentum metallicum 6K, 200K, 35K (March), 35K (April), and 35K Cantharis (Sept) and unknown remedy (Heel-Belgium) had been investigated. They had been excited by visible light and by the resonating field of 2.06 MHz. Their $B_2$-values (counts s) had been calculated and shown (Fig. 7). For comparison the standard $B_2$-values of the reference pure saccharose globules and Argentum metallicum 100MK (Fig. 2) are shown in the first places in the figure (Fig. 7). Then those of the unknown remedies follow with increasing $B_2$-values. The unknown remedy from Heel-Belgium is the last one with the highest $B_2$-value, signalizing a very high potency level of 1.000MK. It was confirmed by the factory that this remedy was an Argentum metallicum 1.000MK. The $B_2$-values of the other unknown remedies are between those of Argentum metallicum 100MK and Argentum metallicum 1.000MK. This indicates that these remedies have potency levels between 100MK and 1.000MK. It was confirmed by the factory later on that these remedies were Argentum metallicum with increasing potency levels. This fact leads to the conclusion that these results build a calibration curve of increasing potency levels of Argentum metallicum. The identification of unknown remedies is up to this moment restricted to remedies having a resonance frequency of about 2.06 MHz and in the region of visible light. An exact identification of the remedy is not possible using delayed luminescence, because Lenger [27, 28] has shown that several remedies such as Argentum metallicum, Cantharis, Bovista, Oxalicum acidum, and Arnica all have a resonance frequency of about 2.06 MHz.

## Discussion

### Standard $B_2$-values of References and Highly Potentized Remedies

This study is the first to report on a discrimination of homeopathic remedies and their references ethanol or pure saccharose by delayed luminescence. Not only discrimination of

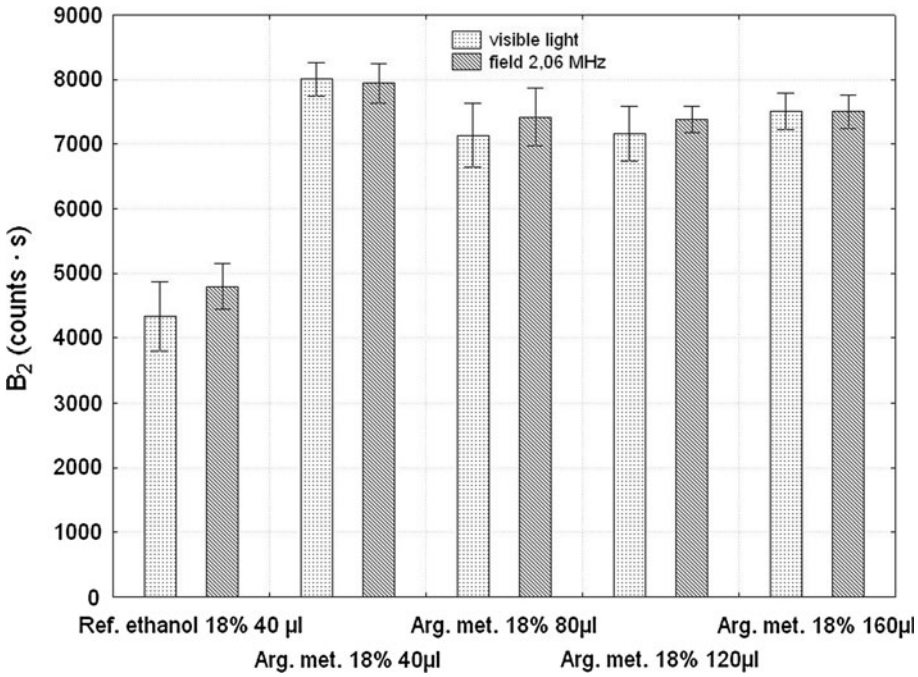


**Fig. 6** Increasing amounts of ethanolic (18 %) Argentum metallicum 100MK from 40 to 160 µl in comparison with 40 µl ethanol (18 %). At first the reference and the remedies were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. Their $B_2$-values are shown. *Error bars* of standard deviation derive of 12 measurements of each

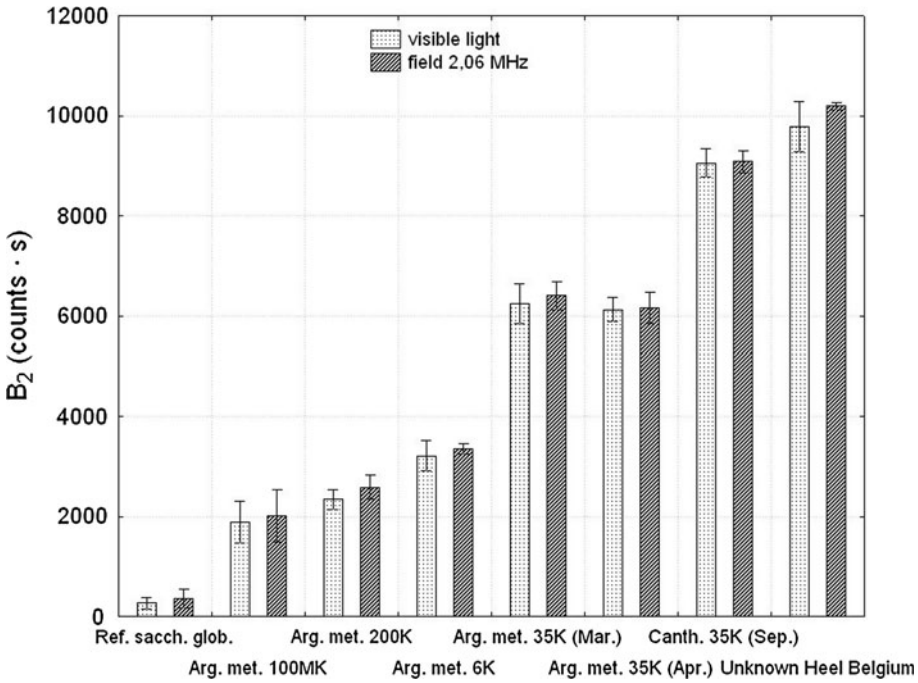


**Fig. 7** Identification of six unknown remedies on saccharose globules. For each experiment 16 globules were used. At first the reference and the remedies were stimulated by visible light *square with dot fill* thereafter by the electromagnetic field of 2.06 MHz *square with upper left to lower right fill*. The $B_2$-values of the six unknown remedies named: Argentum metallicum 200K, 6K, 35K(March), 35K (April), Cantharis 35K and unknown Heel-Belgium were compared with the $B_2$-values of the standard Argentum metallicum 100MK and of the reference standard pure saccharose globules (Fig. 2). *Error bars* of standard deviation derive of 12 measurements of each

homeopathic remedies was possible, but also a quality control of those.

Delayed luminescence using a modified photomultiplier is an extraordinary method to perform these measurements calculated by the $B_2$-values of Bajpai's equation [29–31]. The measuring chamber of the photomultiplier, a Faraday cage, is wound round by a copper coil of 20 windings. The copper coil is connected to an oscillator creating an electromagnetic field of 2.06 MHz/50 V. The frequency of 2.06 MHz is one of the resonance frequencies of Argentum metallicum 100MK and Cantharis 100MK [27, 28].

This field separated the photons of the remedies from their carrier substances ethanol or saccharose [27, 28]. To perform these measurements it had to be statistically assured by the same appropriate measuring methods that the $B_2$-values of the references, ethanol or pure saccharose globules, always had a distinct low number of photons. Whereas, the $B_2$-values of Argentum metallicum 100Mf or 100MK and Cantharis 100Mf or 100MK had been in a characteristic range of about 1.600 obtained by more than 40 measurements of each. The $B_2$-value of a homeopathic remedy is independent of its carrier substance ethanol or saccharose. This means that the stronger magnetic field of the saccharose globules attracts all the photons from the ethanolic potency poured onto them during their production.

## Quality Control of Homeopathic Remedies

Basing on the standard $B_2$-values of references and 100MK or 100Mf-potencies a quality control of homeopathic remedies could be performed for the first time. Their differences show the level of the potency. Therefore it could be proved that both Argentum metallicum and Cantharis in 100MK, sent in April, had been pure ethanol, because their $B_2$-values were nearly the same. Another case was ethanolic (18 %) Argentum metallicum sent in September (Fig. 6). Although a potency level of 100MK was ordered the measured $B_2$-values resulted in the double of a 100MK potency indicating a higher potency level than 100MK. These experiments significantly show that a quality control of homeopathic remedies is possible now.

## Identification of Unknown Homeopathic Remedies

For the identification of the unknown substances the $B_2$-values obtained from the references and from the remedies in CMK potency could be used as a guiding principle and served as a standard for comparison. The determination of the potency level by the height of the $B_2$-values is proved for the first time. Lenger [28] had already measured potency levels of homeopathic remedies by the Tesla-coil system in a completely different way: The energy of the resonating field determines the starting signal for the emission of photons from the carrier substance.

The unknown remedies could be measured by applying the resonating field of 2.06 MHz and by calculating the $B_2$-values describing the photons being emitted from the medicated saccharose globules. The $B_2$-value of each unknown remedy was higher and different from standard 100MK potency level. The $B_2$-values of the unknown remedies increased one after the other which indicates increasing potency levels. The remedy with the highest

$B_2$-value indicated a 1.000MK potency. This unknown potency had been sent from Heel-Belgium and indeed it was confirmed by the factory that it was Argentum metallicum 1.000MK. This is the highest potency level known so far. The $B_2$-values of the potencies sent from C.E.M.O.N had results between 100MK and 1.000MK potency levels indicating 300MK and 500MK potencies. C.E.M.O.N also confirmed that they had sent solely Argentum metallicum in these potency levels. Since the height of the $B_2$-values characterizes a potency level, a calibration curve can be constructed in future: starting with the lowest potency level 100MK and ending up with 1.000MK. The calibration curve will serve to determine the potency levels of homeopathic remedies. Each potency of a remedy needs a different energy for the separation of the photons [28]. It increases with increasing potencies. Lenger [27, 28] discovered the methods for measuring and determination of the potency levels of homeopathic remedies.

For the moment delayed luminescence only allows to determine remedies having the resonance frequency of 2.06 MHz, but does not identify the exact remedy. Lenger [28] already measured that several remedies have the resonance frequency of about 2.06 MHz such as: Argentum metallicum, Cantharis, Bovista gigantea, Oxalicum acidum, and Arnica. These measurements had been done for the first time by Lenger [28]. Further identification of these remedies is possible by measuring their characteristic frequency spectra using the Tesla-coil system [28], as Lenger has shown. Again Lenger was the first to discover that.

To obtain a resonance frequency of an unknown remedy by delayed luminescence the cuvette containing that remedy has to be placed into the measuring chamber of the modified photomultiplier. Next the frequencies of the connected oscillator are modified. When at a certain frequency photons are emitted from the remedy the resonance frequency of the unknown remedy is found. In this way the resonance frequency of Arnica at 1.823 MHz had been found by Lenger [27].

Now it is possible to identify an unknown homeopathic remedy completely by applying both methods: delayed luminescence and Tesla-coil system.

## Stability of Homeopathic Remedies

It was found out that ethanolic (18 %) Argentum metallicum and Cantharis both in 100MK did not remain stable in the course of 1 month. There was a loss of 2/3 of photons. The part of water in 18 % ethanol is considerable. Ethanolic homeopathic remedies in 50 % ethanol are supposed to remain more stable, because there is less water therein.

This fact corresponds with the measurements of aqueous remedies. De Alvarenga [39] performed NMR studies with aqueous remedies. After 5 days of measurements he did not find anything but pure water in the tested remedy. Both water and ethanol have a low molecular weight and therefore get a very low magnetic moment binding the photons of the remedies (Aharanov–Bohm-Effect). Therefore the photons gradually separate from the carrier molecules water and ethanol. Further investigations of aqueous homeopathic remedies by the excellent scientists Anick [40] and Aabel [41], doing NMR studies and Ives [42] doing enzymatic studies don′t show any homeopathic efficacy at all. Very probably the aqueous potencies had lost their photons during a few days after their production. Since, homeopathic triturations with lactose as carrier substance are more stable than aqueous remedies, NMR investigations by Botha [43] showed good results. A chemical shift of the NMR spectrum was obtained. This is a confirmational evidence of the existence of magnetic fields in homeopathic remedies as Lenger [28] showed before.

## Confirming Experiments

The results of this publication describe that after stimulation by the resonating field the homeopathic remedies emit photons. The observations of Louis Rey [44] show a relation to these results. He reported about thermoluminescence of homeopathic remedies. After being irradiated by X- and Y-rays at 77 K thermoluminescence of aqueous LiCl and NaCl having potencies between C 15 and C 20 was observed when progressively rewarmed to room temperature. The emitted light was specific of the original salts. Furthermore, Molski [45, 46] calculated the quasi-quantum character of homeopathic remedies, and herewith confirmed the measurements of the authors [27, 28].

## What Happens Within a Patient Taking a Homeopathic Remedy?

To separate the photons from homeopathic remedies it is necessary to apply a stronger magnetic field than that of their carrier substances and photons. This is what happens by analogy with a patient taking a homeopathic remedy. The sick person has the same frequency as the remedy but as being a whole living system he/she is provided with a stronger magnetic field. That is why the separation of photons from the remedy can take place in the sick body. According to the resonance principle healing now occurs and the pathological biochemical pathways are being cured.

## Confirming Experiments

The assumption that homeopathic remedies with their magnetic fields can cure diseases has much support by many scientists who proved that electromagnetic fields or

even magnetic fields alone influence biochemical reactions [47–49]. Magnetic fields influence enzyme activity in living organisms. Liboff [50] measured the alteration of calmodulin nucleotide phosphotransferase in a 20 mT magnetostatic field. Shaya and Smith [51] observed the influence of magnetic fields on the activity of lysozyme. Lisi et al. [52] showed cell differentiation in pituitary and other glands under the influence of cyclotron magnetic resonance of 7 Hz and 100 μT. They replaced the effects of $Ca^{2+}$ Ions. Furthermore, Pozzi et al. [53] reported that a 50 Hz magnetic field even inhibited cell growth proliferation of Neuroblastoma. This also points to the healing power of the magnetic fields in homeopathic remedies.

### Reflections on a Biophysical, Biochemical Model of Homeopathic Function

The detection of photons in homeopathic remedies finally gives Lenger [27, 28] the possibility to develop a biochemical and biophysical model of homeopathic efficacy [54, 55] in sick patients. During the years 1946–1948, Theodor Förster described [56] the quantum-mechanical behavior of the transfer of electronic excitation energy between two molecules in a solution. FRET-techniques (Förster's Resonance Energy Transfer) are well known to investigate, e.g., conformational changes of proteins or the activity of enzymes [57, 58]. Van Wijk and other scientists [32–38] measured different patterns of photons in healthy and sick persons. These results lead to the following conclusions:

From analogy by the uptake of photons the normal enzymes receive the energy needed to catalyze the metabolic biochemical reactions which have become irregular in chronic diseases by pathological biochemical pathways. The uptake of the photons of homeopathic remedies as similar remedies with different frequencies attenuate those of the pathological pathways by resonance. After that healing process the normal biochemical pathways will be re-established. Lenger [54, 55] proposed that the ill pathways can be healed by taking highly succussed substrates, inhibitors or enzymes of their healthy pathways as the original similars. This was proved by successful application to Hashimoto disease, asthma, and paralyses [54, 55]. Basing on the results of this publication the fundamental Law of Similars: "Similia Similibus curentur" can be expressed as: The frequencies of the homeopathic remedies must match the frequencies of the patient.

## List of Abbreviations

The following abbreviations are used for the alcoholic remedies and globules in 100MK or CMK:

Argentum metallicum = Arg. met.
Cantharis versicolor = Canth.
1M old = 1-month-old

Different names of Korsakovian potencies:

50MK = LMK = 50,000 K
100MK = CMK = 100,000 K
300MK = CCCMK = 300,000 K
500MK = DMK = 500,000 K
1.000MK = MMK = 1.000000 K

Different names of Fincke-potencies:

100Mf = CMf = 100 M FC = 100,000 FC

## Conclusion

It is possible to identify a homeopathic remedy. The height of the $B_2$-values is characteristic for the potency level and the resonance frequencies are characteristic for the remedy. Finally it is possible to perform a quality control of homeopathic remedies.

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