

## FOCUS

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**All Things Considered? Basic Research on Homeopathy May Shed a Different Light on the Recycling of Wastewater.**

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*Can today's science explain all the mysteries of our world? Any sincere scientist will answer: "Of course not". There is still a lot we can't explain and don't really understand.*

*What about the basic principles our world is based upon? Do we understand them all? Here the answer may be much more ambiguous. While some scientists believe, that we've come close to the "last principles", others doubt it.*

*I personally think that we're close to another scientific revolution similar to the one physics went through, when quantum physics was discovered at the end of the 19<sup>th</sup> century.*

*In this article I'd like to present a research project which gives an idea why this might be the case. I also want to speculate about the possible nature of this "revolution": some kind of information transfer not yet understood.*

*If these ideas should be correct, they would also have unforeseen implications for the recycling of wastewater.*

**Homeopathy: A New Dimension of Science or the "Ultimate Fake"?**

For more than 200 years homeopathic remedies have been used for curing diseases. Particularly in the last 2 decades they have become very popular in many countries. Millions of patients appreciate them as a possibility to cure diseases without having to use the "heavy armour" of the chemical industry.

Yet, it's being highly disputed whether homeopathy is really working or whether it's the "ultimate fake", as some term it. The main focus of critique is its use of diluted, or rather "potentised" drugs. An argument often heard is, that below a dilution of  $10^{-24}$  which corresponds to homeopathic potencies of 12c or 24x (= C12 or D24 in german speaking countries), there is hardly a chance to find even only 1 molecule of the active material in the drug.

If there's no molecule, it can't work, is the conclusion of the sceptics. However, this neglects a good and very basic scientific attitude: First look at the phenomenon, then hypothesize about its explanation! Our scientific understanding may simply not be able to explain what happens here.

The sceptics' arguments are very well summarized, in articles available on the internet, e.g. by Stephen Barrett and William Jarvis (see references). And indeed: The lack of a sound scientific explanation for homeopathy has been THE Achilles' heel for many practitioners and users of homeopathy. An example: though there are several dozens of good clinical studies which show clinical efficiency of homeopathic dilutions against placebo, many scientists are not willing to accept this as a fact as long as there is no convincing theory (Baumgartner, personal communication), since "events become "facts" when they are invoked to support a theory" (Vandenbrouke 1997).

**Urgently Needed: Basic Research on Homeopathy**

Physicist Dr. Stephan Baumgartner from the University of Berne (<http://www.cx.unibe.ch/kikom/english-home.html>) is one of the few researchers working on the basic principles of homeopathy. He is very well aware of the potential pitfalls of his field: "Research that reports on preclinical\* effects of homeopathic potencies", he writes, "will be thoroughly and critically analyzed, since an observable and reproducible action of higher homeopathic dilutions can hardly be explained by the present body of scientific theories and the wide-spread materialistic philosophy of life and nature."

"Scientists may be forced to accept new basic concepts and laws in the realm of the general modes of action in nature. It is therefore clear that any such preclinical research has to meet the highest methodological standards, since positive results may lead to a true revolution in science and philosophy". (Baumgartner et al. 1998).

**Setting a Quality Standard**

Based on this conclusion Baumgartner has first carried out a thorough analysis of existing preclinical studies. Although "hundreds of preclinical homeopathic studies have been published in the last decades", he states that their "quality [...] is judged rather differently", both by scientists doing experimental research and by those doing meta studies. As conclusion, Baumgartner developed basic requirements for good preclinical research to be carried out in the future. (see box, Baumgartner et al. 1998)

The most important points to ensure high scientific quality for preclinical studies of homeopathic potencies (according to Baumgartner et al. 1998)

- Careful planning and design of the experiments
- Blind manipulation and measurements
- Blind runs of the typical experimental design (typical standard deviations)
- Detailed descriptions of the production process for homeopathic potencies
- Reasonable and adapted controls
- Several reproductions of a given experiment
- Careful statistical analysis of the experimental data
- Unprejudiced interpretation of all results

**Searching a Stable Experimental System**

Baumgartner is now working on establishing a stable, well defined experimental system which fulfils these criteria. One approach is using cress seedlings (*Lepidum sativum*) which are grown on chromatographic paper in plastic bags in the dark. They can be easily grown in great numbers in order to achieve statistically significant results. The state of growth can be monitored rapidly by photocopying the bags and using image processing techniques for the analysis of various parameters (e.g. growth of root and shoot, curvatures). The seedlings are not destroyed by this monitoring and can be further analyzed, e.g. on chemical contents.

The cress system allows easy handling and a fast yield of a great number of parameters which can be subjected to statistical analysis. Baumgartner considers the system to be very flexible and highlights that the ethical constraints are minimal, compared e.g. to animal testing (Baumgartner 1999).

An advantage of using a non-animal test system also is, that positive results are backing up the hypothesis that the effectivity of homeopathic dilutions is not limited to humans or other animals. In fact experimental evidence from other sources as well as Baumgartner's own work suggest a sensitivity of plants and even microbes to homeopathic dilutions (Baumgartner et al. 2000). This might open new fields of application of homeopathic potencies such as agriculture.

### First results

First results have shown that cress seedlings react to homeopathic potencies of a plant growth promotor (auxin) and a plant growth inhibitor ( abscisic acid) as expected: potentised auxin slows down, whereas potentised abscisic acid enhances the growth of the seedlings. (Baumgartner, 1998, personal communication). Interestingly, plants that have been exposed to poisonous substances generally seem to show stronger reactions (up to 24% growth increase) than healthy plants ( $\pm$  5% growth modulation) (Baumgartner et al. 2000). These results are preliminary, however, and the data have not been published yet.

Although the cress system looks promising, Baumgartner is also evaluating other systems. He wants to get a number of stable, reliable and reproducible tools for his research. When the conditions of the experimental systems are understood well enough, they can be used for a number of burning questions homeopathy is faced with today:

- **How can the production of homeopathic drugs be optimised?** For two centuries, one has relied more or less on the original procedure designed by Samuel Hahnemann.
- **Are there better media for potentisation?** Currently, ethanol-water mixtures are used for liquid, lactose for solid potentisation of homeopathic drugs.
- **How can quality control be ensured?** As a matter of fact, there is currently no way (other than the reaction of the patient), to control whether a specific homeopathic drug has really been prepared according to the guidelines, since most of the drugs in use do not contain any molecules of the potentised mother tincture which could be detected.

### A new paradigm in science?

What is the principle behind homeopathy? This is the ultimate question. Is there really anything radically different from our present body of knowledge, or not? A number of hypotheses have been put up to explain this phenomenon. None of it is really convincing.

Carefully termed one can say that "The therapeutic principle must [...] be regarded as some sort of "information therapy" as outlined by Bastide (1998) which is thought to modulate the internal life forces and the self regulating system of living organisms" (Baumgartner et al. 2000). An information therapy? Of course this raises a multitude of questions: What kind of information? How and under what conditions is it transferred? Why is it transferred? How can the transfer be explained and influenced? What is the active agent? Can the information be deleted? How can it be deleted?

As a careful researcher Baumgartner doesn't want to put up his own hypothesis for the moment. However, he adds, " I am sure that dogmatists will get a hard time in the years to come".

### Significance for ecological engineers

Ecological Engineering is advocating an enhanced reuse and recycling of substances that have been in close contact with, or basically are human excreta. If we accept the idea that there may be a way of information transfer yet undiscovered, we must avoid too close circles. There may be unforeseen effects caused by an "accumulation" of information transferring agents.

Whether this hypothesis is valid or not, we must keep in mind that there may be more to wastewater and excreta than just nutrients, minerals and fecal contaminants.

Although there is no firm scientific basis for this yet, think of the story of BSE: Wasn't it a convincing and even in some ways ecologically sound idea to recycle meat meal by feeding it to cows rather than buying the proteins as soya from the third world? Nobody expected that a protein - the prion as we know now - could possibly be a vector for disease and would be able to survive the conditions in the meat meal ovens.

\* *preclinical = non-clinical, laboratory, experimental*

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