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Foreword

It all started in the beginning of this century, when I met a group of twenty Dutch farmers experimenting with unconventional techniques. They played music while milking, they vitalised water, they added 'informed' powders and observed the benefits of applying them, in spite of hardly understanding how they might work. When they searched for explanations from agricultural extension staff or academic researchers, they got raised eyebrows and were not taken serious. So they stopped talking about it.

But they triggered me and I wanted to know more. I followed three years of training in ECOtherapie – now called ECOintention. It was in this course - 2001-2004 - that farmers felt the freedom to openly talk about their experiences with nature. They were curious to know if farmers elsewhere in the world would apply comparable techniques. If many more farmers were following such unconventional approaches, probably they would feel more confident and comfortable to openly share their experiences. Probably they could even learn from them how to improve these techniques.

Together we initiated a worldwide inventory. A 3-month sabbatical in 2004 allowed me to start exploring the field. The first pre-conference 'Managing Energies on the Farm' organised in Minnesota by Acres-USA offered a splendid overview to start with. With the farmer group we commissioned two special surveys, one to explore the developments in Central and Eastern Europe – in Russian language - and the other in Sri Lanka, where ancient techniques are still used today.

It was amazing how many more farmers around the world were working with comparable techniques and yielded convincing results. It also became clear that little scientific backing was available for most of these techniques. In 2007, I summarized all findings in a document the farmers called their 'energetic bible'. An honourable term, I feel. Efforts to get it published failed, with the exception of some articles in brochures and in Dutch agricultural magazines.

In 2014 I started a course Quantum-informed Agriculture, invited by the Dutch NGO Gaia Sira. They mobilized their network while I had to guarantee the content. In three yearly cycles, 30 farmers, researchers and consumers participated. We invited experts on each theme or I delivered presentations based on my international survey. This process added an enormous amount of additional insights. And we got first hand technical background information. Some of this fascinating information is mentioned in this book.

Gradually the interest for quantum-informed techniques started growing. The Centre for Agro-Ecology, Resilience and Water (CARW), of Coventry University in the United Kingdom invited me to develop this concept further and shared it more widely. About twelve agricultural education centres and universities all over the world showed keen interest in participating. Some of them asked for textbooks.

The making of this book got inspired by several other trends as well. In agricultural consultancy work we see an increasing number of advisers offering products and services for these techniques. Graeme Sait interviewed twenty-two of them for his book 'Nutrition Rules' (2003). Their success and their increasing turnover is a signal of increasing demand.

Water increasingly receives research attention and new knowledge offers scope for improving water qualities for farming. Understanding water is of crucial importance in food growing.
And recent developments in sciences provide a new foundation for explaining the working principles of some unconventional techniques. Future will learn what are the weak hypotheses and what the strong ones. Recent publications in many journals describe a new understanding of the world around us. I like to mention three books of particular interest:

- "Quantum Agriculture, Biodynamics and beyond" (Lovel, 2015)
- "Life on the Edge. The Coming of Age of Quantum Biology" (Al-Khalili and McFadden, 2014)
- "Light in Shaping Life" (van Wijk, 2014)

What this book may bring you

- A wider vision on the world and nature around us: a world not only consisting of matter, that is mass and energy, but also of information. This vision offers fundamentally new options for sustainable farming and gardening techniques.

- An eye- and heart-opener for nature. You will deepen your connection with nature, and you will never look at it the way you did. The learning opportunities are many: a better understanding of photosynthesis or its mimicking, supporting protein production by special music, making plants and animals more robust against cold or drought or diseases, techniques to objectively assess the qualities of water and food with bio-photon measurement techniques and subjective sensing techniques that can enlighten farmers on the needs of their land, plants and animals.

- Your cognitive knowledge will be enriched with intuitive knowing. Intuition not only helps in business management and leadership but also in the better understanding of complex ecosystems in which we produce our food.

- A refreshing impulse towards more vital farming systems, healthier food, healthier animals, a cleaner environment and richer nature.

The process leading up to this book

It's obvious such work is impossible to realize on your own. In the first place many farmers and gardeners around the world opened my eyes. And a dozen of teachers informed me with their knowledge and trained me in their techniques. Next to them, I am inspired by so many people who opened my eyes for the world beyond mass. And, I am very grateful to feel connected with nature's consciousness, sometimes.

An extensive list of all the people I remember can be consulted in appendix 1.

In the book I have used pictures and quotes from different sites and publications. Unfortunately, I haven't been able to trace all of their original sources. I apologize for the ones copied without formal authorization. The works are used in a respectful way, I hope the authors and designers will recognize that.

Your comments for a next edition are most welcome. Please send your suggestions to my website www.gaiacampus.com or directly to my email kieftetcetera@gmail.com Thank you!

Introduction

Around the world farmers and gardeners are exploring and experimenting with unconventional techniques. Some reinvent ancient practices to gain a better balance between man, animal, plant and soil. Others feel forced by external trends to adapt or change technologies. A recent example of such a trend is the transition from a basically chemically oriented agriculture towards a more biologically oriented one. This happened in Europe immediately after the 'first' energy crisis in 1973. Forty-five years later, the call for a more nature-inclusive agriculture is getting louder.

The challenge

In spite of this trend towards nature, we still lack a lot of understanding of nature-processes at the farm, of life between light and water. Imagine someone seated along the beach, looking at the sunset. Why is it that so many people like this scene and enjoy spending time near water while the sun is shining? It may be because, in fact, water and light are the poles of the axis of life.

Life started a long time ago, somewhere in water, probably struck by thunder and lightning. It continued to develop and expand in fields of cosmic radiations, earth gravity and magnetism. It survived in the air in gases as Carbon, Oxygen and Nitrogen. It survived in rocks and soils with minerals as Phosphate, Potash, Iron and Magnesium. Water was able to absorb these elements in solution. Water was also able to store light energy from the sun. In these watery conditions, some elements and energy merged and somehow life sparked and evolved.

The processes of evolution show a trend towards increasing complexity. After the concentration of gases in space, spiral nebulas gradually transformed into globes of tangible mass. A process that passed through a geo-sphere, a bio-sphere and a noosphere successively. This earth is the one on which we happen to live, the world that feeds us. It is suggested that consciousness (noos) emerged millions of years after life (bio) emerged in the lifeless geo-sphere. All plants and animals are basically composed of water and light and some

minerals. Both from evolution over time as well as from food in daily life. To cut a long story short: human life is born from water and light. In fact, we ourselves consist of water for the largest part, energized by light and structured by carbon and other minerals. Physically and biologically, we are fully shaped from and functioning in conformity with the world we emerged from.

Given these facts, isn't it a bit strange that in the last centuries of human existence, we started to consider ourselves as separate from this environment, not connected anymore to it? We no longer see that the way we handle air, soil, water and light must have a direct impact on our own body of water and light. We no longer realise that our physical body and our consciousness are connected with the light and water and elements we come from. This separation seems most visible among people in Western Europe and North America. This disconnectedness has shaped modern society, including modern agriculture, horticulture and management of ecosystems. This disconnectedness also impoverished and simplified farming methods to the extreme, as if the farming orchestra has lost many of its instruments over the last centuries.

Fortunately, this conviction of mankind being totally disconnected from nature, dominated our food production and nature management only for a short while, let's say since around 300 years. Nowadays, some researchers begin to study these almost forgotten connections again. Two hundred agri-cultures all over the globe, have always maintained a more connected vision and intimate relationship with nature – which people in Western Europe and North America are now rediscovering. Often, they feel inspired both by ancient cultures and by recent discoveries in quantum physics and quantum biology. These post-modern discoveries support them in recalibrating old instruments and inventing new techniques in gardening and farming.

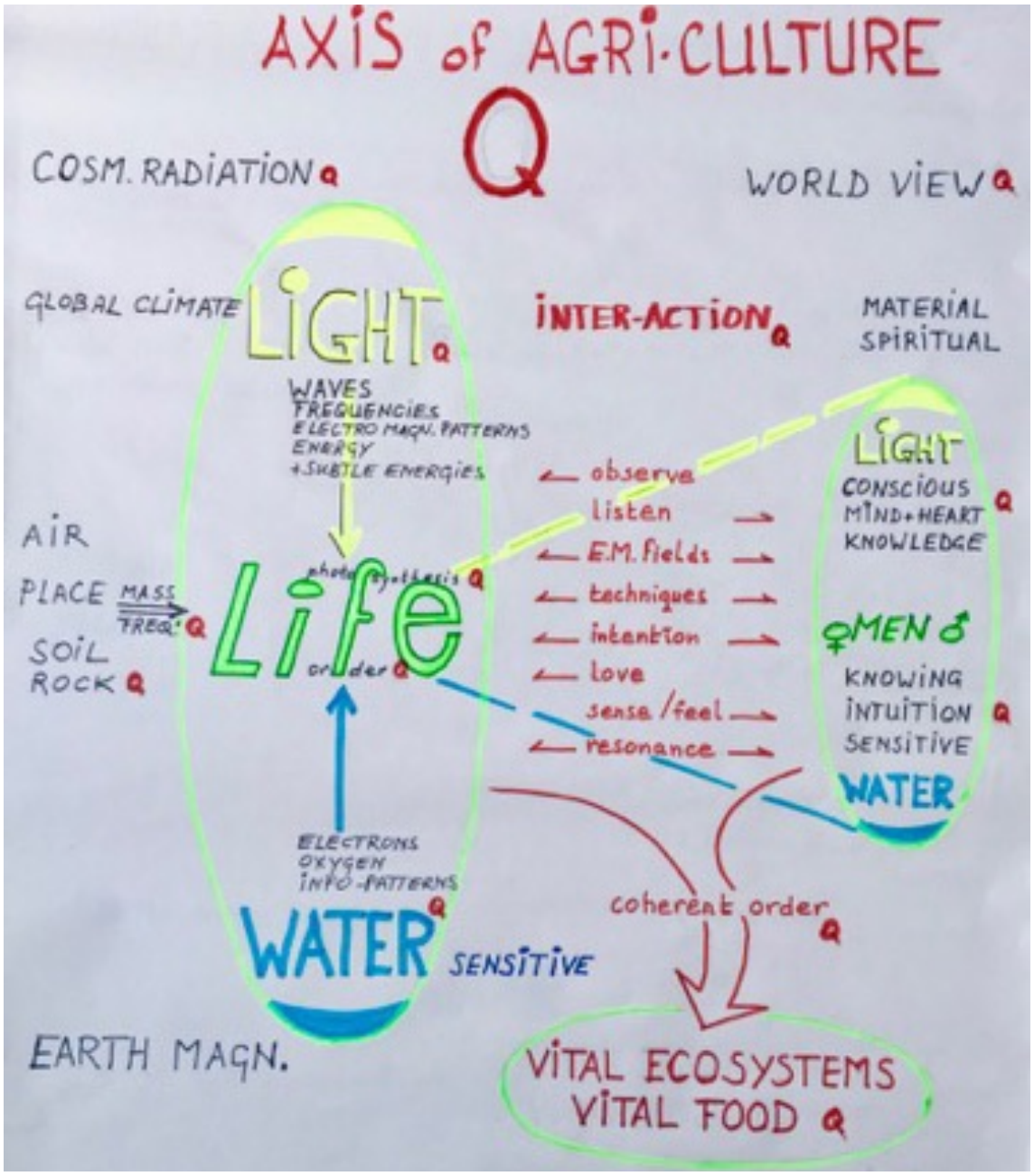
This book presents an inventory of techniques that reconnect man, plant and nature. These techniques have proven to be productive and add a new dimension to vital food. Several techniques reconnect the body and the consciousness of man with our living environment of water, light and ancestral forms of life. The book describes a worldview inspired by post-modern science of quantum biology and by ancient agri-cultures. It presents a new vision on

agriculture. It looks for example at the relevance of cosmic radiations and of earth's magnetism as well as various aspects of light and energies. It explores the depths and the sensitivity of water. It redefines life and vitality. It explores the relations between all these aspects. It refers to post-modern sciences to explain how these techniques do – or might - influence plant and animal metabolism. It deals not only with matter, but with mass plus energy plus information.

Such a different view on life demands a different view on mankind itself, in its relation to nature: how do light and water act together in the life of people, in the body and mind of farmers, gardeners or managers? What is the impact of our consciousness on nature and how are we shaped by our world-views? What does it mean to develop a respectful attitude towards plants, animals and land.

To answer such questions, we are challenged indeed, not only at a technical level but at personal and cultural levels as well. Ancient gardening is an expression of the old view on nature. Modern agriculture is an expression of modern perceptions of nature. Farmers and gardeners probably manage the largest part of land of the world. And they use the largest quantities of water on earth. The way they behave is relevant for our survival, as a physical body but also as a civilisation that respectfully works with nature. The cultural challenge we face, may have to begin with new styles of farming, emerging from a new look at our relation to nature.

I consider the axis of agriculture as a facet of the Axis of Life – positioned between Light and Water and deeply related to it. As soon as we internalize quantum physics theories a bit more, they will fundamentally change our views on processes of life. These theories invite us to look at relations and connections, more than at individual particles as such. They shed a different light on the interaction between man and nature. The picture below 'Axis of Agriculture' intends to express three aspects of this reflection. In the first place it shows how mankind is shaped from the same material and how we evolved from light and water, influenced by cosmic radiation and earth magnetism.



The Axis of Agriculture, seen as a facet of the Axis of Life – between Light and Water. Man interacts with nature in many ways: by observing, by technology and by tuning in to it. If we farm in coherence with nature, we will manage vital ecosystems that produce vital food.

In the second place the picture focuses on the reciprocity and interactions of human beings (of water and light) with the environment we emerged from and still entirely depend on. In the third place it indicates some of the issues (Q) on which quantum theories shed a fundamentally new light. A new light that proves to be crucial for sus-

taining life in garden, farm and ecosystem. And crucial for vital food and for human health. Many of these issues will be discussed in this book.

The aim of the book

The aim of the book is to descend into the deeper levels of nature, to understand it for the benefit of practical gardening and farming or nature management, and to introduce it in education and research.

The strategy therefore is four-fold:

- Providing an overview of unconventional and innovative technologies that appear in practice,
- Documenting their results and potential relevance,
- Exploring scientific discoveries of the last decades that clarify some principles of these technologies, with a focus on quantum physics, quantum biology and related sciences,
- Suggesting options for fast learning to internalize such broader vision.

The flow of the chapters

The book follows my own process over the last 15 years of exploration. First came the surprise of discovering so many unconventional techniques applied all over the world. It was almost overwhelming. I had to classify different techniques to create some clarity and overview in my mind. After a while I realized I had to expand my own worldview as well. I had to complement my classical thinking in particles with thinking in waves. And I needed an additional step towards 'order' and 'information' as part of nature's reality.

Then I felt the challenge to share this paradigm shift with others. What could be the relevance of these techniques for society? How could this knowledge of food production techniques and this deeper understanding of nature help solve some urgent challenges in producing healthy food? I worked this exploration out in 8 chapters.

Chapter 1. Energy and Waves

The chapter deals with long waves of sound and short waves of light and many wavelengths in the electromagnetic spectrum in between. With this 'family' of techniques, you complement particle-thinking with wave-thinking. And wave-thinking is unimaginable without its dimension of energy. The science of electromagnetism is already well developed for over a hundred years, but only recently it has found wider application in life sciences like health care and farming. It is quantum theory that helps to further grasp, at the microscopic level, how these wave techniques influence physiological processes in soil, plant, animal and man.

Chapter 2. Information fields, Patterns and Light language

Chapter two deals with information techniques. With this 'family' of techniques I add another extra dimension: I move towards the energetic and informative aspects of nature. It is about how farmers can support animals, plants and soil with energy and with 'patterns'.

The chapter includes a description of light-measuring techniques to monitor the behaviour of bio-photons in living tissue. This technique informs businesses and consumers about the vitality of the food we produce and consume. Vitality is understood as the internal light coherence of food.

Chapter 3. Understanding Water

Water is not only wet. It is not just a medium to solve and transport minerals. It delivers the first electrons in photosynthesis. It is very sensitive. It has polarity, it can organize itself in clusters that can hold information. This becomes clear in techniques to 'vitalize' water. Water is everywhere, every farmer and gardener deals with it. Nature can help us treat it well. Understanding a bit more of water helps to grasp how electromagnetics and intention may exert influence on plant and animal metabolism.

Chapter 4 Intention, Intuition and Consciousness

In this chapter I move a step further in reconnecting with nature. How does it look like, a more intimate bond between man and nature; between farmer or gardener or whisperer and plants, animals, soils and water? And what would it add to what we know and do already?
We deal with trees and festivals, with crops and animals and fields that are supported with energy and information and intention.
This chapter explores the feeling and sensing of subtle energies. The active use of all senses apparently activates a certain sixth sense. It is about training your intuition and 'knowing' from soil, plants or animals. Natures advices are amazing. As is its willingness to cooperate, as is practiced in metaphysical contracts between man and plant or insect. Hypotheses that explain such inter-nature-communication are still rare. 'Trusting your intuition' remains most relevant.

Chapter 5. A broader concept of nature: Mass + Energy + Information

In chapter 5 it's time for a synthesis that integrates this broad body of knowledge and inspiration. The overall term came with publications mentioning a new concept of reality, called MEI. The MEI-concept integrates Mass and Energy and Information as components that are inherent in all matter, whether dead or alive.
This chapter includes a description of some concepts that are not so familiar. What does Information mean? What is meant by quantum informed agriculture? In this chapter, you'll find the backbone of the worldview behind the book: a summary of quantum principles that I consider most relevant in agriculture. This chapter also explores a more fundamental way of perceiving sustainable agriculture: from a thermodynamic and quantum theoretical point of view.

Chapters 6 and 7. Expanded views on the physics of life.

With almost every new technique came the question 'How is this possible?' or 'How does it work?' Being trained as an agricultural engineer I tried to understand the underlying mechanisms to enable optimal application of the techniques. I studied many theories, their quantity is overwhelming. Some of them are already widely accepted

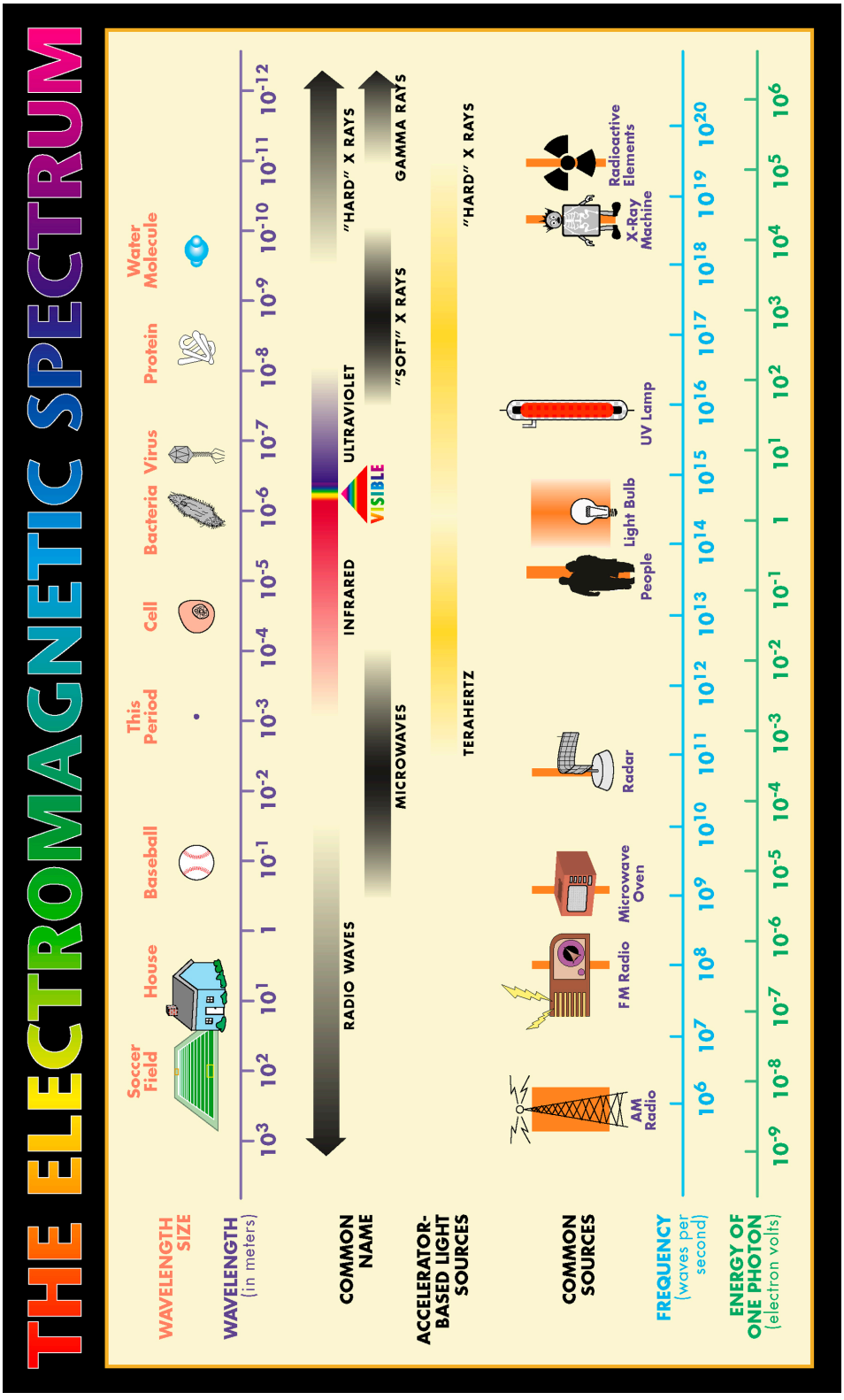
but not yet applied in agriculture (chapter six), others are not yet accepted within larger audiences but are potentially promising (chapter seven). In these chapters I guide you along a number of hypothesis that may explain, to some degree, how plants and animals – and men – might be able to sense and capture vibrations and how these signals influence the physiological metabolism in plant and animal. In my view, these hypotheses taken together build a rather solid foundation for the MEI-concept. In addition, chapter seven includes some new theories about the physics of nature and some reflections about consciousness. Consciousness in the web of Life deals with intuitive knowing from nature and with the influence of love and mind power on nature. Some suggestions touch on the metaphysics of life. These ideas are inspiring enough to deserve deeper exploration.

Chapter 8. Quantum Leaps in Agriculture

In chapter eight, the perspective of quantum-inspired agriculture is set against the challenges faced in the food and farming sector worldwide. The MEI-techniques carry the potential of a fundamental improvement of current food production systems in answering several of these major challenges. They may guide farmers and gardeners and researchers towards zero-entropy farming and towards a nature-inclusive agriculture. That is nature in its fuller meaning, including its form and mass, its energy and its information.

A wider application of such style of agriculture demands further development and evolution at personal, technical and cultural levels. One condition is a more inclusive attitude towards nature. Another condition is a reformation of the free market system for food. Both conditions can only be realized with awareness of the personal and cultural values behind the organisation of our institutions and markets and behind our thinking about and behaviour in nature. It invites us to deeper look into our blind spots, into key issues we do not yet perceive or have ignored. I suggest four fast learning paths to get introduced in this wider world view. With the words of a modern mystic Michael Roads: “In the end, it is not nature that needs help, it is men.”

I hope you will get inspired by this path of exploration.

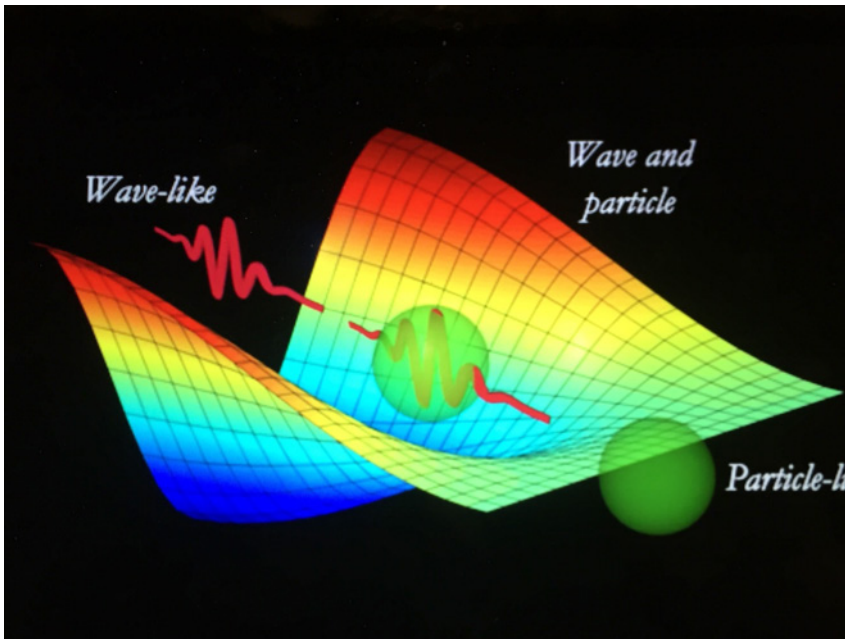


The spectrum of electromagnetic waves and its many applications. The picture shows the energy levels of various wavelengths or frequencies. And it gives a size reference of wavelengths by comparison with some known objects. Source: www.sciencebuddies.org

1. Energy and Waves

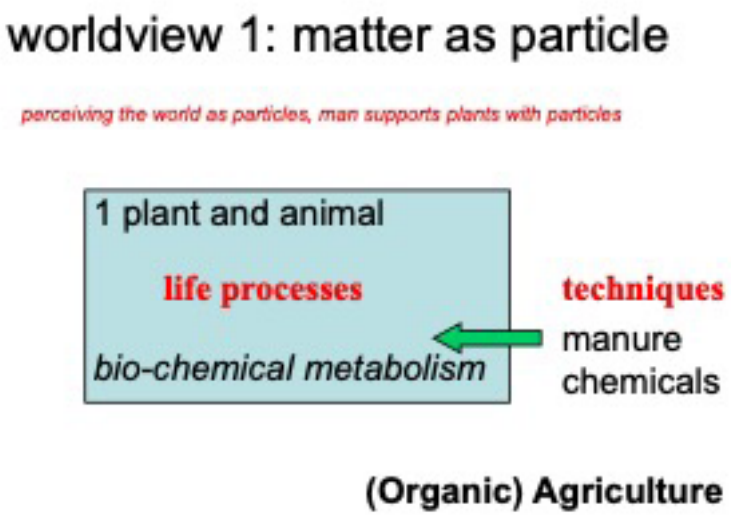
The wide spectrum of electromagnetic radiation, its impact and its huge variety of applications always impress me. Interestingly, there is not any reference to applications in farming. This in spite of the fact that many biological processes are being influenced by radiation and the fact that quite some farmers have started using techniques that broadcast long waves of sound or short waves of visible or UV light and various wavelengths in between. The science of electromagnetism is already well developed for over a hundred years, and recently it has found wider application in farming as well. Quantum theory is one of the theories that help in explaining how these wave based techniques influence physiological processes in soil, plant, animal - and man.

It requires a big step in our thinking, when we try to enlarge the mainstream world view of particle-thinking towards a perception of matter as waves. It is even more interesting to combine particle-thinking and wave-thinking. In this case it is a practical expression of Einstein's famous formula that energy equals mass x speed of light square. It means that matter can express itself both as particle and as wave. Waves have frequencies and they always carry energy.
However, the expansion of any world view is a big step.



Depending on the conditions, a 'wavicle' will express itself as particle or as wave. Source: livescience.com

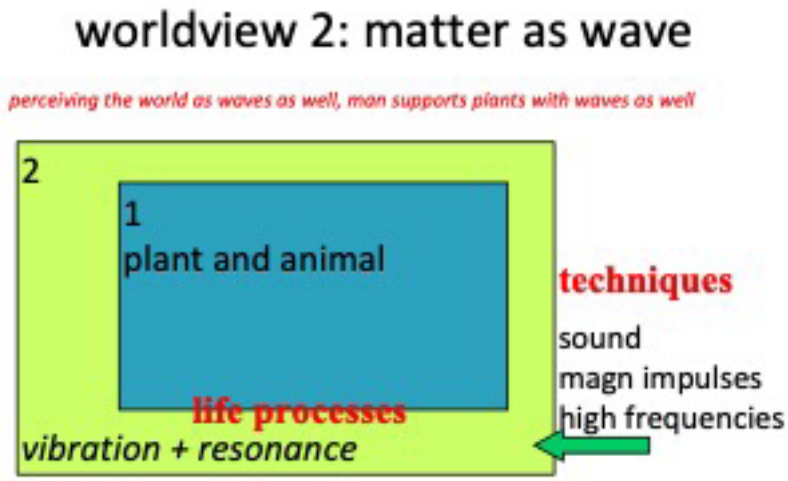
Farmers or gardeners who think in particles alone, will support their plants with particles: that means with manure and chemicals. Farmers who think in waves as well, will complement manure and chemicals with sound techniques, magnetic impulses or they broadcast UV frequencies. Such farmers have complemented their perception of matter as particle (worldview 1 in the picture below) with a perception of matter as wave (worldview 2 in the following picture).



In current agricultural education we share the worldview that everything around us is composed of particles with mass. We tend to explain life processes in terms of biochemical metabolism. Thinking this way we limit ourselves to farming techniques that add particles and mass: be it organic material or pesticides.

The first step in enlarging the classical perception of reality – particles with mass - towards perceiving matter as wave as well, is by considering vibration and resonance as part of living reality. In practical farming this means broadcasting frequencies over plants or animals. The picture at the beginning of this chapter shows that the electromagnetic spectrum of frequencies is very large and the variety in applications huge. It also shows that the impact of vibrations varies with their frequencies and the energy they carry. The transfer of energy

demands waves as a medium, whether it is broadcasting sound or just light.



ElectroMagnetic Agriculture

Once you understand the world as composed of waves and energy, you start developing a whole new set of techniques: wave-based techniques. The picture shows that the wave-aspect of reality (green 2) encompasses and embraces the particle-aspect of physical objects (blue 1). The space designed for the wave-aspect of an object is wider than the space given in the picture to the physical aspects of that object. This means that the frequencies emitted by any object are measurable outside its 'skin'.

Wave-based techniques are relevant in agriculture. They for instance can reduce the use of antibiotics in livestock and the use of mineral or chemical inputs in crop cultivation. There are more benefits: decrease of resistant pathogens, lower pollution of the environment resulting in healthier products and saving costs. These effects are already proven in practice. Fortunately, some initial theoretical explanations are becoming available as well[1].

Techniques that work are able to create a market, even when they have not yet got official support from accepted scientific theory or from official agricultural extension services. Many farmers are keen to try out uncommon techniques when they face severe problems for which no conventional treatment is available.

In this chapter I will briefly describe some relevant wave-based techniques that are already available on the market. And where possible I will complement the practical experience with some theoretical explanation:

- Genodics offers protein music to promote disease resistance and to improve production (1.1)
- Magnetic Rock Powders can enhance soil fertility (1.2)
- Simulated Magnetic Energy Technology decreases Johne's Disease in dairy cows (1.3)

In each of these three cases I will add a short description of a slightly different technique that is probably based on a rather comparable principle.

In addition I refer briefly to some wave-based techniques in their early phase of exploration (1.4)
- The Agritron, a mobile microwave to disinfect greenhouse soils
- UV light against fungi in union or potato.
- Animal health centre based on Global Scaling theory

1.1. Genodics protein music

On the label of some wine bottles from Italy or France or South-Africa you'll see the symbol of music notes. These wine growers market their wine as 'Grown with music, you taste it!' And indeed there is a special music that increases of sugar content in grapes, by 5 to 15%[2].

The technique is recent, it carries the name *Genodics*, a word combining 'gene' and 'melodies'. By broadcasting specially designed music, farmers are able to support plant growth and animal health.

This technology was born by combining quantum physics with the laws of musical harmony. It is a most fascinating discovery. French quantum physicist Joel Sternheimer, also a musician, discovered the relevance of high frequency sound signals in the synthesis of proteins. He wondered whether or not he could mimic that 'natural music', and if so, if it would strengthen crops or animals or even human health.

Sternheimer's initial experiment

A woman suffered from anaemia after surgery but she refused blood transfusion, as of the risk of AIDS. Sternheimer suggested her to listen to his music. He first played the "music of haemoglobin", so many octaves lower that it became audible for a person. This is not necessary for the music to be effective, but it is desirable to let the listener know that the music is "on". He played 4 to 5 tones per second, and gave her a tape with that music so she could continue listening. Some days later the haemoglobin content in her blood had increased from 8 to 12. That result triggered his further research. He experimented personally with the frequency of endorphins: which led to feelings of slowness and low energy. Then he applied an endorphin-quenching frequency (the same frequency but in reverse sinusoid) and he felt better and more energetic again. Gradually his conclusion became clear: When you play the melody that corresponds to the sequence of sound signals in the organism itself, a supporting reaction will occur. A specific protein melody then strengthens the synthesis of that very protein, while it does not and cannot influence other proteins.

In his trials with plants and animals that followed, this assumption turned out to be valid as well. He got his technique internationally patented as *"Method for epigenetic regulation of protein biosynthesis by scale resonance"*.

MUSIC = ENERGY + INFORMATION

Sternheimer invited Michel Duhamel, an international management consultant, to continue developing this technique and officially market it. Duhamel engaged himself in this new challenge, and for the purpose he established Genodics. He calls it *"Une nouvelle approche du Vivant !"*, a new approach of the Living.

That new approach of life is what Duhamel is after. Designing a technique that responds to the inner characteristics of every plant or animal. At first, it was difficult to develop this new view and get it rooted: it was not immediately recognized by formal research institutes, nor by farmers.

So Duhamel had to build a convincing story and he had to prove the effects in practice to get farm doors a bit more open. His story started with an effort to understand molecules. How do molecules join each other to form proteins? How exactly do amino-acids interact? As partner of Sternheimer, he started to study some basics in quantum theory. The following quotes inspired him a lot in his further exploration.

Max Planck: *"Matter in itself does not exist, matter is a combination of waves."*

Albert Einstein: "People, vegetables, cosmic dust: we all dance to a mysterious melody played far away, by an invisible flute player."

Mark Twain: "The biggest problem is not what we do not know, but what is not true in what we are certain to know well."

He wanted to find out which factors in fact influence plant growth. Factors that add to what is already known. He focused on the trinity of relations of a plant with 'other plants', with the 'soil in its environment' and with 'the farmer'. He imagined each of these three factors broadcasting waves in the form of circles, interfering like the waves of three stones thrown in the pond. Those wave patterns shape each other. This profound discovery underpins the fact that everything can be influenced through resonance, if their frequencies fit. Scale waves connect all layers of matter, from quark to photon, and all kinds of processes in organs, and in plants, animals and humans as well.

So the key challenge for developing practical applications was to focus on key processes in life that could be supported by music: they choose to focus on proteins.

The quantum physical background of Genodics

Genodics descends deeply into the very tiny dimensions of the cell and smaller, close to unseen aspects of life. Each particle has mass and each particle also has its own specific wavelength. And each wavelength has a specific natural frequency f. Frequencies can be calculated easily. When you multiply the wavelength times the frequency f you always get the speed of light: wavelength x f=300,000 km/sec.

Furthermore every frequency has a certain energy, also easy to calculate with the formula E = hxf, in which h represents Planck's constant. The shorter the wavelength, the higher the frequency, the higher the energy transmitted. These formulas are based on electromagnetic theory and quantum physics. Some more formulas and details can be found in Appendix 2.

It is not the frequency, it is the interval

One other crucial discovery was the working principle of this protein music. It is not a special pitch or one specific frequency, but it is a series of specific 'intervals' between tones that counts. Every protein is constructed with amino-acids. A specific protein is shaped in its specific order of amino-acids. At the moment of connecting, the attached amino-acid emits a wave signal that 'invites' the next amino-acid to come and attach. Each amino acid that links to the chain emits its specific tone. Their frequencies are higher than those of visible light. So it is a series of tones, a melody, that determines the order in which specific amino-acids join the ribosome. Any working protein music has to exactly reproduce that same series of intervals.

Genodics-code

Here we arrive at the key-knowledge of the Genodics-code: to know the order of all amino-acids in every relevant protein. With the information in the table below, Genodics then assembles the exact musical intervals that serve a specific protein for a specific crop, or animal in their specific phases of growth. All known proteins are composed of only 22 different amino-acids. Genodics established the code for the twenty most relevant amino-acids.

Amino-acid	**Pitch, Tone**
Gly	Low A
Ala	C
Ser	E
P, V, T, C	F
L, I, N, D	G
Q, K, E, M	A
His	B flat (Bes)
F	B
Arg, Tyr	C sharp #
Trp	D sharp #

In this table the twenty most relevant amino-acids are encoded (in the left column), with their attracting pitch (column at the right). Gly, Ala, Ser, P, V, T, C, etcetera are abbreviations of the amino-acids.
Source: www.genodics.com

Interestingly, Duhamel suggests that composers might have been influenced by their environment. In e.g. Vivaldi's 'La Primavera', Sternheimer discovered intervals that match the synthesis of the protein called Actine which is active in sunflowers! Could Vivaldi perhaps have composed this piece in the vicinity of sunflowers?

Applications in practice

Over a period of 40 years, many experiments have been done. When protein music would be played for a protein that is not active or not present, nothing happens. The music only effects the targeted protein if it is present and active in the body. For each crop's growth phase you have to offer music for those proteins that are active during specific periods in their cycle. Music should be played 2 or 3 times a day during 5 to 10 minutes. That's enough. During the rest of the day, the memory of water (see chapter 3) in the plants retains the effect.

The technique is already applied in agriculture practice, in the food processing sector, in environmental and health issues, and in animal breeding. It is also applied for generating bio-energy and in producing medicines. The following results of protein music have been documented:

- Stimulating plant growth
- Increasing resistance to drought or cold
- Preventing and curing diseases
- Providing higher yields of produce
- Enhancing longer shelf life

Over the years, Genodics has built up a broad repertoire. Once a protein melody has been developed for a particular crop or animal, you can use the same melody for the same protein at other times or in other animals or plants. Genodics reports the impact of protein music on drought-resistance in tomato plants, increased resistance against the bacterial disease Erwinia in endive plants. The method is also used for quicker fermentation of bread, for faster ripening of fruit, for crop protection (e.g. against mildew) and also for processing wine grapes. Genodics is working on applications to increase CO2 storage, for waste handling and for purification of water.

These results help the farmer saving inputs (nutrients, pesticides, water and energy), easily amounting up to 2000-5000 euro financial benefits per year for a farm.

Also in livestock farming, interesting effects have been measured and reported. Such as higher production of milk from cows, goats and sheep, and milk of better quality. And less diseases such as bacteriosis after weaning piglets and less impact of the OsHv-1 virus in 8-12 months old oysters.

The potential of this method has not yet been investigated for treatment of soils. That would be quite complex indeed, as there are so many different proteins in a living soil, active at the same time. The same constraint holds for special animals such as horses. Horses are complex creatures with many different proteins. They are getting rare in the agricultural sector, so the development of proteins for horses

is relatively expensive. It requires a lot of work for the license and for testing the protein response and you can only earn it back from few horse owners. In people on the other hand, the different proteins are quite well known. Genodics needs about 1.5 hours for a diagnosis of the relevant human protein.

Still in 2018, the pharmaceutical industry shows little interest in this technology. They probably do not yet understand it and continue to believe only chemistry tells the whole story.

The Genodics box, broadcasting music over lettuce and over an orchard. Source: genodics.com

Genodics believes molecules communicate via wave-patterns that stimulate cell metabolism. In the Genodics view, a pathogen does not have to be eliminated (with poison), but its effect can be neutralized with the help of frequencies.

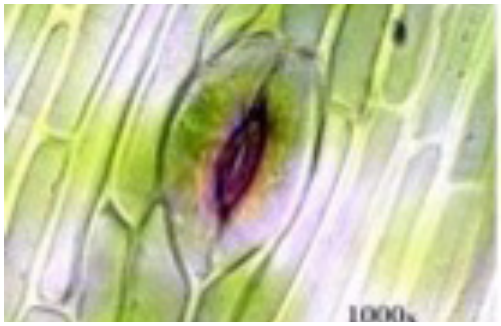
Protein music as offered by Genodics is a recent technology. It was however preceded by older music techniques. One of those is Original Sonic Bloom.

Original Sonic Bloom: Music + Leaf Manure

One of the predecessors of Genodics was Original Sonic Bloom[3]. With this simpler technique you broadcast music in the frequency range of singing birds, around 4700 to 5300 Hz. The farmer may broadcast this music in combination with foliar fertilizer, sprayed 15 minutes after the music started. The standard package includes both the music and foliar fertilizer.

The broadcasting equipment by Original Sonic Bloom.
Source: www.originalsonicbloom.com

The effect of their music apparently increases both the absorption of nutrients and the release of oxygen. Photos before and during the music treatment, show the opening of stomata.



Picture (1000x magnified) of a leaf stoma that opened 15 minutes after starting the music. Source: www.originalsonicbloom.com

Normally the plant itself regulates the opening and closing of its stomata. It was thought to be a function of climate conditions, the hour of the day, the air humidity and stress factors. Experiments have shown that sonic frequencies increased the nutrient absorption capacity of the leaf by about 50%, in laboratory conditions even up to 70%. Because the plant can take up at least twice the amount of leaf fertilization, the dose of fertilizer can be reduced by 50-75% while maintaining the same yield. These savings on the quantity of inputs are also achieved with herbicides, other fertilizers, certain fungicides and pesticides that are administered via the leaf. Daily application leads to an increase in yield of 5 to 20% and more on grain, rice and corn. There are similar results for other crops, with adjusted sound frequencies applied. The technique has been developed in the USA, came to Japan and Indonesia and has been rewarded with prizes from these Ministries of Agriculture.

Effective without theory

Certain sound frequencies apparently resonate with respiration in plant leaves. The company has published no theory that explains more profoundly how the process might work. Although the technique has proven to be effective (as an empiricist would say), the lack of a solid explanation makes the technique less convincing for potential users (says a positivist).

It would be interesting to investigate whether the effect of Original Sonic Bloom music could be explained with the theories of Joel Sternheimer and Genodics. In that case the intervals of several proteins should be traceable in the Original Sonic Bloom music. Another interesting question would be whether the fairly constant and specific intervals in birdsongs might resonate with specific intervals required for certain proteins. If so, bird life would be important for plant growth. An interesting topic for further on-farm research.

Validating ancient sound techniques

Mantras are still applied in farming today. In Sri Lanka, Buddhist priests used to chant ancient mantras for crops or animals[iv]. And they still do so by radio, while farmers orient their speakers in the direction of specific crops or animals[4]. Could it be that the working principle of such ancient mantras is comparable to the Genodics principle? Would this ancient singing have impact indeed at the reproduction of specific proteins? Or will we find another explanation in the near future?

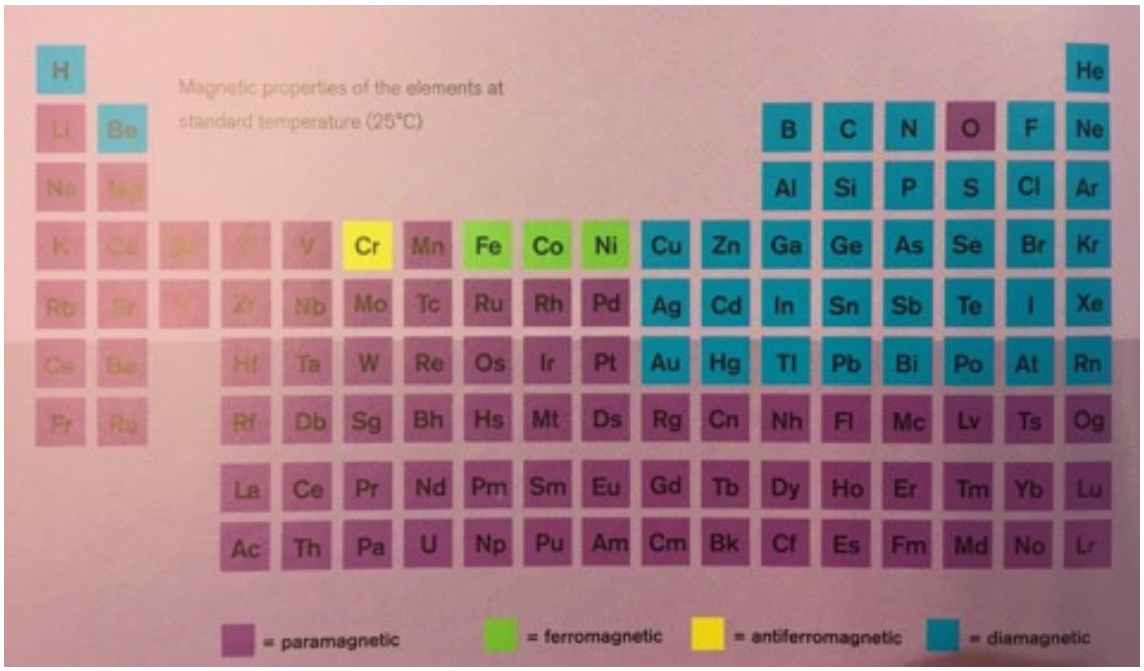
1.2 Magnetic rock powders for soil fertility

Farmers are often confronted with poor soils, for whatever reason. Some have discovered that soluble fertilizer alone is not sufficient to keep up soil fertility. Hundreds of them have started to experiment with rock powders. It may be because of the extra minerals, but these powders have other qualities as well, that is their magnetic effect. An aspect less known, but relevant.
In addition to the magnetic aspects of the earth as a celestial body, the minerals in the earth themselves also show magnetic properties.

Specific rock powders have their specific properties. Knowing these magnetic characteristics of rock powders is relevant for both agriculture and horticulture. The first agronomist who documented his understanding of the relevance of magnetic aspects of rock powder for agriculture was Phil Callahan[5] .

Paramagnetic and diamagnetic

The diagram of the periodic table of the elements, copied below, shows the magnetic character of the elements. In addition to the 'active' forms of electromagnetism and ferromagnetism, there is also a 'passive' form of sensitivity to magnetism. Such quality is expressed as either paramagnetic or diamagnetic. Rock powders do not themselves exert any active magnetic effect on other matter, but they are passively sensitive to magnetic influence. These terms of para- and diamagnetism are explained in standard physics books. The magnetic characteristics are known for all elements in the Periodic System as is pictured in the diagram below.



The Periodic System of Elements, mapped according to their magnetic properties. Elements in blue are diamagnetic. Elements in purple are paramagnetic. Source: 'The Periodic Table, a visual guide to the Elements' by Tom Jackson. (2017, Aurum Press). Picture by author.

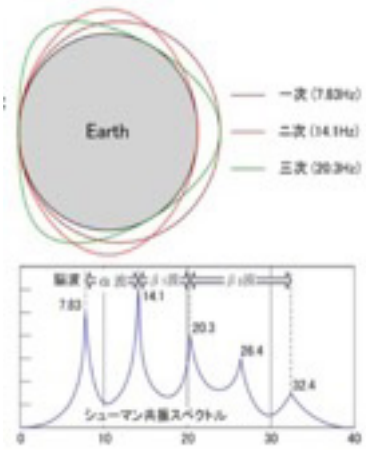
It is striking that oxygen, positioned in the middle of the diamagnetic elements itself is paramagnetic.

Types of magnetism:
Electromagnetic = field caused by electric current
Ferromagnetic = static magnetic field, such as in an iron bar
Paramagnetic = non-ferromagnetic substance, attracted to a magnetic field
Diamagnetic = idem but these substances are repelled once exposed to a magnetic field

There is a simple test to determine whether a piece of rock is para- or diamagnetic. Take a cord, attach a diamagnetic material, such as wood, and hang it in a magnetic field: the wood is softly repelled from the strong magnet. Paramagnetic material, on the contrary, such as a piece of basalt on that string, moves towards the magnet. Therefore the degree of dia- or paramagnetism is expressed as cgs (centimetres per gram per second). The more centimetres a gram of a certain substance moves in one second, the stronger para- or diamagnetic that substance is.

Relevance of magnetic properties of rock powder for agriculture

Paramagnetic rock increases sugar content in plants and makes them less susceptible to frost. A suitable soil - which is sufficiently paramagnetic - can absorb favourable cosmic radiation, which, according to Callahan, strengthens root growth. Farmers have experimented with small towers or vertical tubes filled with paramagnetic basalt. The photo below shows such a device. A high tower can serve up to 50 hectares, as was experienced at a wheat farm in Southern Australia.



Description of both pictures is given in the text below.
Sources: Hugh Lovel (left) and Callahan (right).

On the left-hand image above we see a practical application of magnetic rock: a sewer pipe filled with basalt rock powder (which has the highest para-magnetic value of over 3000 cgs), that appears to have a favourable effect. The image at the right shows Schumann frequencies (of 7,83 Hz, 14,1 Hz and 20,3 Hz) as standing waves between the earth and the ionosphere around it. According to Lovel (2014), the rock powder serves as an antenna for favourable frequencies from the cosmos and the ionosphere around the earth, for example the Schumann standing waves. Such very low frequencies of very long waves penetrate deeper in water and soil than short waves with their higher frequencies. Just one pipe appears to have an effect on tens of hectares.

Ancient knowledge on magnetic rocks

These magnetic properties of rocks were known already long time ago, both in East and West, but have actually been forgotten. Now they appear to emerge again - with new explanations - through the insights of Callahan and Lovel and others who study the effects of rock-powder. Callahan assumes a parallel with the use of stones in ancient Japanese and Chinese gardens. The standing stones are usually paramagnetic and basically yang, while the lying stones usually are diamagnetic and yin.

Other types of magnetism are relevant as well. The example below is based on ferromagnetism.

Magnetoculture: magnet bars to increase root growth

Not only para- or diamagnetic properties are relevant for farming. Active ferromagnetic material does also influence plant growth, especially root growth.

Magnetoculture, also called Electroculture. Plants are sensitive to both electricity and magnetism. The left picture shows a so-called Beeswax Magnet Antenna Capacitor. The picture at the right shows the yields of untreated (left) and treated potatoes (right).
Source: Yannick van Doorne, www.electroculturevandoorne.com

When you bury a Beeswax Magnet Antenna Capacitor in a field, it enhances the local magnetic field. Yields can thus increase by over 30%. Diseases are occurring less or not at all. The observed effects are better growth, higher yield, improved quality and less or no pests. How such magnetic beeswax strengthens the soil – or the roots – is not clear yet. But those results suggest that plants are sensitive to active magnetism as well. Most organic material - like plants or organic matter - is diamagnetic.

1.3 Stimulated Magnetic Energy Technology to control Johne's Disease in dairy

SMET-boxes are applied at 150 dairy farms, with the intention to control Johne's Disease. It is a Dutch invention that is relevant for dairy farmers. It is also showing how promising inventions sometimes hardly break through because of scientific hesitations.

SMET stands for Stimulated Magnetic Energy Technology[6] . The device is hung in the cowshed, and emits frequencies around 25 Hz, during one minute, at hourly intervals. This is a very low frequency of tones, but also its "overtones" in harmonic resonance may have impact.

SMET-box, a Stimulated Magnetic Energy Technology device. Source www.smetparatbc.nl

At the moment no techniques, other than prevention, are available to control Johne's Disease. Preventive measures, advised by the Veterinary Health Service, include that infected cows should be culled, calves should not drink this cow milk and they have to be kept separate from the mother cows, and when farmers enter their cowshed they have to disinfect their boots. This is because of the characteristics of the causative agent of Johne's Disease *(Mycobacterium Avium subspecies Paratuberculosis* (MAP) and the absence of a cure or an effective vaccine against the disease[7]. Dairy farmers and milk factories are aware of the risks of this disease: not only cows lose productivity but some researchers fear that consumers might get infected as well.

It is a promising fact that MAP could be negatively affected by weak Low Frequency Electromagnetic Fields, either directly or through activation of the immune system of its host. Farmers using a SMET-box report a decrease in clinical cases of Johne's Disease, also if infected

cattle is retained and no specific preventive hygienic management is implemented. The only formal research by the Dutch Veterinary Services reported data of one herd. That herd was tested before installing the SMET-box and again after ten years of constant exposure to the SMET-box frequencies. No preventive measures regarding herd management or hygiene were taken during this period[8]. In 1997, before a SMET-box was installed, 20% were infected, while in 2008 - after 10 years of constant exposure to its frequencies – only 3% tested positive for MAP. One of the cows that tested positive for MAP in 1997 was still in the herd in 2008 and tested negative for MAP at that time.

Research justified in spite of scientific hesitations

A substantive explanation for this SMET-technology is not yet found, and this fact hampers wider application by farmers and hampers backing by official bodies. Hence research funding is difficult to mobilize. That was the case in 2010, when a proposal was sent to a funding agency for dairy research in the Netherlands. The proposal was refused 'as no immediate impact on dairy productivity could be expected.' The argument was that there were no peer-reviewed scientific papers that could convince the selection committee. This is a typical Catch 22 situation: an invention in its initial stages never has formally published research papers to back up the technology and, without funding of the rather costly testing methods, it is difficult to produce peer-reviewed papers. Since 2010 no further research has been realized.

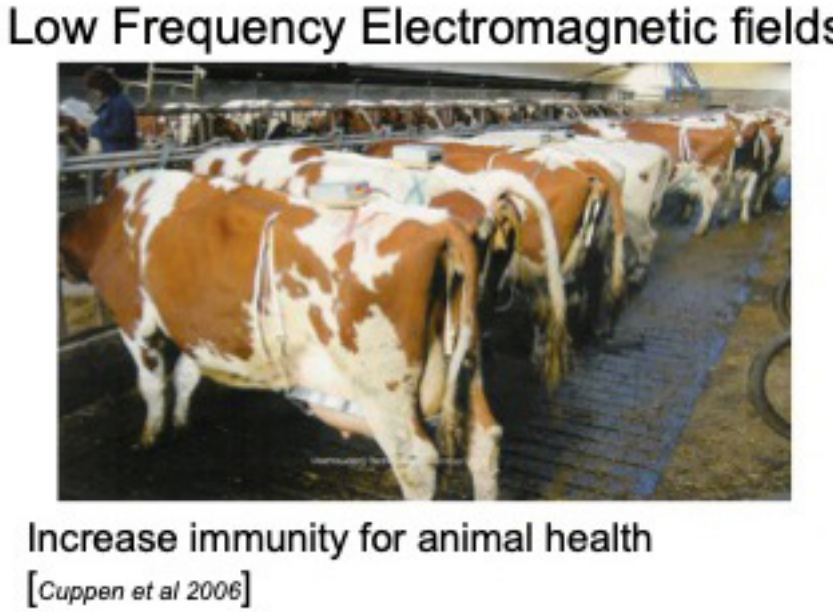
In spite of these hesitations, several studies suggest that Low Frequency Electromagnetic Fields (LF EMF) can complement herd management in controlling Johne's Disease indeed. A lot of work on the effects of frequencies on living tissue has already been realised - experimental evidence is accumulating for the efficacy of LF EMF against a wide range of pathogenic bacteria. The additional technical information presented in appendix 3 is the most advanced, and supportive, knowledge available at the moment of writing the book, in 2018. So, altogether there is sound argument to investigate the effectiveness of the SMET-box in controlling the Johne's Disease[9].

One other example of the practical use of low-frequency electromagnetic fields in dairy farming is the so-called Immunent-Activator.

Low-frequency electromagnetic fields applied on dairy cows, poultry, pigs, rabbits, shrimps, goldfish and people

The researchers working on the SMET-box also refer to the work of Jan Cuppen, who is owner/director of Immunent. The Immunent-Activator® technology is supposed to strengthen the resistance in animals and humans with Low Frequency Electromagnetic Fields.

Immunent found promising results of an electromagnetic technique to prevent mastitis, that's inflammation of the udder, during calving. Their idea arose during earlier research by Philips that had shown positive effects on women's breast inflammation. The method has got worldwide patent[10].



Experiment in preventing and curing mastitis by Extremely Low Frequency fields. Source: Veehouderijtechniek magazine (spring 2007), based on Cuppen et al, 2006.

Tests on treatment with ultra-low electromagnetic fields, both in universities and on farm, showed higher productivity and lower mortality. Immunent-Activators® are successfully serving poultry, pigs, rabbits, shrimps etc. Cuppen mentions 40% increased activity in 700 samples of immune cells; 60% reduced mortality in 2000 sick goldfish; 40% reduced intestinal lesions in 600 broilers with coccidiosis; and 12 % improved feed conversion in 900 broilers. Other Immunent-

reports mention improved weight, Food Conversion Rate, (egg) production and decreased disease damage, feed costs and mortality. In Bangladesh, on site trials with poultry are successful since 2009 and commercial systems have been installed since 2010. Tests with the Immunent EMF method by the Indiana University (USA) have shown positive results on human cells. Immunent-Activators® also are being installed in hospitals in areas with high infection risk.

What is the theory?

Immunent and partners have indeed postulated a hypothesis: a short-term EMF exposure triggers a feedback loop from danger signals that activates the immune system. Hence, the animal itself controls the infecting agent. Literature quoted by Cuppen et al indeed shows that comparable techniques do have effects on physiological processes in plants and animals, and certainly on their immune systems. Exactly how this process works chemically, however, is not very clear from the hypothesis. Their hypothesis basically describes the logic of the researchers.

1.4. Wave-based techniques in early stages of development

Many new electromagnetic techniques are on their way to the agricultural market. Briefly three more examples:

1. A technique to control soil infection in horticulture.
2. A technique to prevent fungi in potato and onion.
3. Application of Global Scaling theory to boost the immune system of horses.

Soil disinfection with a moving microwave

This Agritron device emits electromagnetic waves with its 150 inbuilt microwave tubes. Everything containing water is boiled to death, including fungi, insects, nematodes and worms that survived in spite of chemically disinfecting methods[11].

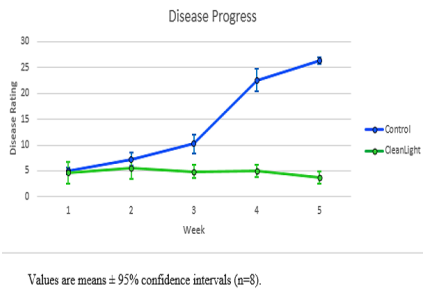
Demonstration of a prototype Agritron, disinfecting greenhouse soil. Source: Koppert Machines.

The device moves at a low speed of approximately one meter per minute. The slower the speed, the deeper the impact in the soil. This method of soil disinfection reduces energy costs up to 80%, emits 75% less CO2 gases and allows lower pesticide use. That's why in 2008 the device has received a Dutch environmental award.

However, the issue should be raised that probably all soil life is boiled to death. If the machine is not able to distinguish between desired and undesired life in greenhouse soils, the technique is not so positive for organic soil management. Perhaps this is the reason why this technique is not yet actively marketed.

Ultraviolet light disinfects

Specific frequencies in the range of ultraviolet (UV) light reduce phytophtora, a common fungus in potatoes and onions. UV light clearly has anti-bactericidal and -fungicidal effects.



UV-light used in onion cultivation Source: www.cleanlight.nl. The graph at the right shows the progress of the disease during 5 days without treatment (blue line) and with UV-treatment (the green line).

Research has shown that phytophtora infection in potato cultivation decreased by 93% when treated with 10 mJ / cm^2 in a 7-day period. The treatment took place 3x, on days 0, 2 and 4. This technique also works with onions. The device has been approved by SKAL, the Dutch organization for the control of organic crops.

Global Scaling theory and the immune system of horses

In 2004, the first animal health centre was built according to the theory of Global Scaling[12]. The centre treats wounds of horses with specific dimensions of construction, combined with colour, light and magnetic field therapy.

The healing rotunda at the animal health centre in Uzwil, at the border of Switzerland and Germany. Source: www.healthbalance.ch.

An electromagnetic field in itself can activate the immune system. This effect apparently is being enhanced when the treatment stable is precisely dimensioned to fit horses. These building dimensions follow Global Scaling theory. The relevant aspect in this theory is that every animal and every organ has its specific optimum size in which it functions well[13]. The therapy hall is dimensioned according to special geometric rules. The size of the animal is related to an optimal wavelength for that size, which in turn determines the exact measures of the health centre. These exact dimensions create standing waves that are optimal for the animal, in this case for the horse.

In addition, the Healing Rotunda on the picture above was positioned according to geomantic principles of earth magnetism, which are not further explained. It is built above the strongest geomantic point of the entire area. Large sediment plates in the foundation and rose quartz significantly support the recovery of the horses, according to the abovementioned website.

The hall has mirroring walls as well. In these Kosyrev mirrors (pictured below), the animal is able to see itself. Such mirrors are meant to shield electromagnetic disturbances from the outside and at the same time to reflect the body's radiation. So the radiation of the horse's body gets in tune with the standing waves of the optimal wavelength for the animal in the treatment room.

The Kosyrev mirror wall in the animal health centre in Uzwil. Source: www.healthbalance.ch.

1.5. Relevance and perspectives of wave-based techniques

The first chapter shows that it is promising for food production to enrich the dominant particle-view on reality with a wave-perspective. These electromagnetic techniques clearly offer a potential for agriculture, horticulture and animal husbandry. They support increasing yields while preserving the environment and saving considerable costs. They require fewer chemicals for prevention or cure. They absorb inputs more efficiently. Products have a longer shelf-life.

They reduce veterinary costs as the animals are calmer, develop a stronger immune system and a more efficient feed conversion. And there are more techniques I did not report on, like the magnetic induction of seeds which can generate relevant improvements in plant genetics[14].

The presented techniques also generate relevant effects for society at large. Early detection of problems, new possibilities for prevention and treatment of diseases, more efficient production of food, lower use of raw materials, less pollution of the environment and nature. Last but not least, the techniques result in lower costs for society and its taxpayers. Costs that often remain hidden, like environmental costs and human health costs[15]. Therefore, further development of these techniques deserve to be supported with public funds.

The human health sector and the agricultural sector have a common interest in electromagnetic techniques. Immunents' method, for example, was developed in the human health sector and eventually applied in the animal sector. In the human health sector conventional medicine and mind-body medicine are increasingly cooperating. This is shown in Integrative Medicine, where conventional and complementary techniques are combined. An Integrative Agriculture could be promising as well. Cooperation between the human health sector and the agricultural sector provides an accelerated learning curve for both.

Last but not least, electromagnetic techniques support a more robust agriculture. Farming and gardening are about administering nutrition (= mass) and energy. And we saw as well non-material information entering our view on life! Can you imagine anything as non-material as an interval in music. A succession of tones is not matter indeed, nor energy, it is just information. It literally helps shaping the form of proteins, it in-form-s life processes.

This 'information' is what we'll try to grasp a bit more in the next chapter.

Footnotes:

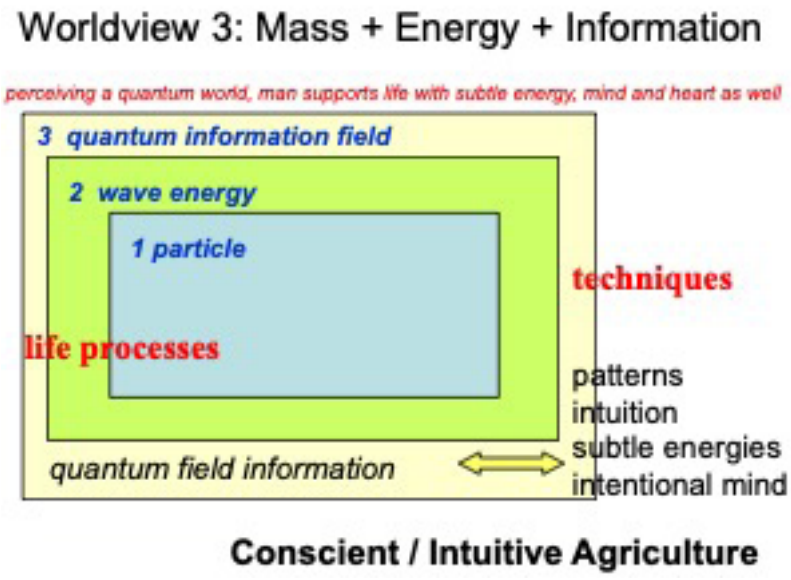
[1] At www.daydreameducation.co you will find a clear infograph about the principles of waves.
[2] www.genodics.com
[3] www.originalsonicbloom.com
[4] In 2007 at my request, mr. Felix Wijesinghe and mrs. Chesha Wettasinha made an inventory of ancient farming techniques used in Sri Lanka (not published).
[5] As he described in his book "Rediscovering nature's Secret Force of Growth" (1995).
[6] www.smetparatbc.nl
[7] Barkema et al., (2014).
[8] Hiemstra (2010).
[9] The follow-up of this story will be shared at www.gaiacampus.com
[10] www.slideserve.com/kata/IMMUNENT-ACTIVATOR "Productievere en Gezondere Dieren"
[11] www.Mamascreen.com/nl/Koppert-Machines-Zonen-Agritron_2
[12] www.healthbalance.ch
[13] The inventor of the theory, dr. Hartmut Mueller, presents much background information on www.globalscalingtheory.com
[14] Sousa de A. et al. 2006. Pre-sowing magnetic treatments of tomato seeds incrrase growth and yield of plants. In Bioelectromagnetics 27:247-257.
[15] Olivier de Schutter (2018), TNO (2016), RIVM (2017).

2 Information fields, patterns and light language

With this 'family' of techniques we move towards the energetic, informative and intuitive connections between man and nature, between the gardener and plant, animal and soil. It is about how farmers can support animals, plants and soil with energy, with 'patterns' and with intention. It is about measuring and interpreting the meaning of bio-photons, light in living tissue. And how this technique sheds new light on the 'vitality' of food.

The first step we have made, from worldview one into worldview two, made clear that farmers and gardeners can support their soils, their waters, their plants and their animals not only with particle-based techniques (Mass) but with wave-based techniques (Energy) as well. In this chapter a next step is taken, the step from Energy towards Information, the step into worldview three. It is a bigger step, a more fundamental one, a step into a field that is not itself matter. In literature, this field has got various names, such as 'zero-point field', 'morphogenetic field' or 'Akasha-field'.

I prefer to call it the 'quantum information field' as this concept resonates with the focus of this book on quantum biology as well as with the view that reality is Mass + Energy + Information interwoven.



This scheme visualizes that informational agricultural techniques inform and are informed by the quantum information field.

The figure above shows that the *quantum information field, the Information-dimension*, completely integrates both the waves in the Energy-dimension and the particles in the Mass-dimension. All information is present everywhere in and around the farm, and the art of the farmer is to use this information consciously. Many farmers and gardeners already have developed access to this Information-dimension and include it in their decisions.

Although this field is not considered part of matter, it appears to have a formative and informative effect on the physical and chemical life processes. Moreover, this field is 'sensitive' to patterning techniques broadcasted by farmers. It is 'accessible' for the human mind as well. Worldview three has inspired people to invent new techniques for agriculture and gardening as well as for measuring food quality. Some of these are briefly presented here.

In worldview 3 both material fields of particle/mass (1) and wave/energy (2) have been complemented by the non-material quantum information field (3). This full picture fits an agricultural sector that connects with earth minerals, magnetism and cosmic energy, with organic matter and nature and its ecosystems as well as with the quantum information field. It is a field through which farmers and gardeners can relate to nature's information.

This chapter first deals with 'informative patterns' offered in Quantum Agriculture (2.1) and with techniques that assess the vitality of food by analysing the pattern of bio-photon behaviour (2.2). These techniques do not require personal engagement of the farmer or the researcher, they are quite objective. On the other hand, techniques and methods presented in chapter 4 do require a personal engagement of the farmer 'in resonance with other life'.

2.1. Informative Patterns in Quantum Agriculture

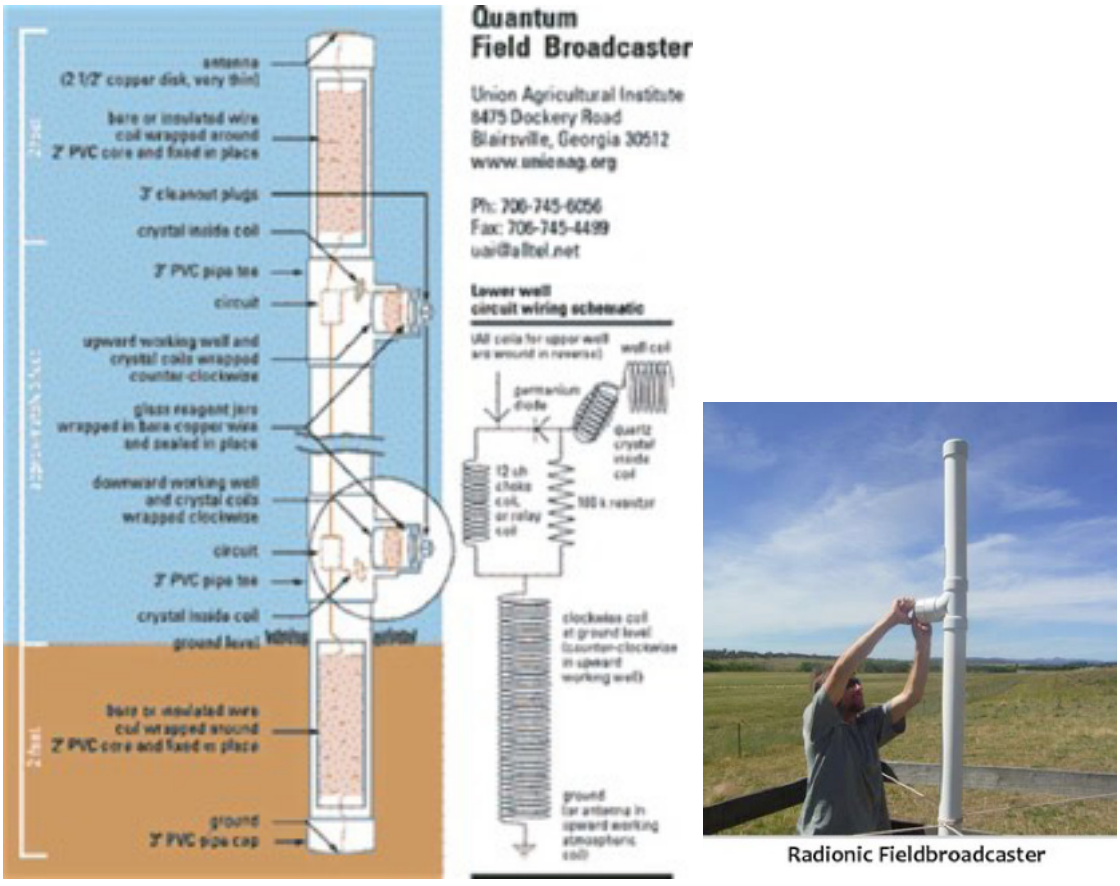
Lovel is a highly respected farmer and farm advisor in Australia[1]. He modernized the use of biodynamic principles. Already in 2004, he introduced the term 'Quantum Agriculture'. And he is invited by farmers all over the world to share his vision. He says that, if we wish to achieve highest efficiency in agricultural systems, we should understand and apply the rules of quantum mechanics. Lovel suggests that agriculture will become most efficient by using energetic patterns to support life.

Life energy is organizational, it attracts and concentrates. It goes against entropy. Entropy means that atoms or molecules disperse in space until its concentration is the same everywhere. It is like the brown colour of tea spreading from the teabag in your cup, you do not need to stir. It's a basic phenomenon in physics. The basic process in biology shows the contrary, it concentrates. And hence it is called negentropy. You may remember the early architect of quantum physics, Erwin Schrödinger, who noted in his book 'What is Life? (1944) that living organisms have the remarkable ability to 'absorb order' from the environment. He probably means with 'order' about the same thing as Hugh Lovel means with 'patterns' and 'Information'. Lovel insists on good nutrient management as well, as a condition for the energetic and informative techniques to be effective. In his view Mass and Energy and Information are correlated. In addition to applying patterns, he recommends the use of colour therapy, biodynamic remedies, homeopathy, radionics, field broadcasters and many more. These all work according to the principles of quantum physics, he suggests. Most of these techniques transfer information.

Field Broadcaster and how it works

The Field Broadcaster is one example of Lovel's quantum agriculture techniques. It is designed to catch cosmic radiation and to broadcast it unto land and crops, informed with specific patterns that provide information. Lovel suggests it would be a wonderful tool for forestry

and for environmental reclamation as well. The functioning of the device is based on the principles of radionics as discovered by medical doctor Abrams in the USA and later on applied in farming by Charles Upton (Appendix 11 shares some more background on radionics). With radionics you can transfer patterns. It's working principle might be understood with quantum principles of non-locality and entanglement. Field Broadcasters can have impact in a radius of roughly five kilometer.



Radionic Fieldbroadcaster

The Field Broadcaster in construction design (left-hand picture) and pictured in the field (right-hand picture). Source: www.quantumagriculture.com

Lovel describes the instruments as stationary, self-driven induction field devices that are designed like crystal radio sets and driven by ambient electron flow between the soil and the atmosphere. It sets up energy patterns in the biological zone between the subsoil and the immediate lower atmosphere. Only the pattern is transferred,

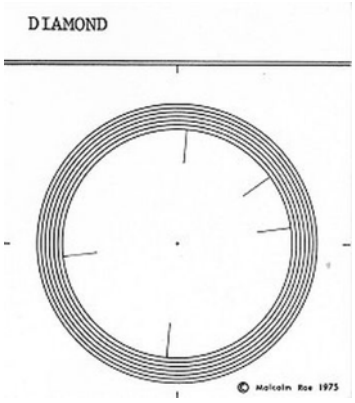
which has no mass. It works according to a radionics device. A radionics instrument can pick up patterns at its *input* and transfer them to the *output* where a so-called *witness* is quantum entangled with the recipient field or crop. A witness can be a photo or the name or the floor plan of a field you want to treat. This device transfers the treatment patterns to the field of soil and crops. It is not limited by any distance or time lapse. It works instantaneously and without loss of pattern density.

The functioning principle of radionics devices is based on an invention of T. Galen Hieronymus (1895-1988) who studied how life energy interacts with plants: 'Conducting Chlorophyll Energy over Wires.' This way he sprouted seeds in lightless boxes. Hieronymus got this technique patented in the USA. Lovel improved the device with an automatic switch, broadcasting specific patterns in daytime and others during the night, when the processes in plant and soil switch as well.

Energy and Information patterns go hand in hand. Lovel does not only work with cosmic energy in his Field Broadcaster. He also advises farmers to use existing earth energy grid lines - like Hartmann and Curry lines - and energy power spots for setting up pattern energy devices to accumulate energy. Patterning devices may include: establishing boundaries, prayer wheels, cairns, energy circles, as well as technical instruments like field broadcasters.

Patterns and crop quality

Each form of life possesses inherent patterns. And farmers can strengthen these patterns. Without organizational patterns (such as biodynamic preparations) in the reagent wells *(input and output)*, a Field Broadcaster does very little to strengthen a crop. Lovel conducted various experiments with raw preparations, radionically copied preparations, homoeopathically diluted and radionically potentised versions. His conclusion is that radionic BioDynamic preparations made from Malcolm Rae type geometric cards[2] were the most effective.



Example of a McRae card used for broadcasting diamond-pattern information. Source: www.quantumagriculture.com

Patterns can be recognized in many natural processes, like variations in frequency, in shape and growth form and in life cycles. Think of Fibonacci series of seeds in sunflowers, of phi-curves in shells. Patterns provide information. Farmers can deliver Information to soils, plants or animals by strengthening specific patterns. Thinking this way, Lovel says, you develop the subtlest as well as the cheapest techniques that support more robust and resilient food-systems.

Patterns have profound effects on crop quality. Farmers and gardeners can establish far more ideal patterns at every level, from minerals and soil biology to plant functions. Dynamic patterns give rise to corresponding forms of energy. Lovel makes an important distinction, see appendix 4, between energy that explodes and expands and increases entropy, like in the cylinders of your motor car, and organisational energy in living systems that 'implodes' and concentrates and increases syntropy. Lovel suggests agricultural research to make investigation and classification of energy patterns a top priority.

Transferring Patterns via resonance, holography and entanglement

Lovel sometimes uses the resonance-principle in sound to clarify the transfer of patterns. A bell or a tuning fork has a certain inherent pattern or tone it resonates to. When struck it will resonate to that pattern. Sea shells or spider webs likewise have particular patterns that allow them to conserve energy in specific ways that resonate or set up a standing pattern through their entire structures. As they grow, they resonate according to that basic, natural pattern[3]. The

difference with tuning forks is that radionic resonance happens immediately and does not lose intensity, therefore it must be based on the quantum principle of entanglement.

Lovel also refers to holographic principles to understand the radionics technique. Every part of any organized whole (e.g. a living organism) is one with, or connected to, all other parts. Therefore, any part can represent the whole, just as every cell in a person's body contains the same DNA. You can imagine how it works. With a radionic instrument, you impart a pattern to a part, a specimen, or witness of an organism or field, and the holographic principle in the radionic device instantaneously imparts the same patterns to the entire organism or field, no matter where it is. An aerial photo or an official survey map of a farming field, serves as witness of the entire field. Imparting a pattern to the witness of a field in the device, allows patterns to be transferred from any distance to the farming field that is addressed. And in that treated field the farmer can intuitively sense the more informed, coherent and stronger life energy.

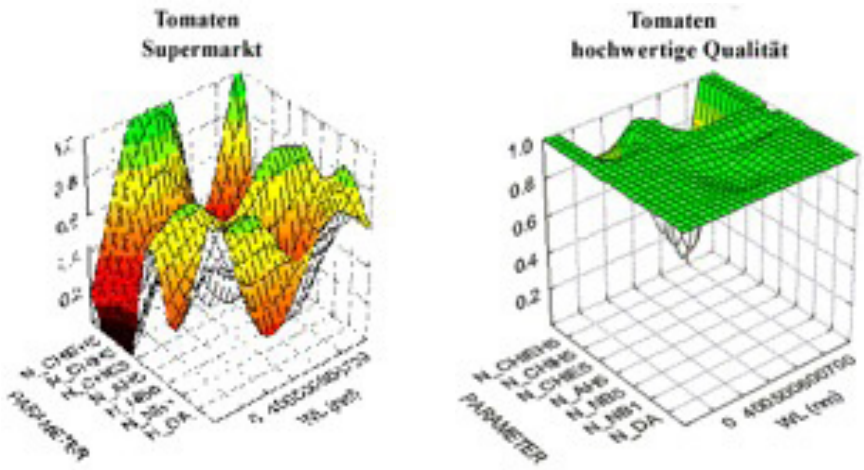
A much deeper understanding of these things would help farmers to meet the challenges we face in agriculture, concludes Lovel.

2.2 Bio-photons and vital food

Light is most relevant in life. In photosynthesis to begin with. But it plays many more roles, as the profound study of the tiniest particles of light – photons - suggests. A wider application of this science of photons in life processes would give us a more complete understanding of life processes. It also offers a new quality indicator of food, complementary to commonly used tests for chemical content and structural properties of a product[4]. The new science of bio-photons

offers a very relevant and objective technique for farmers and gardeners who try to optimize energy and information in the food they produce. It can discriminate levels of food vitality.

Let's take two different tomatoes as an example. The computer graph below shows the different light-energy pictures of low quality tomatoes (left-hand graph) and high quality tomatoes (right-hand graph). The low quality tomato is leaking energy (indicated by the red and yellow colours and its overall drop in energy levels). The healthy tomato maintains its energy and its order (indicated by the stable layer in green colour) – it's light is internally more coherent.



Bio-photon behaviour pictured for average supermarket tomatoes (at the left side) and very healthy and fresh tomatoes (at the right). Source: Van Wijk (pers.comm. 2006).

The light of life

This photon light we are talking about is very weak[5]. We are not able to measure it in daylight, as we do not see lamp light in our room while the sun is shining. To see the light emitted by an insect, an apple, or an egg or a person it has to be in a pitch dark room. Healthy living systems do not emit much, as the little light these cells may lose, is immediately absorbed by neighbouring cells. Unlike tumour cells, who do not take in the photons emitted by other cells. Their energy is lost, and that lost light is what we measure. Our measurement tells

us something about what happens inside the organism. The art is to learn to interpret this light language.

An example of manure. We are used to see it as tangible matter, as particles. But seen from a bio-physical angle, the value of good compost lies in handing over life-energy, as a kind of information. In a compost heap, this information is being built up. The gardener hands it over to the soil. And if this information is strong enough, the soil may require less kilograms of manure.

The photon measuring equipment is developing rapidly. At the moment it is still very expensive, but in five years or so it will probably be within reach of general practitioners' practices and gyms. But the challenge lies not so much in the development of tools as in the people to develop an interest in the language of light. China is decades ahead of us in this respect. As early as the 1980s and 1990s, Chinese universities went in search of light in the meridians. And we are gradually gaining access to this knowledge because Chinese students are translating it for us here. In fact, China walked in the opposite direction: it moved from energy to matter. We are now working together. We install light measuring equipment at Chinese universities and they repeat our measurements as we do with their measurements.

Most of the time we do talk about a light particle, but physically you'd better think of a wave. A wave that releases energy to a material molecule. You could even see it as a photon dance - a process of pushing and pulling, in which photons give power and energy to living matter over and over again. Think of light as a great transfer artist.

Which diet supports the body the best? These are foods that themselves have a high degree of order, they are not filled with toxins. Actually, one should not speak of toxins but of coherence-reducing influences. Fertilizer is known as plant nutrition - it promotes growth - but it reduces coherence. In the same way that artificial additives generally interfere with coherence. Without coherence there is no life! But in order to maintain coherence, the food and the moisture we take in must be as coherent as possible. That's why it also makes sense to vitalize water.

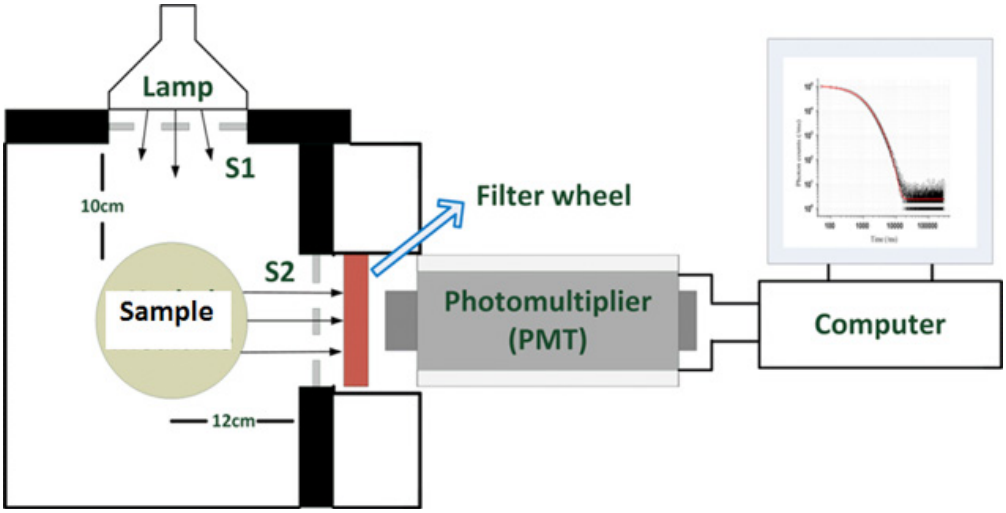
In this way you can measure whether milk is coherent enough to promote the health of the child that drinks it. And that applies to almost all foods. There would be a great advantage in a recognizable label with one or two or three stars for increasing coherence in the light quality of food. Then we can reward farmers and horticulturists for the quality delivered and the consumer gets an insight into the price-quality ratio, or - better - in the price-coherence ratio. After consuming such coherent food and water, we energize it further with our own life energy. In the end, the real vitalizer of all absorbed water and nutrition is ourselves. Plant and man transfer their coherence to all external building blocks. The cook also contributes to this.

As soon as the consumer accepts that there is light in the human body, and that this light expresses everything from stress to meditation, there will also be interest in the light language of food. Then it is only a matter of time before the first supermarket chains take advantage of it.

Measuring the vitality of food

In order to be able to understand this light language to some extent, it helps to get a better idea of the measurement methods. This chapter began with the light-picture of tomatoes. The vitality of food can also be determined by studying its Delayed Luminescence. Among others, this technique is used to predict seed germination, to estimate growth and ripening stages of fruit, and to assess product vitality under different storage conditions, for example of milk. Vitality measured in this way correlates well with longer shelf life of the product.

With the technique of Delayed Luminescence, you measure how a tomato, or an egg, or herbs, or milk, reacts on an external impulse of light (it may as well be an energy impulse of sound or heat). The scheme below shows the standard set-up of DL-measurement.



Source: Meluna, pers.comm. (2018).

Suppose you send a short light signal to a sample of a food product. The food stores such light-energy by means of excitation of electrons in its molecules. Then immediately the sample starts to release this light-energy again, fast or slowly, to the rest of its body, while a part of this energy leaks out again. That delayed release of leaking light energy is measured during 10 seconds after it received the energy impulse. The intensity of the release is plotted in a graph that shows the remaining light intensity during every second. The shape of the graph provides the crucial information. A healthy tomato shows a *hyperbolic* curve of photon emission, it contains more energy and is able to hold it longer. It means its internal structure is ordered, it's light is coherent, like laser-light. That energy is available to its consumer.

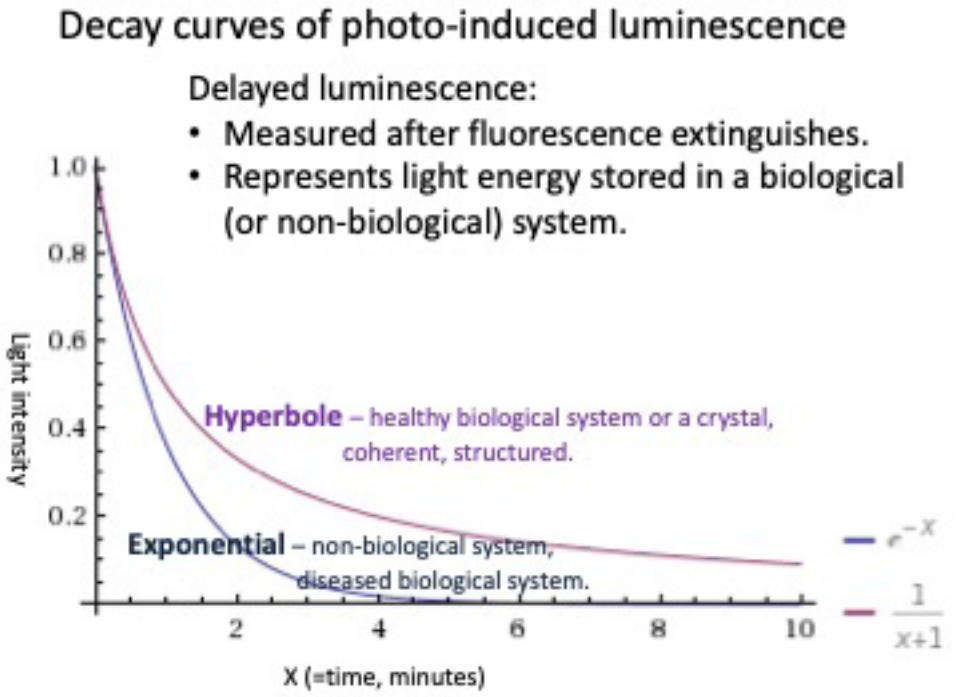
The light-picture of a rotten tomato is no longer a clear hyperbole but comes close to an *exponential* curve. This means a rotten piece of food quickly loses its energy, it cannot hold it. Not much of its energy, nor its order is left for its consumer. You better not eat it.

The same principle works for other products. The light picture of good manure or good compost shows a hyperbolic shape. Food grown with additional nitrate as artificial fertilizer shows a less clear hyperbolic function, it is internally less coherent.

The fast decrease in light emission intensity of a rotten tomato is similar to that of dead material. It is striking that hyperbolic curves

are also found in crystals. Both healthy fruits and crystals have a high internal coherence and ordered state of their molecules and atoms.

In the graph below, you see the pink 1/x+1 hyperbolic curve of a healthy biological system or a crystal above the blue e^{-x} exponential curve of a non-biological or a diseased biological system.



Light intensity (vertical axis) of a product, measured during 10 seconds (horizontal axis) after an energy impulse at time x=0. If the curve turns out to be a hyperbole, it indicates a healthy biological system or crystal. Source: Van Wijk (2014).

Measuring the Delayed Luminescence of chicken eggs shows whether or not they are fertile[6]. Interestingly, genetically modified (GM) food gives a Delayed Luminescence curve of an exponential nature (as almost dead matter). This means that the system is internally less ordered, which in turn means that the organism is less adapted to the environment and has a lower self-regeneration potential and is not promoting the health of an animal or human body.

Other ways of measuring light behaviour are possible as well.

Early detection of disease

Measurements of biophoton behaviour of a plant can show stressy conditions before human eyes can see any stress in the plant. This bio-photon technique allows early detection of disease and hence offers the farmer an opportunity of early treatment of a crop and saving money. The earlier you see stress or illness coming, the less resources you need for control.

This method of stress assessment differs slightly from measuring Delayed Luminescence that is being measured after an external impulse of light. In the case of early detection, you just measure the *spontaneous emission of light* after putting a plant in white light, for example. Within minutes you will measure the specific colour spectrum of active photosynthesis. 89% of spontaneously emitted photons of leaves have a wavelength between 600 and 1000 nm (red and near-infrared), which comes from chlorophyll and mitochondria in the cells. As soon as pathogens enter the leaf, the mitochondria – the plant's energy centres - change their metabolism and one finds a different colour spectrum. Wounds or oxidative stress induce higher photon emission and loss of energy. Any immune reaction in plant or animal creates an oxidizing peak, visible in photon emission as well.
It means the analysis of light-behaviour can serve as an early detector of stress or dis-ease, already before you can see it with your eyes.

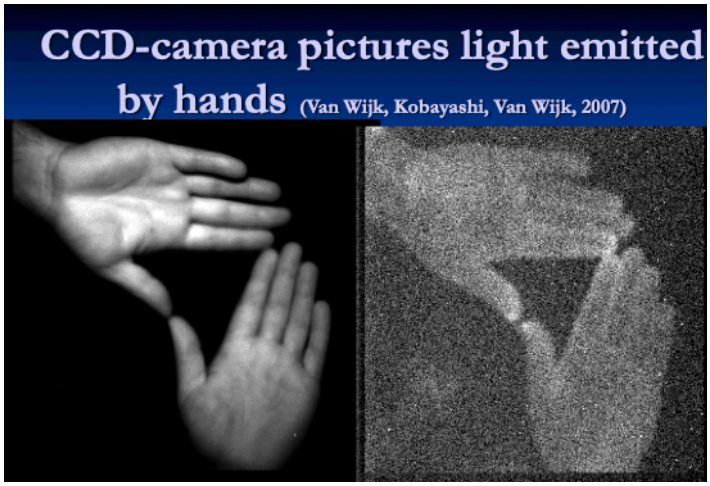
What are bio-photons?

Photons are the smallest entities of light, much smaller than electrons. Bio-photons are photons contained by or emitted by living systems. They play several roles: in the communication of cell-to-cell and organism-to-organism, in shaping a formative field for biological development, in coordinating metabolic processes, in storage and transfer of energy and information. One can say that bio-photons are an expression of life energy. People also store daylight: not only through the eyes, but also through the skin. Also crystals can hold light more or less well. So, living beings - and crystals - can be called light-holders. Without light, no life!

The Russian researcher Alexander Gurwitsch[7] discovered, almost a century ago, that an onion root-point appeared to stimulate the cell division of another onion root at a distance of 2 mm. So 'something' was transferred between these roots. He called it 'mitogenetic radiation'. But Gurwitsch didn't have any UV measuring equipment yet. After the Second World War, very sensitive measurement devices were developed, both for a particle perspective and for a wave perspective. Now the behaviour of photon light could be observed in much more detail. More background information about this technique in appendix 5.

From 1972 onwards F.A. Popp discovered that almost all life forms – not only onion roots - emit light in the visible and in the UV-domain. *Apparently, there is a biophotonic field* around each organism, a light field. Popp also theorized that this photon field could play a role in the internal organisation of biological systems. This insight formed an important bridge between quantum physics and biology.

Since the 1970s, researchers look primarily at the information aspect of biophotonics. They wondered how information is transferred in living systems. From 2004- 2007 the Meluna-team (now based in the Netherlands[8]) worked closely with prof Popp and his team. Popp c.s. hypothesized that the behaviour of biophotons provides an important indicator of the health and vitality of people, animals and food. This knowledge is now being further developed by the International Institute of Life Energy, in which the Meluna-team plays an active role.



Living bodies emit light. Pictured by a very sensitive camera.
Source: Van Wijk, Kobayashi, van Wijk (2007).

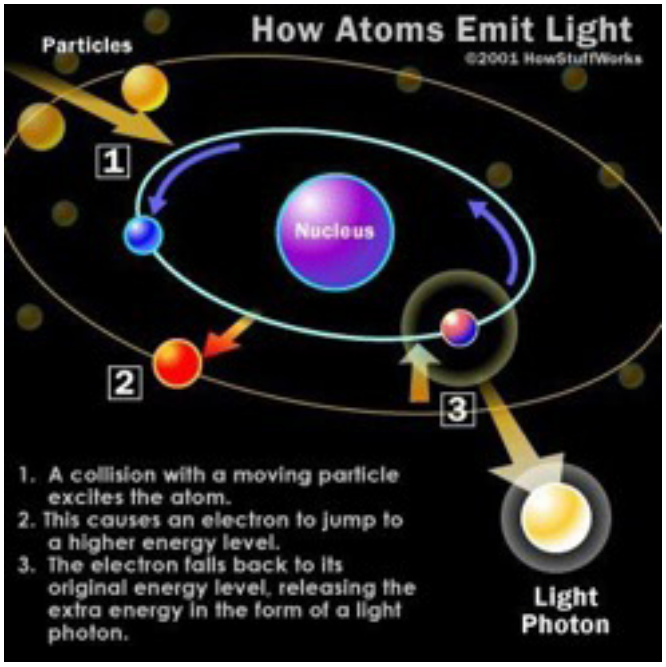
Ultra-weak light research has discovered several biological processes that emit light. Some insects can emit visible light, like fire-flies. This is called bioluminescence. It is observed in soils as well. Bioluminescence is functional in the communication between microbes: light-sensitive receptors are found in the cell membranes of many microorganisms, they stimulate each other's cell division and they also regulate the spatial orientation and distance between cells.

Photons emitted from a living system are photons that leak out of that system. The system cannot hold them, which provides information about the (loss of) vitality of the system. The exact numbers of photons can be counted, on measures approximately 10 to 100 photons per second per square centimetre of tissue. This intensity is a thousand times less than the human eye can see. Only extremely sensitive cameras can detect photons. The colour of the emission also tells something. For example, UV frequencies suggest rapid cell division. Visible light is emitted from proteins and fats reacting with reactive oxygen[9].

Energy impulses excite electrons

The impulse from an energy source (called 'pump source') makes an electron vibrate faster. If it gets enough energy, the electron jumps to an orbit further from the nucleus of the atom.

Sunlight - the most important pump source - excites electrons in chlorophyll in the leaves of plants. The excited electron is contained in molecules that are transported in the plant to the places where energy is required. When the excited electron falls back into the orbit closer to the nucleus, it emits exactly this 'excess' energy again in the form of a photon, as depicted in the picture above. This energy can then be used, for example, for the metabolic process in the cell. Or when it leaves the organism it can be detected by measurement devices.



How atoms emit light (3) after an energetic impulse (1).
Source: www.ledtuning.nl

There are several other pump sources relevant in natural processes.
- Molecules in plants or animals, can react with radicals of oxygen or nitrogen.
- In animals - that do not have photosynthesis - food is a pump source.
- Audible sound can also act as a pump source and generate photon emissions. Loud sound can lead to light emission from an organism.
- Red light can be compared to low tones and blue light to high tones.
- Researchers use an artificial pump source to measure delayed luminescence.
- Farmers use UV-light device as pump source on crops as described in 1.4.

Intention and Delayed Luminescence

When a farmer treats his plants or animals with good intentions, the Delayed Luminescence hyperbolic curve moves upward. This became clear in research on milk. The intention of the farmer was an important factor for the vitality of the product!

This may sound as a remarkable conclusion, but interestingly the physiological effect of intention is confirmed by other experiments. People shouting bad words to rice, experienced quick rotting of the rice. Others, speaking nice words to plants, experienced more vigorous plant growth. I experimented with two identical violets that I had bought on the market. One plant got a plus sign (+) written on its pot, the other got a minus sign (–) written on it. Every evening I smiled to the (+) and tried to feel good intentions and imagined it growing well and blossoming. To the (-) I did the contrary: I looked angry, saying "I don't like you" while I imagined it getting weaker and not blooming. Both plants got the same sunlight and the same water. Two weeks later, after a weekend away, the (+) was strong and clean, while the (-) had wilted and was full of lice. This is only one case, but we did this experiment as a group ECOintention students in 2002 and almost all members experienced the same effect.

Moreover[10] biophotons may play a role in our awareness and consciousness. Both Popp and van Wijk suggest a kind of continuum between matter – light – consciousness. In fact they think it's the other way round: material development follows the light-reality. And coherence of light can be influenced by conscious attention. Many measurements confirmed it. It is amazing that such impact of intentions can be measured objectively with Delayed Luminescence. This vision has far-reaching consequences. This impact of intention will be carried further in chapter 4.

Light language

Biophotons play a role in cell-to-cell communication with ultraweak photon emission. A biological system - such as a cell - affects a neighbouring system with its photons. This type of communication not only takes place between cells, but also between organisms such as onion roots, radish seeds and water fleas. The way photons are ordered or broadcast in groups, tells something about the process they originate from. Good compost for example is rich in coherent light, incorporated in the soil it will hand over this ordered light to soil life, which makes it available for plants etcetera. In the end this coherent light informs the bodies of its consumers and even the quality of their manure or poo. If recycled …. You can imagine a farm or a region as a cycle of light.

The question is, how can these photons carry information? That's in the patterning of their light waves, it is about wave-modulation. The hypothesis is that vibrations carry specific deformations - 'modulations' – that are specific for specific information. It is like transmission of radio waves as FM (Frequency Modulated) or AM (Amplitude Modulated), or combinations of both modulations. A picture is shown in appendix 5.

You can speak of light language indeed[11]. In living animal tissue, these information-carrying biophotons can be transmitted through conductive 'cables' found in collagen tissue[12]. For example, in human bodies, several organs communicate with the pineal gland, a small organ just below the brains – small as a grain of rice - that controls important parts of our hormone balances. These collagen fibres are found all over the body while water molecules cause these fibres to swell. And bio-photons 'travel' easily through such watery 'jelly' tissue. For good internal photonic communication, it is therefore important to drink enough water.

Here an interesting issue pops up. If proteins are deposited in collagen fibres, if water molecules cause these fibres to swell and if bio-photons 'travel' easily through water in collagen structures, could this tissue be a place where protein music, light information and water treatments come together and have their basic impact on life processes? It would position life between light and water indeed.

And as - in addition - light language informs organs like our pineal and if photon behaviour changes with our intention, would this common place of protein and collagen all over our body, of water and light all over our body play a role both in the sensitivity of our body for subtle energies and in our human consciousness?

Anyhow we may state that this biophoton concept of food quality and health, in principle, is in line with Schrödinger's suggestion that life sucks in order from its environment. Biophoton behaviour can be considered as an indicator for the degree of internal order and coherence between various internal processes and therefore offers an indicator for the vitality of food. In case supermarkets would get interested van Wijk stated[13] that the bio-photon method has been developed far enough to indeed discriminate between food with high or medium or low light coherence.

2.3. Relevance and perspectives

Anyhow, the informational methods described in this chapter, can generate a new impulse to the food production sector, its robustness and its licence to produce that the sector needs for continued support in society.

The results generated so far provide strong arguments to further develop our understanding of radiation and information patterns, and of relevant measuring methods. The methods result in healthier living conditions for people and animals. The methods can help in early detection of disease, in requiring lower inputs and in saving costs. They generate additional quality standards for water and food vitality.

It seems timely to start including this knowledge in agricultural education. Obviously, such new methods also create new challenges for Research&Development. And it requires creating awareness of new food quality indicators among market players and consumers.
The idea to serve plants with patterns and the biophoton concept of food vitality and early detection of stress and diseases both are in line with Schrödinger's suggestion that life sucks in order. Lovel's suggestion to make a top priority of energy patterns for land and crops is very valid.

Understanding the quantum information field as part of nature, is important for a fully integrated approach of nature and for developing new management techniques in farming. It might bridge the gap between the Wizards and the Prophets[14], the technocrats and the ecologists. It enriches our vocabulary with 'patterns and order and coherence' and this results in relevant techniques.

Footnotes

[1] www.quantumagriculture.com
[2] Malcolm Rae geometric cards are small paper cards with at least seven rings of concentric circles around the outside with the centre clear. Ordinarily these are used in a type of radionic instrument with a doughnut shaped pickup that was invented by Malcolm Rae, one of the early radionic pioneers in England. Lines or sector marks corresponding to the patterns of each (biodynamic) preparation are drawn that are no more than a centimetre and a half long, raying from the innermost circle towards the centre. Since the circles are complete 360 degree vortices, one card can contain all the pattern lines necessary for the complete pattern it represents.
[3] Lovel explains this principle in his book 'Quantum Agriculture' (2014).
[4] A new science of light. www.Melunaresearch.nl
[5] These reflections about the light of life are quoted from a recent interview of dr. Roeland van Wijk by Bart Hommersen in Vruchtbare Aarde edition 4, winter 2018.
[6] Beloussov (2007), grandson of Alexander Gurwitsch.
[7] See van Wijk (2014).
[8] Meluna is the abbreviation of MEasuring LUminescence in NAture.
[9] Prasad (2014).
[10] Popp (2007) and Van Wijk (2014).
[11] Additional information can be found on www.gaiacampus.com and on www.melunaresearch.nl
[12] Van Wijk, (2014).
[13] In Vruchtbare Aarde, editie 4, winter 2018. The entire edition of this magazine is devoted to the developments in understanding light over the last two decades.
[14] As Charles C. Mann has put it in his recent book 'Can Planet Earth Feed 10 Billion People?'

3. Understanding Water

Water is essential in all life processes. Thousands of farmers around the world practice vitalization of their waters. Only very few can tell you what it means.

Water is not only wet. It solves and transports minerals. It delivers the first electrons in photosynthesis; already in this fundamental action it interacts with light. It organizes itself in clusters. The better we understand water, the better it is for growing food. Water is sensitive. Because so much water is deteriorated by human activities, it has become important to 'restore' it again. That's why it is important to 'vitalize' water and to explore its energetic and informative qualities.

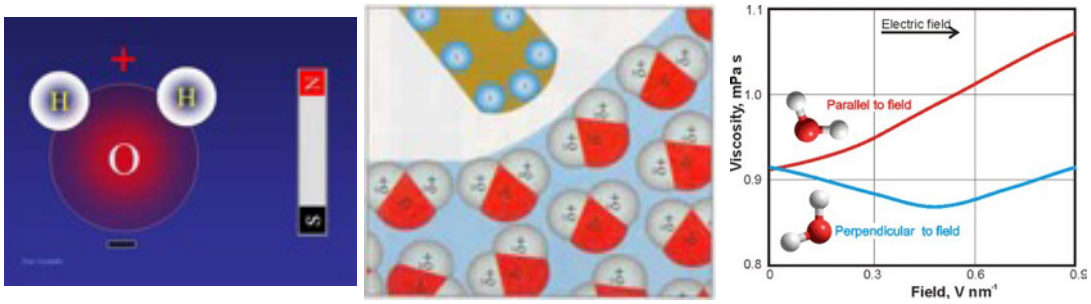
Water is quite 'ab'-normal

Water differs from common physical behaviour of matter, in at least 69 different ways. I'll mention just four[1].

1. The *highest density* is 4 degrees above the freezing temperature, which explains why ice floats on water instead of the liquid state being on top. That's why we can skate on frozen water without having to plough through water in its liquid state. This is an abnormality in physics, although we find it very natural for water. Of other elements the solid state is heavier than the liquid.
2. Water has a *specific heat* that is 3 times as high as alcohol. The specific heat of matter tells you how much energy you need to raise the temperature of 1 kg water by 1 degree Celsius. Its specific heat is lowest at 37 degrees (exactly the temperature of our body). This means that at body temperature, water is most sensitive for variations in temperature.
3. Water boils at 1*00 degrees Celsius*. This is higher than you would expect from its place in the periodic system of elements. It means its molecules stick relatively strongly together.
4. Water is the only substance that *simultaneously* occurs in 3 aggregation states (solid, liquid and gas) and even a fourth phase has been found.

Water has 'memory'

Magnetically restructured water induces changes in rat brains[2]. A magnet can reorient water molecules. Water molecules are small magnets, they behave as *dipoles*. Each water molecule has two positive charges of the two hydrogen atoms (white in the figure below, 'the ears of Mickey Mouse') and a double negative charge of oxygen atoms (the red in Mickey's angry face). This bipolarity of water explains its sensitivity for magnetic fields or electromagnetic frequencies. Because of its bipolarity, water molecules are easily attracted to each other and *cluster* into formations of fifty to four hundred molecules. Such clusters have shapes and water can *maintain such shapes* for some time. That is how water carries *information,* in other words has 'memory'.



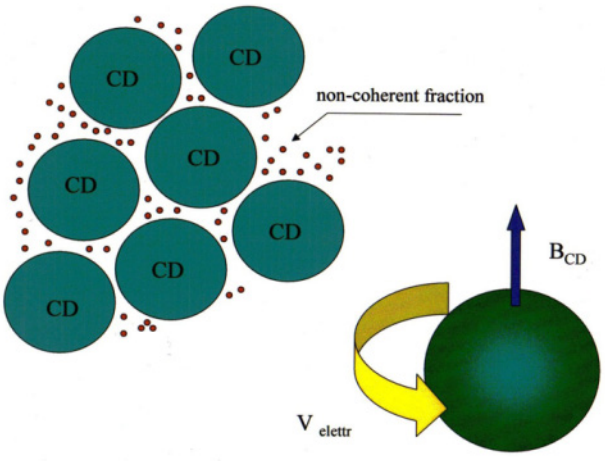
Drawing of the polarity of a water molecule H2O (Oxygen in red and Hydrogen in white). In the middle the orientation of water molecules, influenced by a magnetic bar (green). The negative pole of the bar attracts the positive poles of water molecules. The viscosity of water is influenced by electric fields around it. Sources: www.chemistryland.com , www.planethorizontechnologies.com and www.isbu.ac.uk

These magnetic aspects of water molecules have more fundamental consequences. Pollack (2007) emphasizes that water has a fourth phase. It then is in a kind of jelly structure. Areas where water is in its fourth phase are also called Coherent Domains.

3.1. Coherent Domains in water

'Water is not just passive matter, it's an active process capable of self-organisation. Water vapour thickens into clouds, clouds gene-

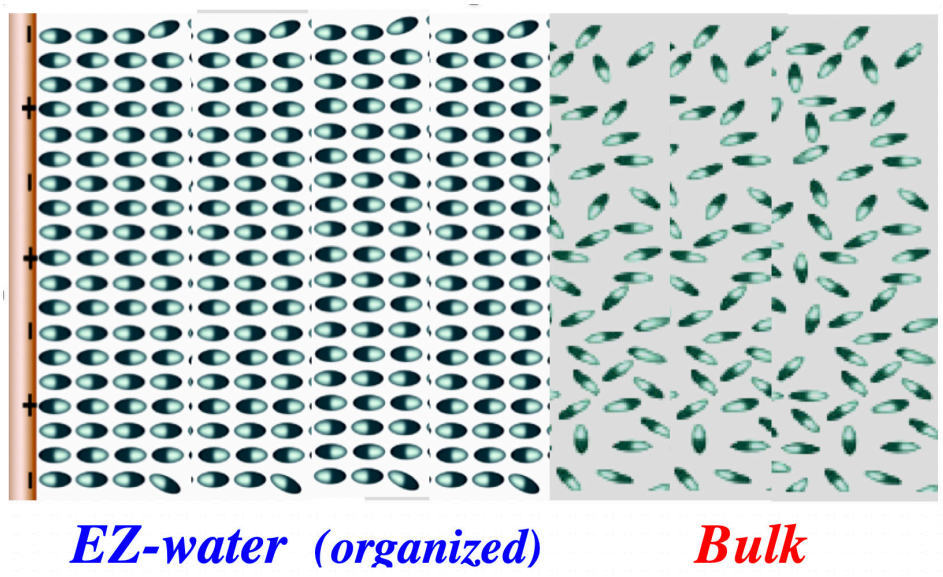
rate tornados. Vortices spontaneously appear in flowing water[3].' At nano-level water is able to organize itself into structured Coherent Domains and unstructured non-coherent bulk water.



Drawing of Coherent Domains of water (CD) with a diameter of around 100 nm. Every CD is magnetically sensitive. Source: Voikov, based on G. Preparata, E. Del Giudice, G. Vitiello, 1988-2014.

Living systems are sensitive to electromagnetic influence

Coherent Domains are formed in all kinds of small veins and tubes. You find them in phloem and xylem of plants or in veins and arteries of animals. Water, saps, lymph or blood always flow through veins and touch the inside of such tiny tubes. At the interface with the different composition of the vein, water organizes itself into a so-called 'exclusion zone' (EZ). In such situations water is more coherent, it is in its fourth phase, it behaves like a liquid crystal and it is able to connect in long chains of the same character. The picture below represents the left half of a vein. Immediately next to the vein the water is organised in the Exclusion Zone EZ and in the middle of the vein you'll find the unorganized bulk water (that's the right side of this drawing).

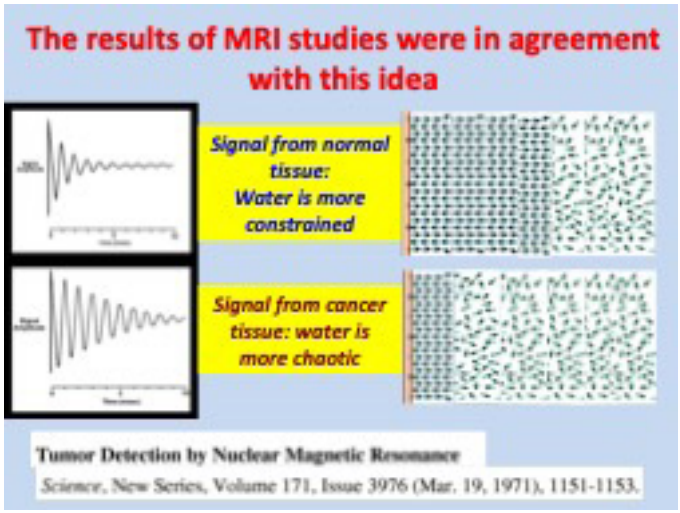


Water self-organized in an Exclusion Zone (EZ), at nano-meters from the other substance of the vein (the pinky border at the left with its positive and negative charges). Slide from Voiko, pers.comm. (2017), based on: Gilbert Ling, Gerald Pollack, Emilio Del Giudice.

Such condition of water-at-the-interface-with-other-matter is the common situation of water in plants and animals. So the consequences of Exclusion Zones in water are relevant for plant and animal life. An Exclusion Zone is rich in ordered negative charge, while the bulk water is rich in protons and builds up a positive charge. This can result in an electric tension between the vein and the watery liquid it contains, of up to 150 millivolt. In addition, water in this Exclusion Zone may donate electrons, a fact that can be verified as coherent photonic radiation. This process shows once more how living substance is sensitive to electrical and magnetic variations.

Incoherent water might indicate activity of cancer

The incoherent and chaotic structure of water could be an indicator for cancer. The slide below illustrates how this relates to the Exclusion Zone. Differences in Magnetic Resonance Images MRI apparently are correlated to the dimensions of the Exclusion Zone. When a disease is active in the body, the Exclusion Zone gets thinner, hence the distribution of electric charges changes, which in turn gives a different picture in the MRI-scan of the tissue.



Tumour detection by Nuclear Magnetic Resonance as compared to different degrees of coherence in water. Further explanation in text. Source: prof. Voikov, pers.comm. (2017[4])

Probably this decreased coherence occurs in cases of stress and other diseases in plants or animals as well. This fact allows us to detect diseases by electric devices.

Vital water

Energy without Information is purposeless. Information without Energy is powerless. Together Energy and Information provide the existence of informed living matter. This is Voikov's view, it brings us closer to a practical definition of vitalized water.

Vitalized water has got its Exclusion Zones enlarged and its internal coherence of Energy and Information improved. Such vitalized water contributes to the health of plants or animals.

Understanding consciousness by understanding water?

In his presentation, Voikov also argues that water is important in 'Coming to Consciousness'. See also appendix 7. He argues that different states of consciousness equal different states of water. If we would 'penetrate' deeper into water science, he says, our understanding of consciousness may also deepen. Water is the most abundant sub-

stance in the Universe capable for self-organization and excitation. It may be the key entity integrating the world both on inorganic, organic and conscious states of matter. If water is the essence of living matter, one may suggest that human consciousness is not only the receiver, processor and emitter of informational signals, but it can directly affect the material world consisting mostly of aqueous systems. The necessary condition for living aqueous systems to function is the availability of enough energy (thermal or infra-red or other) to support the liquid state of water. The same condition is needed for the spontaneous emergence, existence and self-organization of living (= conscious) systems.

3.2. Light-pictures of plant or animal saps

Aquaphotomics is based on a new research technique. It visualizes disturbances in the internal light-order of liquids in plants and animals. It involves a spectrum-analysis of water for wavelengths of 680–2500 nm (nm = nanometer), which is in the near infrared. The energy of these frequencies is weak enough to allow analysis of thicker samples without destructing them. This fact allows samples of plants to be measured in living conditions, without losing some of their life characteristics.

The spectrum of a healthy plant differs from a plant inoculated with mosaic virus. The spectrum of milk of a healthy cow differs from a mastitic cow. The combination of the spectra of milk, blood, urine, tissue etc. of one dairy cow, is called the Aquaphotome of that cow. You get its entire 'light-picture'. Appendix 8 gives a summary of the current state of art in Aquaphotomics, presented by dr. Tsenkova from Kobe University in Japan. It also shows a matrix of the aquaphotomic of a dairy cow.

These studies could lead to a better understanding of disease in plant or animal via its relationship to the structure of water. One day we will know the most desirable or most harmful light-structure for every living system. This technique again shows a beautiful example of the interaction between light and water in life.

3.3. Vitalising water, a new science of water?

Suppose you experiment with a water vitalizer for your cattle and you observe their drinking behaviour. If they drink it more greedily than before the experiment, you may assume the vitalizer treatment to be positive for the cows. Water that is 'flat' - not vital - is not absorbed well in living tissue and your cows won't like it. Such water can contribute to symptoms of dehydration, regardless of how much water a cow or a person would drink.

More than twenty types of vitalizers have entered the market over the last two decades. One of the most recent ones appeared in 2018. Its design is based on the natural flow-form of a shell. It is called 'Turritap'. The Turritap vitalizer is mimicry of the internal shape of the Turritella shell.

The presented model is for domestic use. Larger models are available for farms. Source www.watiswater.nl

The Turritap is an outflow piece of metal (5 cm long) that's easy to screw on the tap. My housemates were surprised by the 'natural' taste of this water, they said it tastes sweet.

Again: what is vital?

In 3.1 we concluded that vitalized water has a high internal coherence of Energy and Information, which contributes to the health of that plant or animal. Pangman and Evans[5] suggest that *only when the elements become organized, they sustain the flow of energy and of in-*

formation necessary for the existence of life. This type of organization refers to molecular organization like that found in crystals – built with repeated geometric patterns that are able to amplify and to conduct signals. Many living tissues and cellular components have now been identified as liquid crystals. Quantum biologists and quantum physicists have begun to define life itself in terms of an organism's ability to maintain the *liquid* crystalline state[6].

We can slightly rephrase the definition of vital water.

Vital water is internally coherent and geometrically structured, sustains the flows of energy and information, it conducts signals and facilitates communication in living beings.

This new understanding of water also suggests that water can be polluted with unhealthy structures or information that prevent the flow of energy and information in living beings. Much of the water we consume from the tap carries unhealthy information that cannot be measured with chemical and physical techniques that are commonly used by drinking water companies. Vitalizing water is of utmost importance.

Vitalizing techniques include one or more of the following principles: *cyclic movements and 'dancing', static magnetism, electromagnetic fields, sound and light* frequencies. Even darkness is mentioned as a preferable condition for water to maintain its vitality. Water is also sensitive to *trans-material information like patterns or intention.*

Water loves to dance

In natural conditions, water swirls and spins. That's how it gathers and organizes energy. The spin of a vortex produces powerful forces. Viktor Schauberger, one of the 20th century's champions of nature, demonstrated that a vortex is capable of gathering energy. Vortices organize molecules into their most energy efficient geometry - that of a *liquid crystal*. In this form, water is capable of storing energy and information.

Vortex design. Source: Dancingwithwater.com

A meandering river is a good example of vortices in action. As water flows down a riverbed, the central channel of the flowing water becomes a huge horizontal vortex, interacting with numerous smaller vortices within it. This is the way a river stays balanced and energized[7]. The movements that vitalize water are comparable to the movement of flowing through the internal shape of shells. Almost all shells turn clockwise. With *flowforms* one tries to make water move rhythmically, according to natural patterns in streams and shells, and such water improves its energetic properties. Guiding water through such natural shapes is the basic principle behind the Turritap mentioned earlier.

Water responds to electromagnetic fields

Electromagnetic fields are generated by electrical current flowing through copper wire coils. This *electromagnetic* treatment is used in practice, for example, to prevent the stench in water pipes of a paper factory in Belgium. How could it work? The electromagnetic influence probably makes the smelling particles smoother or smaller and keeps them in suspension. Some specific molecules will coagulate less.

When water is placed within an electromagnetic field - even a very weak field - also the molecules solved in it will reorient themselves. The *alternating current* of our electrical grid is damaging to water. It causes the ceaseless switching of poles and causes water to heat up slightly. However, if water is placed in a *direct current* or within a static magnetic field, its molecules line up and are able to form a repeating pattern, a regular structure.

Some techniques apply *electrodynamic frequencies*. This is not about an electromagnetic field in itself, but about the frequency of an electromagnetic signal. The Aqua4D method for example (described in 3.4) works with two frequencies in a harmonious musical 'fifth'. In addition to avoiding lime scale, you will find no biofilm on this water.

When cyclical movement (like a vortex) combines with weak electromagnetic forces, water gets a liquid-crystalline structure. If both forces are present together for a prolonged period, water reaches a coherent state where molecules respond cooperatively to external influences. In other words, the water can maintain its liquid crystalline structure even when it is removed from the electromagnetic field. It remains vital.

Sound and Light

Sound and colour – both wave-based phenomena - also exert influence on water. Water can be imprinted with sound frequencies from music, drumming, the sounds of birds and crickets, etc. It can also carry light energy from the Sun. Sound and light frequencies initiate energetic *currents*, helping water to maintain its liquid crystalline form.

Darkness

If light can influence water, the absence of light may be important as well. Strong heat and light are two of water's worst enemies. This is one of Schauberger's statements[8]. Too much sunlight robs the energetic enhancements acquired by water. The longer water sits in the sun, the less energy it has - especially if it remains motionless. Only in the absence of sunlight, in the cool and dark confines within the Earth, would water become fully mature. This discovery explains why Grander technology uses 'original' water from deep (dark) wells to inform and vitalize tap water[9].

Water that has been exposed to the combination of healthy vortices, tiny electromagnetic fields, natural sound and indirect light, may get energetically refined. It is vitalized.

Trans-material techniques

Several *'trans-material'* or informational techniques like patterns or intention, may influence the structure of water as well. Masuru Emoto tried to show this with his pictures of ice-crystals of water that has been exposed to healthy or sickening conditions. He also states that mind power can change the structure of water[10]. Although his pictures meet with a lot of cynicism, it may hold some truth as the electromagnetic fields of environmental conditions or of mind and heart of people may exert a certain influence on the structure of water, as described above. Moreover, other *cymatics* research (how patterns are influenced by sound vibrations) tends to confirm these observations, for example the sand patterns of the German physicist and musician Ernst Chladni caused by sound vibrations, or the work of Swiss pedologist Hans Jenny.

One of the first vitalizers in the market is from Grander. Their technology is largely inspired by Schauberger's ideas. No substances are transferred in this technique, its working principle is *proximity vitalisation*. This phenomenon could probably be explained as 'transfer of order or information'. In the Grander Technology, the source of information is special 'old' and deep water with high life energy and with information of perfect order. You can imagine this transfer when you know water is sensitive to weak electromagnetic fields and is able to hold that information for a while. A bottle (nr 1) with 'ancient' Grander water stood next to a sealed bottle (nr 2) of unvitalised water. After only a few days, the water in bottle nr 2 had copied the information of the ancient water and had been revitalised, albeit to a lesser extent. As the electromagnetic influence weakens at larger distance, the bottles have to be close together: in proximity.

Grander technology is being used throughout Europe, China, Australia, Chile, Brazil, North America and South Africa. Farmers report that it gives food more freshness and taste and a longer shelf life, it provides stronger crops and beautiful flowers, it saves detergents, the water can be recycled to nature, and animals feel attracted to it. A Grander device in a slurry storage tank produces slurry of high quality, with a higher ammonia-nitrogen content and lower nitrate content, resulting in less odour nuisance, if sufficient oxygen is availa-

ble in the slurry facility. Appendix 9 reports on Austrian and Russian research confirming the change of structure of water treated with Grander equipment.

Vitalization techniques can change qualities of water, organize and inform it

The methods that use magnetic, electromagnetic and electrodynamic vitalisation, refer to well-known physical phenomena. Nothing strange to it. Methods based on swirling and trans-material principles of vitalization, have a non-material component as well. They 'inform' and arrange 'order'.

It is important to be aware that some vitalization techniques may carry a human or a technical push aspect. Not all vitalizers are free of intention. This means that in some cases uncomfortable conditions may arise after having a water vitalizer installed. The information in the device may not be harmonious with your personal bio-field. In such case, you better remove it.

3.4. Aqua4D, influencing water with magnetic fields

In the desert of Rajasthan in India it is dry and water contains many minerals, among which quite some salts. The Aqua4D treatment[11] produced several effects. It increased the germinating percentage of the seed from 40 to 100%. The water entered better in the small capillaries in the soil. The plants developed small hairy roots, while otherwise it forms rather woody roots. Irrigation pipelines suffered less accretion of limescale and crops in slightly saline soil grew better. Treatment drastically reduced nematodes in plants. These results are reported from research in Tunisia and India. In the Netherlands vegetable growers, breeding companies and flower growers started with Aqua4D as well. For example, a large chrysanthemum nursery in Naaldwijk (NL) has not steamed the soil in their trial compartment for 33 months. This means they have no serious problems anymore with nematodes[12]. The Aqua4D is also effective in building technology and livestock farming. Investments usually pay back within 1 or 2 years. Reasons enough to explore this technique a bit deeper.

The rhythms of Life

The inventor of Aqua4D, the Swiss civil engineer and guitarist Walter Thut, was willing to reveal how their vitalizing process works. He calculated the appropriate frequencies for water treatment, using both quantum theory and the laws of musical harmony. Thut realised that you can achieve great effects with relatively little effort. Remember sitting on a swing and someone giving you a tiny push at the right time and you go higher and higher. Exposing life processes to specific rhythmic impulses may reinforce internal natural rhythms.

Thut recognized rhythmic impulses in all kinds of life processes. The heartbeat and breathing rhythms in people. He recognised the cosmic rhythms of day and night, of the lunar cycle with ebb and flow, of the regularity of magnetic mass eruptions of sunspots. He identified rhythms both in the microcosm and in the macrocosm. And what is a rhythm other than a frequency?

Each electron, atom or molecule has its own mass, its specific frequency and therefore its own rhythm. Aqua4D technique influences the water with the specific frequencies of Oxygen and Carbon. In all processes in nature, says Thut, the frequency of the electron is the most important, because it occurs in everything. And the fascinating thing is that water vibrates in *harmony with the electron frequency,* only at 15 octaves lower! Which means they can strengthen each other when resonating in sync.

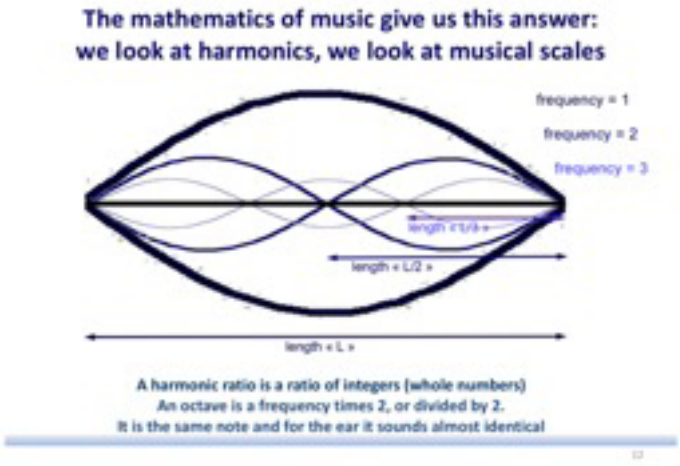
The *frequency* of vibrations is important, but also their *intensity*. The intensity of vibrations in human beings is low as compared to the intensity of the technical frequencies around us, that tend to disturb the natural frequencies. Thut compares our body with a small orchestra that has to play against the noise of a drill. That is why our body often suffers when it is exposed to technical electromagnetic radiations and electricity around us. Some people are more sensitive or allergic to radiations than others, so the qualities of the receiver also are important.

Calculating the frequencies

How did Thut find the right frequencies for optimizing the characteristics of water?

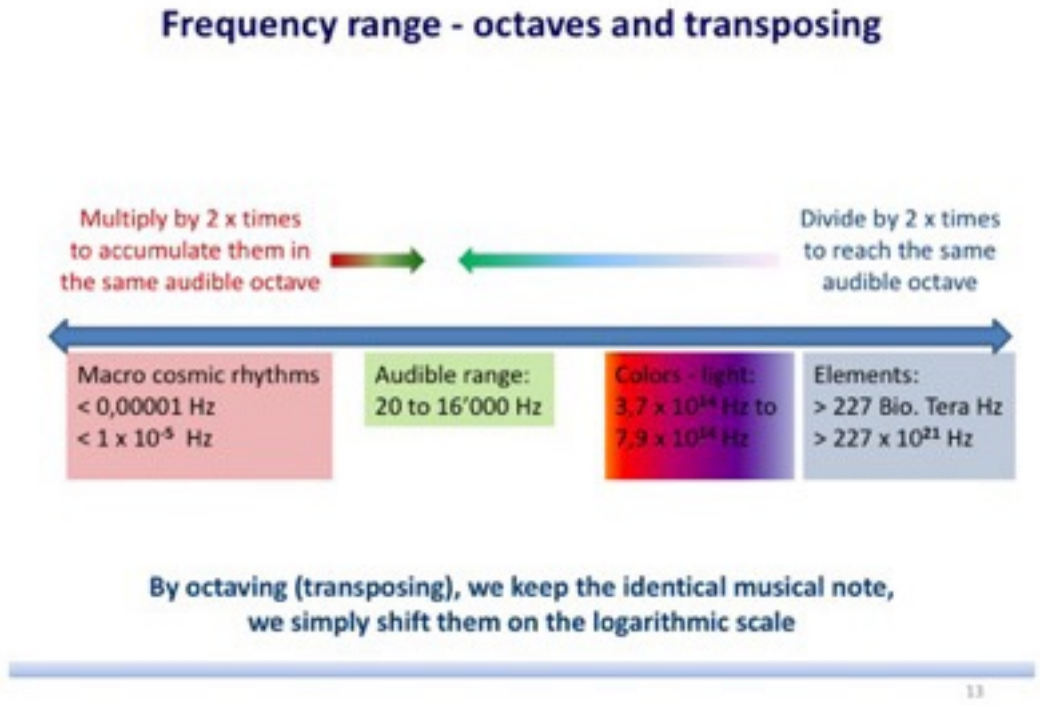
Quantum physics offered him half of the answer. He argued as follows. Each mass has its own frequency. Each particle or element has its specific wavelength L. The basic formula was provided by the quantum physicist Louis de Broglie. He equalled the energy formula $E = m \times c^2$ of Einstein with the energy formula $E = h \times f$ of Planck: $m \times c^2 = h \times f$. This way he easily deducted the frequency f from the mass m of each atom, because the speed of light c and Plancks' constant h are constants.

The other half of his answer came from the laws of musical harmony. Frequencies are in harmony with each other when they vibrate exactly one or more octaves higher or lower. The picture below shows how waves 1 and 2 and 3 are standing between two fixed points, they exactly fit in the same space of length L, although they have different wavelengths. In that situation they are in harmony, they reinforce each other. The ratio between these wavelengths of standing waves exactly is a ratio between whole numbers, as only whole waves can exist in that very space. And this fact is used to calculate harmonic frequencies.



The law of harmony in music. Only complete standing waves, expressed in whole numbers, can vibrate in harmony in the same space L.
Source: Thut, pers.comm. (2016).

Thut used this universal law of musical harmony to transpose the frequencies of all elements in the Periodic Table of Elements into frequencies we can hear. He divided the very high frequency of each chemical element so many times by two until that vibration became audible. This is called *octaving*. Conversely, he worked up the very low cosmic frequencies, like ebb/flood, by continuously doubling that frequency until it also became audible. The outcome of that process is pictured in the figures below.



Laws of musical harmony applied in calculating the audible frequencies that represent the physical elements in the Periodic Table of Elements (in the picture moving from the right to the centre) and some cosmic rhythms as well (moving from the left to the centre). Source: Thut (pers.comm. 2016).

These octaving calculations have led him to a complete scheme of frequencies of all elements, some molecules and of the cyclic movements of sun, earth, moon and planets. All these calculated frequencies correlate with a specific musical pitch (or tone) as represented below in the coloured vertical bars of an entire audible octave of G-G' in the 'Table with elements and molecules' below. For all harmonic chords the 'harmonic ratio' is indicated as ratio of whole numbers, called integers.

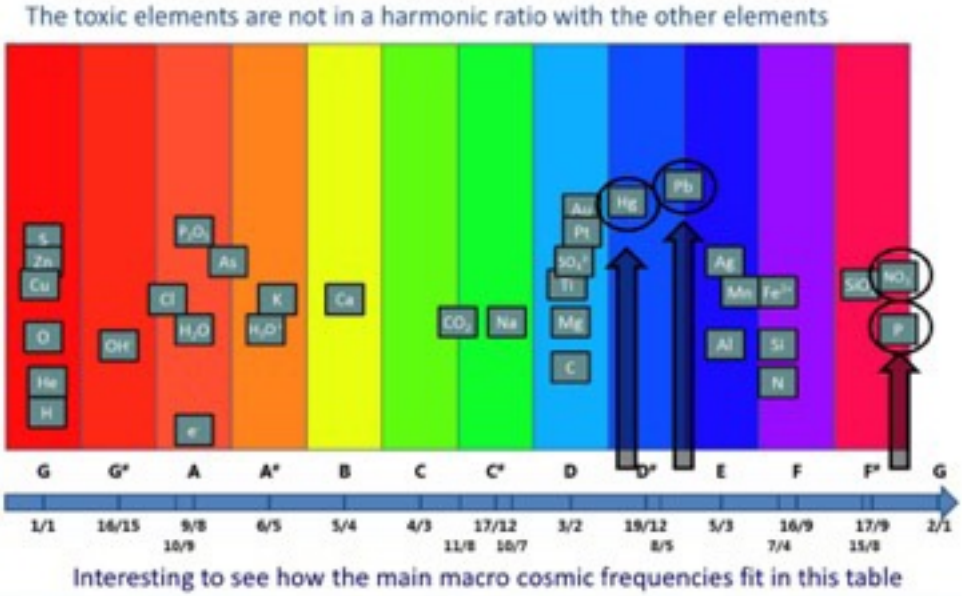
Toxic elements are non-coherent, healthy elements are coherent with harmonic ratios.

When Thut studied his overview, he saw striking aspects that strengthened his trust in his discovery. For example, toxic elements such as lead Pb and mercury Hg, do not coincide with any harmonic ratio. The same holds for nitrate NO3 and pure phosphor P. On the contrary, safe implants in teeth and molars contain elements that are not rejected by the body, like gold Au or platinum Pt, as you find them almost exactly at a harmonic ratio, in this case a ratio of 3/2. Another aspect that stands out is that water and the electron harmonize in the same tone A, with the harmonic ratio of 9/8.

Cosmic rhythms can be 'in sync' with element frequencies

Farmers and gardeners who take into account the cycles of the sun, the moon or planets, may find an explanation in Thut's work. These cosmic rhythms can be in harmony with mineral frequencies with the same audible pitch. Maybe this is what ancient people meant when they said: As above, so below. The lunar rhythm, the frequencies of water and of the electron, vibrate harmoniously in pitch A and increase the intensity of each other's waves.

Table with elements and molecules



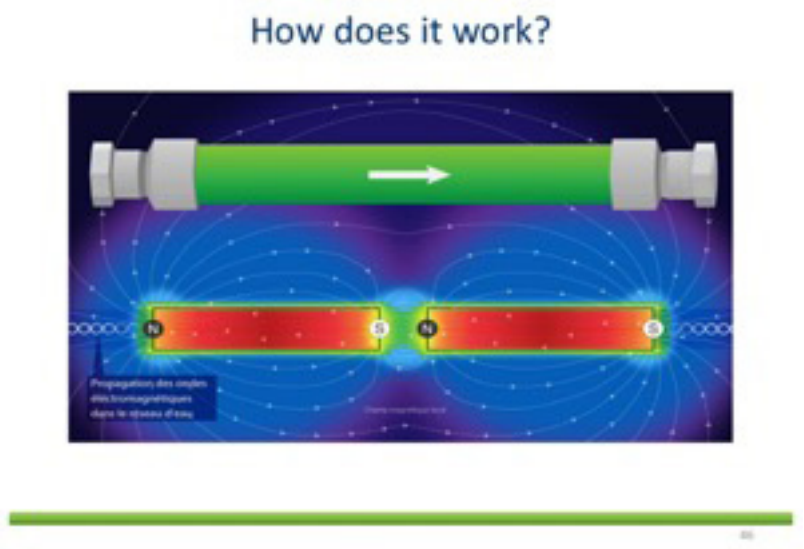
The 'musical' Table of Periodic System of physical elements. The three vertical arrows indicate how Lead Pb, Mercury Hg, Phosphorous P and nitrate NO3 do not coincide with any harmonic ratio, and none of them is healthy for our body. The picture also shows water H2O and the electron (e) to resonate in pitch A at the harmonic ratio of 9/8. Source: Thut, pers. comm. (2016).

Aqua4D treats water with a combination of Carbon C and Oxygen O frequencies under DC electricity (Direct Current). They have chosen Carbon and Oxygen as – with Hydrogen – these are important in all life processes. The elements of Carbon (pitch in D) and Oxygen (pitch in G) together form a musical quint. Interestingly they harmonize as well with the spin of the earth and the tides (also in pitch G) at ratio 1/1. So these external cosmic frequencies would also harmonize with inner plant processes.

It is an interesting conclusion that the natural world can be regarded as an electromagnetic organism, vibrating at low intensities and with all kinds of harmonic structures and coherent resonating frequencies. It resonates with the ancient conviction that the cosmos was audible for us through the Music of the Spheres.

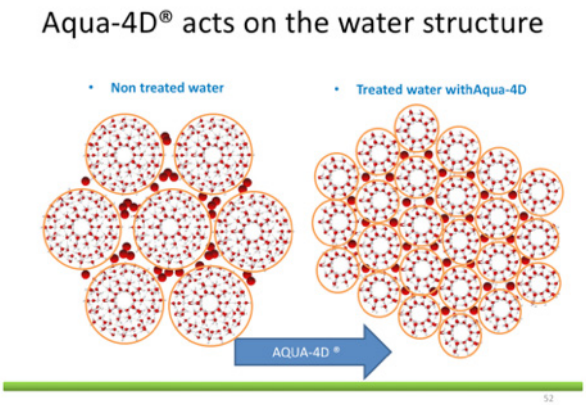
How does this water vitalisation technology work?

Thut refers to several characteristics of water. Clusters of dipole water molecules hold information for some time. Water has a high electrical conductivity. The structure of water can be influenced fairly easily with a direct current electromagnetic field. The picture 'How does it work' shows an Aqua4D device with two magnets that change the water structure.



Simplified picture of the magnetic device of Aqua4D water treatment. Observe its double magnet that is required to maintain the adapted properties of treated water over long distances in irrigation pipelines. Source: Thut, pers.comm. (2016).

The changes in water structure are shown in the diagram below. On the left side the more chaotic structure of untreated water and on the right side the more regular structure of magnetically treated water. Notice the smaller size of the clusters in treated water and its higher 'order'.



The Aqua4D treatment of water apparently results in slightly smaller clusters of water which makes it more 'fluid' and less 'viscose'. It enters small pores more easily. Source: Thut, pers.comm. (2016).

3.5. Relevance and perspectives

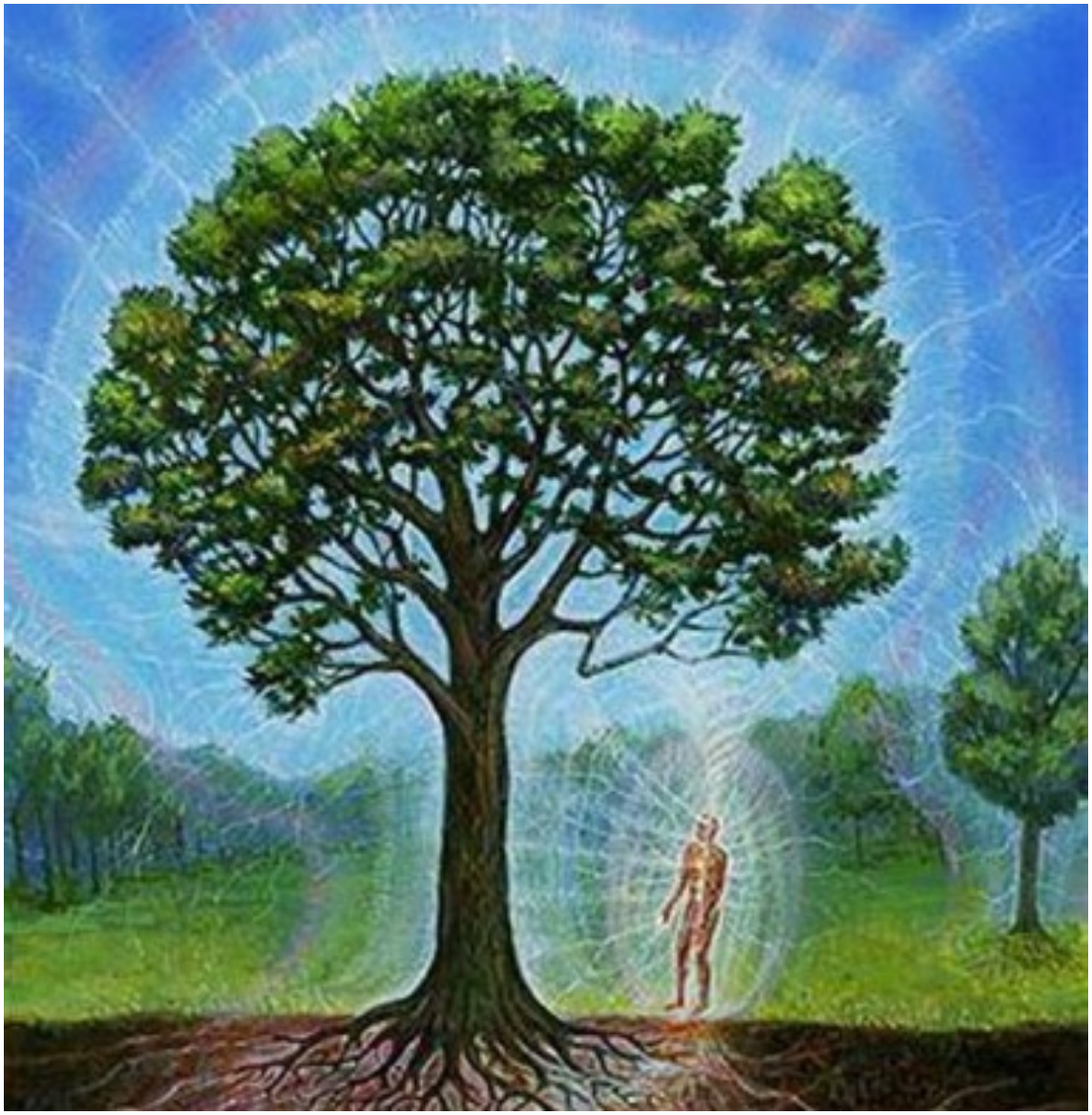
Water is crucial in all life. Water is bipolar. It holds information. It is sensitive to light, sound, magnets, frequencies and even intention. Many questions still remain, but it seems important for mankind to understand it better, to study it from the perspective of wave, energy, information and order.

It also is relevant to understand the meaning of vitalisation of water. Some techniques offered in the market may be based on pseudo-science, but other techniques are definitely worth further investigation as their working principles can be understood with the solid electromagnetic science that is already one hundred years available.

The influence of intention on the behaviour of water still remains an open question. How could that work? Is an electromagnetic explanation strong enough? Can we approach water and nature from different angles and comprehend it in other ways? These questions will be explored in the next chapter.

Footnotes:

1 See also www.watiswater.nl
2 Dr. Singh (2002).
3 Professor Voikov, Faculty of Biology, Lomonosov Moscow State University in Russia, in his presentation at the International Institute of Life Energy, in August 2017, in Germany.
4 Copied from Science, New Series, Volume 171 pp 1151-1153.
5 Authors of 'Dancing with Water. The new science of water'. www.dancingwithwater.com
6 Dr. Mae-Wan Ho describes this in her widely acclaimed book, The Rainbow and the Worm (2008).
7 Olof Alexandersson documented Schauberger's ideas very well in his book 'Living Water' (2013).
8 'Living Water' (2013).
9 See www.grander.com
10 https://en.wikipedia.org/wiki/Masaru_Emoto
11 www.aqua4d.com
12 See www.aqua4d.be



Artist drawing of subtle energy fields of trees and a person. Both fields always interfere and always exchange information, even when you are not actively aware of it. Source: image by unknown artist.

4. Intention, Intuition and Consciousness

Information can be objective and subjective. The objective techniques of broadcasting patterns and of measuring biophotons (described in chapter 2) do not require personal engagement of a farmer or researcher. Subjective techniques however do require direct personal awareness and engagement and some sense of connection. With intuition a person can sense energy and receive information from nature. With intention a person can radiate energy and influence nature. It is almost impossible to imagine man and nature would not be connected.

Inner qualities of people

External information becomes accessible through feeling, seeing and hearing. There is another path for receiving relevant information, a path we usually overlook. Access to this information requires inner qualities of people. Inner qualities include sensing and *presencing*. Being present indicates a state of active awareness of all reality, within and around you. It helps to 'hear' what is needed from you, here and now, also in your garden, farm, or nature area. It brings you into a deeper inner connection with nature-as-it-evolves. This state of mind allows you to sense, to tune into and to experience nature with its energies, its information and its messages.

It is interesting that developing intuition is increasingly recommended to modern managers[1]. A great example is the 'U-theory'. In a paper for World Economic Forum 2010 in China, Otto Scharmer speaks of 'Deep Innovation'. His paper bears the title "The Blind Spot of Institutional Leadership: How To Create Deep Innovation Through Moving from Egosystem to Ecosystem Awareness." The designers of this approach introduce concepts such as 'sensing' and 'presencing'. Presencing – from 'being present' - to indicate 'the deeper inner connection with the future-as-it-unfolds'.

It is little understood how such intuitive techniques work. In spite of little scientific support, such techniques are widely used in farming and gardening, because they work. How? It could work via the activa-

ted right brain-sphere, or via the pineal just below and between both demi-spheres. The physical connection could work as well via the water/light/protein connection in the collagen network, that is found all over our bodies, as a kind of sensitive body antenna. Such suggestions and methods are increasingly being studied. The number of publications about bio-photons, quantum principles, neurobiology, eco-psychology, and philosophy of nature is increasing.

During the course of my investigation of emerging techniques, I got intrigued by the huge variety of intuitive methods used in ancient cultures. I got even more intrigued by the fact that modern communities all over the world also develop such methods, often inspired by ancient knowledge. I have learned some of these methods myself and that personal experience motivates me to talk about it in this book. Some methods still are beyond what current science can grasp, but the effects and results of these methods convinced me of their relevance, also for modern times. I now consider them as a very welcome enrichment of today's farming and gardening technology. I hope the examples in this chapter give you a glimpse of their relevance. Some are 'simply' sensing - and measuring - energy, others relate to a certain consciousness in nature, a relation that requires a certain presencing from our side as well. For me these practices were the most brain-cracking, they require some surrendering to nature, some trust in it. And surrendering is the opposite of control that I as an engineer like so much. It was mind-blowing for me.

Forms of energy

Energy is a key-word in this book. In current sciences one usually distinguishes between *kinetic* energy and *potential* energy. Kinetic energy is related to movement, while potential energy is stored, that means it is available for later movement. Kinetic energy can be thermal, mechanical and electrical. *Magnetic* energy causes movement by its pull or push. Potential energy is stored in chemicals, in food, in elasticity, in the nucleus of particles. Or it is a consequence of distance from the source of attraction, like *gravitational* energy. Human beings can experience such energies through their senses, as sound, as heat, as light and as weight. In the earlier chapters we came across some other types of energies.

Vortex energies can be considered as *both kinetic and potential*: in their typical movement they conserve energy and they can release it. In fact, the energy of electrons and photons stored in plants and food as potential energy is also kinetic, as these tiny particles move at enormous speed within their atoms or molecules. Is it by coincidence that these vortex energies and conserved energies are both kinetic and potential? Hugh Lovel mentioned the fundamental difference between *entropic* energy in dead matter and *syntropic* energy in living systems. Based on such view on life, we could label life energy as *informational energy, implosive energy or as patterned / organisational / coherent* energy. Comparable to the wave coherence in laser light.

Furtheron in this chapter, we will come across *subtle energies*, often compared with energy concepts of ancient cultures as ch'i, prana, ruah, ka, etcetera ….

In current positivist science, the life energy and the subtle energies cannot be measured in the same way we use to measure kinetic or potential energy. Maybe we have not yet found the instruments that fit, apart from our own body that can sense some of these energies. It is through the intuitive experience in our bodies that we know they exist and that they can inform us about the state of health of living organisms. Several methods of intuitive measuring of these energies will be given.

Philosopher and paleontologue Teilhard de Chardin, already in the 1930's, assumed a certain convergence of energy forms in his book 'The Phenomenon of Man[2]' . He suggested that one day humanity will understand the link or the correlation between these different forms of energy, measurable and subtle. As in the end – he thought – they all (can) bring mass and life in movement. Is it correct to assume these kinetic, potential and subtle energies are all somehow connected or related or intertwining? Why do I assume it is? Here is why I think it is an acceptable hypothesis.

Over the last century, scientists have discovered new energies that we did not know before. Like for example nuclear energy, that we now use in hundreds of energy plants. In another discovery, the Dutch researcher H. Casimir found an unknown energy that still exerts force

at zero levels of movement, close to zero Kelvin temperature. In another discovery of some decades ago, photons have become measurable. They can be observed as particles as well as waves. Waves always carry energy (and information). Could a new type of energy be distinguished via the information it carries? Then we would have a new category of *informational energy* indeed. These discoveries show that it would not be wise to exclude the possibility of detecting and accepting other forms of energy. It would be wise to suppose we will be able to relate them to what we already explicitly know. Maybe we travel on the same railway as David Bohm with his implicit and explicit order.

Another way to approach this issue: after discovering the atom, many sub-particles - more subtle particles - have been discovered (gluons, mesons, bosons etc). Particles that subtle that they have almost zero or no mass at all or they only exist for less than a milli-second. Particles whose existence we can only prove indirectly, by measuring supposedly related phenomena, like researchers from CERN did with the Higgs-particle. All these particles have different characteristics, different mass, different frequency, different strings, hence different energies. As every particle can express itself as well as wave with its specific frequency, also *different expressions of their energies* may exist. And I cannot imagine what happens inside black holes, in spite of the fact scientists in spring 2019 published a picture to guide our imagination of what it could be.

I think it is realistic to assume that - in the near future - we will be able to distinguish new aspects or kinds of energy that relate to what we have already discovered and formally accepted, in the same way we have discovered new kinds of particles.

Sensing energy

The sensing of subtle energies requires a bit more explanation, as this technique is used in several intuitive methods. You can sense that subtle energy radiance with your body. I imagine this radiance to look like subtle magnetic fields around my body and around trees, plants or animals, like on the drawing in front of this chapter. Most people - myself included - feel such subtle energies best in their hand

palms, others on their chest or in their forehead. Using a small device to strengthen or visualize the bodily reactions on the sensed energy, is called *dowsing.*

Obviously, this method is subjective because the senser or the dowser is involved, with both mind and body. The measurements get less subjective when the same field, plant or tree is observed by several people at the same time. When these measurements are compared, and if they fit well, the measurement becomes an 'intersubjective' assessment. Gradually, in this way, a pretty objective documentation of energetic changes is being built up.

The technology of sensing radiation - of subtle energies - is called *radiesthesia.* Radiesthesia is an ancient experiential science about the subtle energetic dimensions of reality. Many farmers use it, they trust the method. This is the world of Bovis values of food, land and water[3]. Subtle energy cannot be understood (yet) as one of the four nuclear forces or as other known types of energy, but it can be observed nevertheless. It can be measured intuitively, directly with your body, or with help of a Lecher antenna, a biotensor, a pendulum or a dowsing rod in your hands. Subtle energies may, one day, be understood as kinetic energy of particles induced by electromagnetic fields[4].

When I saw farmers and gardeners using this method and taking management decisions based on its results, I realized their families depend on it. So I started to take it more serious and I trained myself in some of these methods. Some of these were already rather mature. Reference standards have been developed, to distinguish between sick-normal-healthy energy levels. For example, Bovis values are widely accepted as indicator for various degrees of health. The users of these techniques know how to interpret their measurements. Gradually a rather objective and reliable body of energetic knowledge is developing. In general terms, the more energy, the more vital, the stronger its radiation and the easier you can sense it.

For example, above a soil you can sense layers of different soil energy densities at about 40 cm, at 130 cm and at 170 cm above ground level. For a first impression of an unknown soil, you best focus on the upper side of its top layer. With an average quality soil, you will find

the top layer at about 160 cm above ground level. If this layer is detected closer to ground level, the soil is not very vital. In this way, for example, one can get a quick impression of the vitality of a farmer's field, by standing in or near it, just for a moment. Learning to feel this subtle energy offers us an immediate and simple first impression of the vitality of a soil you wouldn't know otherwise.

Farmers, gardeners and researchers as well as the food processing industry, supermarkets and consumers can make good use of this subtle energy aspect of vitality. It is suitable for assessing energy and information levels in the soil, the water, the plant, the cow, the manure, the milk, the cheese, i.e. all elements in the cycle of dairy farming. And the measurement results provide a farmer, a gardener or a forester with management suggestions.

Let us have a look at sensing the energy of trees, without any intention to influence them.

4.1 Trees react to music

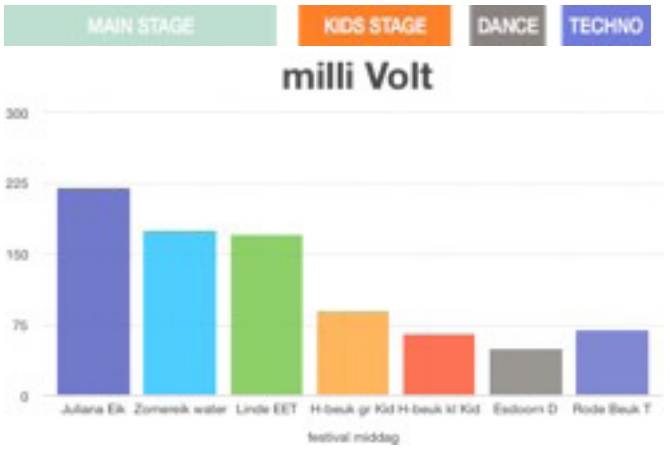
"Do trees suffer from the loud music during the festival?" Organisers of a City Festival in 2016 in the center of the Netherlands got questions of nature-lovers about the implications of noise on some old trees in the City Park. The organisers asked me to find an answer to the question. An interesting challenge. I tried it by combining three different approaches. Firstly by measuring the electric tension between root and leaf (in millivolt). Then by recording and analyzing the variations in the music of a midi synthesizer that responds to the electrical resistance in the tree. As a third method I sensed the subtle energy radiation from the tree trunk, with my hands.
Methods one and two use conventional electrical measurement devices. The third method is less known, it is intuitive and subjective. I describe these methods in some more detail after presenting the outcome of this experiment.

Seven trees were measured three times: four days before the festival, during the festival and finally three days after the festival, when everything was calm and clean again. All days the

measurements were done in the afternoon, in similar weather. Clear differences in tree vitality appeared. After all measurements I could conclude: All trees react to music.

To my own amazement, the outcomes of the three methods confirmed each other. Therefore it is sufficient to present the graphs of one method only: the electric Volt-measurements. The upper line mentions the type of music closest to the tree. The meaning of the bars are explained under each graph below.

Four days before the festival.
Both oaks (at the left, blue) at the Main stage are very weak. The linden tree (green bar) also at the Main stage, scores reasonably while the other four trees (hornbeam in yellow, beech in red, maple in grey and a red beech in purple bar) are reasonably vital.



During the festival.
Both oaks (left bars) have improved a lot. The linden tree (green bar) also improved slightly. The 4 other trees in the spheres of KIDS and DANCE and TECHNO music drop an average of 100 mV in electric tension and thus were weaker.

Three days after the festival.
The vitality of all trees has recovered and both oaks maintained the improvement.

Indeed all trees reacted to music. More precisely: two weak oaks, near the MAIN stage, got strengthened immediately, two beech trees (near KIDS stage) and one maple (near DANCE stage) were stressed, and a red beech (near TECHNO music) had a hard time. Three days after the festival, however, all trees had completely recovered and the originally weak oaks had maintained their increased vitality.

Description of the three methods

Method 1: measuring electric tension between root and leaf.
Already for over 80 years, electric current in plants has been measured and analysed. It is only recently this phenomenon regained attention in forestry and horticulture.

With a simple Voltmeter connected to root and leaf, you can easily determine the electrical tension between root and leaf. Source: www.pixabay.com.

Imagine the saps flowing through the trunk: nutrients in water flow from the roots to the leafs while excited electrons flow from the leaves down through the whole tree. Both flows contain electrically charged ions and electrons: so there is electric current and we can indeed measure the related electric tension in milliVolts (mV). The measurements reported in literature[5] and my own measurements reported here confirm that the electric tension in weak trees is less than 50 to 100 mV. Vigorous trees show values above 150 to 200 mV, up to 500 mV. That is half a volt, the voltage at which a LED can light up. This means the higher the voltage measured, the more vital the tree.

Method 2: Analysing electric resistance in a tree, signalled by a midi-synthesizer

'Music of the Plant' devices. The left picture shows the older version. The picture at the right shows the 2018 version called 'Bamboo'. Source: www.damanhur.org

The 'Music of the Plant' device has been developed by members of the Damanhur nature community in Northern Italy. They could experience trees with their hands and eyes, but also desired to use their ears. They knew that listening enters the mind more deeply than looking. So they searched for a way to convert signals from trees into sound. Plant electricity was their solution. To be more precise, it is the internal resistance of the plant to electrical current, called the *impedance*. In the technical world of music, the MIDI-synthesizer is a well-known device that converts changes in impedance into music tones[6].

You connect a 'Music of the Plant' device to the the trunk at soil level and to the leaf at the top of a branche you can reach, like you do with the Voltmeter. I recorded the music for one minute and analyzed it afterwards. With a stopwatch I counted the seconds of silence and the seconds of playing time - that is, the time when the tree is active and shows variations in resistance. Then I calculate the percentage of playing time for each tree. The percentages of time that music was heard during that minute, ranged from 43% to 79%. My hypothesis is that this percentage of playing time can be considered a second indicator of the tree's vitality. The higher the percentage of music playing time, the more vital the tree, I assumed. One warning though. Always use your eyes as well to properly observe the tree. Because a tree in great stress also gives a lot of signals, showing great activity.
This method confirms the results of the electric Volt measurements, but is less pronounced in the differences.

Method 3: Sensing the subtle energy radiation of a tree, with your hands

Feeling the soft energy radiance from a tree. The purple circles drawn around the trunk indicate where you feel the energy belts around the tree (with your hands or chest). Source: image by unknown artist, www.pinterest.com

What information do we get from these bodily measurements? Observations of many people have learned that the tree is healthy if you feel its radiation at or beyond its crown projection. Looking from above, a circular crown projects about a circle on the ground. If a tree is weak, you will sense the energy radiation closer to the trunk, within its crown projection.

So every time for every tree, you just measure and note down the distance between the trunk and the outer border of the energy belt you feel. And you compare it to the distance of the crown projection from the same trunk. When you enter all these notes together in a graph, you get a quick overview of the reactions of the trees on the music performed close to them. These graphs look very much like the mV-graphs of the same trees.

Reflections

All three methods of observation have led to very similar conclusions. Two of them are rather objective. This builds confidence in the reliability of the unusual way of measuring subtle energies. All three methods are cheap and simple, everybody can apply them. And these methods can be refined further by more frequent measurements and by following a tree - or any plant - during a longer period of time, under different styles of music.

The most important conclusion for the organizers – and for the tree-lovers - is that trees do indeed react strongly to different kinds of music, but that eventually the trees do not get sick or - on the contrary - have got an impulse in vitality.

Do the trees respond to the music or to the mood of the people? My first response would be that the different musical styles attract people who are happy with 'their' preferred music. So the mood-factor would be less relevant. The trees then react stronger to the music than to the mood of the audience. Later some people, who attend many festivals, told me that we shouldn't underestimate people's moods as a relevant factor, as the state of mind may also exert its influence. Some music, like techno they suggested, may generate or amplify anger of the audience, and that could have a disturbing ef-

fect on the tree. Other types of music - like played at the Main stage - evoke more peace and quietness in the audience and could have a more beneficial effect on trees.

A series of questions remains open: Do the vibrations in the soil also affect the trees, or is it just about the sound waves through the air? Do all trees react the same or can one tree be happy with Techno and the other tree get stressed? Does classical music of Mozart or Bach have a better influence than Jazz or Rock or Punk? Which music can you offer to reduce stress on trees or especially to improve their vitality?

These questions are an invitation to you as reader to start experimenting yourself. Some farmers or gardeners already offer music to improve the vitality of their crops. Agricultural advisor dr. Yannick van Doorne, active in France and Belgium, works a lot with music[7]. To support plants he advises classical baroque with rhythms of 60 to 72 beats per minute. If possible, the music should have 432 Hz as its basic pitch, he suggests. This kind of music proved to be very effective in strengthening the health and growth of plants in general.

4.2 ECOintention, management of energy and information

There is another aspect to subtle energy, apart from only sensing and measuring it and deducing management suggestions: you can make active use of it to support your fields, crops or animals energetically. Particles simultaneously are energy packages and these energy packages follow our attention, intentions and convictions. You can strengthen the energy of a plant or animal by guiding your attention to it. ECOintention[8] is an example. Before 2016 it ws called ECOtherapie. The method has been developed by Hans Andeweg and Rijk Bols. Andeweg got introduced into resonance therapy in Germany around 1980. This method was developed to heal forests suffering from acid rain. The remote treatments with life energy and information did work and forests became more vital. Based on these experiences, Andeweg started a training programme for foresters, gardeners and farmers in the Netherlands. His lessons evolved into a full-fledged 4-year vocational training, which is officially recognized by the

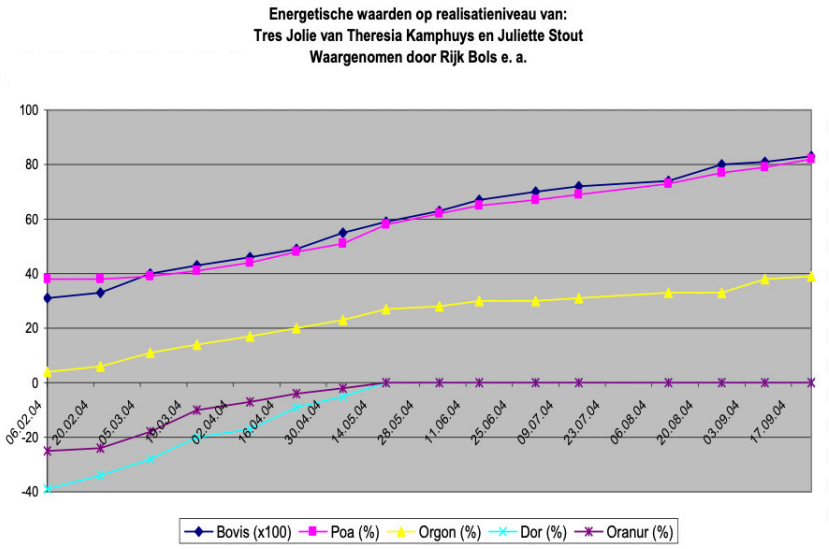
Dutch Government. I was one of the students in their early years, in the beginning of this century. Gradually, interest for this type of education also grew in the wider business community, and the method even supports events and concerts, not only farms[9].

Tangible results of ECOintention

The technique is quite well developed for farms, gardens and even nature areas, such as the large nature reserve 'Geopark de Hondsrug' in the Netherlands, large *finca's* in Costa Rica and *moors* in the United Kingdom. The effects are visible and measurable in more vital, healthier nature parks, often with increased biodiversity. At farms the treatment can result in higher yields, quieter animals, more relaxing time for the farmer family, and satisfied staff. Altogether it provides positive financial results. This style of treatment supports farms or ecosystems towards inherent complexity and stronger robustness. In 2005, I made a synthesis of 35 reports of ECOtherapie students who treated a farm or a garden. Out of 17 dairy farmers 50% mentioned 'healthier cattle' and 'quiet animals' and 25% mentioned 'lower veterinary costs'. One dairy farmer reported his veterinary costs per cow had decreased from 1100 euro to 500 during one year of treatment[10] . Out of 18 crop farmers and gardeners, 90% mentioned 'higher yields', 25% 'few disease problems', 15% 'less weeds' and 10% mentioned a 'mediocre yield'. A grower of shrubs noticed that his plants had a longer shelf-life and he had less problems finding paying clients. All farmers reported "I am, more than before, the pillar of my farm". I didn't find any disappointing comments.

One Dutch pig grower precisely registered all his data[11]. After one year therapy his sows had one piglet more every throw and he had saved 7000 euro on veterinary costs. Fodder conversion ratios slightly improved from 2,63 to 2,44. This means that for every kg of meat he needed a little less concentrate. Appendix 6 provides you with the summary of another impact research of the ECOtherapie method.

ECOintention insists on formal documentation of all what happens. The development of the project is represented in clear graphs showing the trend of each energetic parameter. Below is a graph from my personal ECOtherapeutic treatment of a fruit garden[12] in the centre of the Netherlands.



Graph of five energy trends monitored during the 7 months of energetic balancing of a fruit garden. The negative energy components (the two lowest lines) have been reduced to zero in 3 months time. The energy levels of Bovis and the % fit with the environment (the two upper lines) have been doubled and the general energy level (yellow line in the middle) has risen from 04 to 39.

I treated this garden at a distance, from my office desk at home. During the treatment season I monitored the energy levels of their soil in situ and concluded they were rising. These measurements in the garden were verified by two colleagues and by a supervisor. In the end we had to climb a kitchen ladder to reach the third energy level. It was extremely high, around 2.40 meter above the soil. The energy also felt smooth and soft, stresses had clearly disappeared. The garden is still functioning very well today.

It happens that animals take over worries and tensions from their owners. Animals react even more strongly than human beings on earth vaults and water veins that cross their housing. They do not feel safe and relaxed in an energetically stressed barn. The life forces and energy flows of trees, gardens, crops and animals can also be blocked due to increased environmental pollution. This results in a reduced vitality and a greater susceptibility to diseases and pests. Such stressed places and blockages can be treated by managing earthly and cosmic energy flows[13].

ECOintention uses a set of parameters to assess the condition of any system in terms of energy and information. The parameters are intuitively measured by dowsing. The vitality of a living system is determined with four parameters.

- Measuring the grounding of the system on a scale of 0-100%.
- Measuring how internally coherent its information field is, on a Bovis scale between 1,000 and 20,000 Bovis. Values above 7000 Bovis are generally considered to strengthen health. (More on Bovis in appendix 15.)
- Measuring to what percentage the system fits with its context and the percentage of the required life energy that is available.
- Checking the percentages of blocking or stressing energy.

The ECOintention process

The duration of an ECOintention project varies between 7 to 12 months. You start by *setting goals and a time-frame*. The clearer and more focused this is, the greater chance of success. An energy scan at the start, reveals the vitality of the farm or the nature area before treatment, also whether the goals are achievable and how much time it will take to get the farm system energetically coherent and vital. For this scan, a map, a floor plan or the name of the project is used as 'witness' or 'resonator' to establish an energetic connection with the morphic field of the project[14]. Graphics with the data from the scan – like the graph of the fruit garden above - provide information about energetic blockages, stress, levels of healthy life energy and of self-organization of the farm. These data are being compared to the target values of the farm or the ecosystem.

Before balancing, the practitioner shrinks the project map and creates a *holon* around it - represented by an unbroken circular line - of around 5 cm diameter. A holon acts as an energetic resonance box. Using that holon and their intuition, the practitioner establishes contact with the farm system. They ask the project what it needs to strengthen its vibration. This strengthening is informed with items of similar or higher vibration, such as colors, crystals, music, mandalas, symbols, Bach flower remedies, homeopathic remedies etc. In this way they remove blockages, harmonize stress, add healthy life energy and increase the project's self-organizing capacity. In this way

the practitioner also picks up information from the farm.Balancing is carried out several times per week, using the same floor plan as used for the first scan. Every 11-14 days a new scan shows whether the energetic values are increasing and the project improving. Depending on the results of the latest scan, items from the toolkit or other energetic interventions are offered. The practitioner places each energetic item in a specific position on the holon. This connects the project's energy fields with the energetic intervention chosen for the treatment. At that moment the transfer of life energy and information takes place and the vitality of the project improves. The vitality of the project is monitored in situ, regularly. During the balancing treatments, the farmer concentrates on their affirmations, to add direction to the energy delivered. The results of the new scan are presented in a chart and explained to the farmer, and checked with the on-farm experiences of the farmer during the treatment.

Remote healing

According to ECOintention, this technique of remote healing is rooted in radionics and resonance therapy. Lovel suggested that remote healing in turn is rooted in the quantum principle of entanglement. In radionics only radionic equipment is used for healing on a distance. I refer again to appendix 11 for the discovery and history of radionics. In resonance therapy symbols and fractals are added. In ECOintention the practitioner assembles a personal energetic and informational toolkit, with colours, crystals, homeopathic treatments, Bach flower remedies, symbols and an orgone energy beamer. In ECOintention both the practitioner and the owner or farmer is intensely involved in the balancing process. That personal involvement is neither the case in radionics nor in resonance therapy.

Resonance might work via similarity of vibration or similarity of form

Resonance is based on vibration and energy. Every organization and every eco-system contains energy and has a unique and characteristic 'own' vibration. Resonance depends on the similarity of vibrations: when an external force supplies a vibration that corresponds to the 'own' vibration, the energy of that object is amplified. At that mo-

ment you are in 'flow' together, you feel it clicks. Just like two equal tuning forks do. With resonance, you can achieve great effects with relatively little force, if the impulse is provided at the right timing[15] You can push a swing to a great height by giving a small push every time at the right moment. A gentle breeze can cause a large suspension bridge to 'swing' by blowing against it with a certain rhythm.

Resonance happens not only with similar vibrations, but according to the theory of morphic fields, also with similar shapes. Identical forms resonate and reinforce each other by morphic resonance! Their distance doesn't matter. This principle is applied for example by using of a floor plan or an aerial photo of a field as a witness or resonator. Their identical shape allows resonance to happen. Quantum physics may help explaining this phenomen, entanglement probably being its key principle.

The impact of intention understood as quantum process

The impact of intention can be very real, it can influence behaviour of subatomic particles. Repeated intentions, also called affirmations, can create an 'attractor'. It could influence the functioning of our brains, working 'at the quantum border'. That's where the physical world of our body and brain meets our immaterial mind with its intentions. At this quantum border, the brain functions at synapses, the very small distances between nerves endings. Neurotransmitters 'jump' over these openings, or they do not, and so deliver signals to the brain and to the entire body and even beyond the body. Because of its tiny dimensions, this can be approached as a quantum process. Such processes are sensitive to intention, but also to magnetic fields for example.

Information is not the same as energy. If you listen to the news you get information. Energy is needed to convey the message to the listener. If you can't hear the message, you turn the television louder and add more energy. This makes it easier to hear but doesn't change the information. With your heart, you give life energy and – according to ECOintention - you get in touch with the zero-point energy field. With your mind and intentions, you influence the morphic field with information around the brain.

The highest impact on other objects is achieved when you combine the life energy from your heart with the information from your mind, while focussing on the other object. That is when heart and mind are in sync. In other words, electromagnetic vibrations plus information together cause physiologic effects.

4.3 Measuring vitality of Milk and Manure

The vitality of soil and fodder determines the vitality of the cattle (that feeds upon the soil) and of their milk. It also determines the vitality of the manure, which in turn feeds the soil again. So the way a farmer treats his land, his water and his animals is important for the quality of our food. The quality of milk, cheese and meat products that you buy at a farm, directly influences your health as consumer. Of course the food processing industry and the supermarkets also have great influence on your food. They may conserve, improve or destroy the food quality from the farm. A complete insight in all aspects of the farm and the food cycle would give a much better picture of the quality of the food we consume.

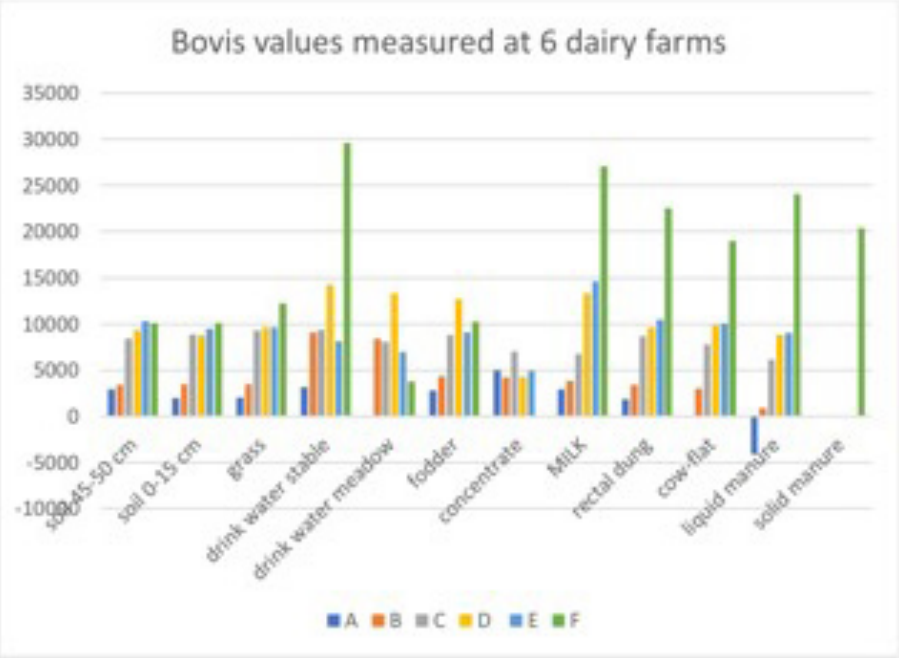
But still, we would miss something crucial in the current way of food quality assessment. With current quality indicators it is difficult to differentiate between products grown in different ways. The vital product of a serious and very good farmer disappears in the mass of the average products. For example the energy and information of food from genetically modified crops differs much from organic farm food. Unfortunately, these differences are not measurable with conventional methods. Therefore it is relevant for consumers, restaurants and for supermarkets to develop complementary quality assessment methods: methods that add Energy and Information indicators to the conventional Mass indicators. Several methods, as chroma's, crystallisation patterns or photographic techniques are emerging in the market. But their calibration, that means the interpretation of the patterns or pictures, is not yet objective enough. Bio-photon studies (as shown in 2.2) are effective and objective but these still are rather expensive.

Frank Silvis, from Vortex Vitalis[16], developed a simple way to assess Energy and Information dimensions in food and farm. His intuitive

measurements – by dowsing their Bovis values – help clarifying the states of 'vitality' and 'order' in the entire farm cycle. He explains the interpretation of Bovis-values in appendix 15. Many farmers also use dowsing, they trust the method. Silvis uses Bovis values as indicator for 'Life Energy', and Information levels as indicator for 'order' in our food. He also assesses 'negative information' indicating to what degree metabolism processes are being inhibited[17]. Silvis is increasingly invited by farmers in the Netherlands to assess the vitality of diverse aspects in their farm cycle.

Example of measuring vitality in six dairy farms

To get an impression of what can be done, below you see one of his graphs. This graph represents his Bovis measurements of twelve items at six dairy farms (A-F). The interpretation of these data is quite detailed and technical. You can skip reading it, unless you want to get an impression of their added value to conventional measurements of the nutrient cycle. It also helps you to get acquainted to the meaning of Bovis values and to correlate these values with various farm management techniques. Last but not least, it shows how much additional information is available and accessible on the farm.



Bovis values (upper vertical axis) of 12 aspects of the nutrient cycle (horizontal axis) in 6 dairy farms (encoded A-F).
Source: www.vortexvitalis.nl

In general Bovis values below 3000 indicate the item is degraded or sick. Food or fodder below this value should not be consumed. Healthy food ranks above 7000.

The *soil and grass quality* of conventional farms A and B (both slurry injection) are very low (1,960-3,480 Bovis). Slurry injected at conventional farm C is of a much higher quality (8,380-9,300); almost as good as in both organic farms D and E (8,730-10,300 Bovis), where only slurry spraying is applied. The highest Bovis value occurs at organic farm F, where the grass has an average value of 12,260 Bovis.
The *drinking water quality* of farm A is remarkably low. Farm D uses groundwater and has a vitaliser for both the water in the barn and in the meadow. This is reflected in the higher values of 14,200 and 13,300 Bovis. Farm F uses drinking water and a vitaliser for the water of the cows in the barn (29,600 Bovis). In the meadow the cows drink surface water from a ditch, with poor quality (3,750 Bovis). The other dairy farmers all use groundwater for their cows.

The silage of A and B is of low Bovis value although slightly better than from their grass. Farm D silage has the highest Bovis value: 12,700, as it is enriched: every 1000 kg of silage is enriched with 6 kg of carbon (impact powder) and 1 litre of seacrop (concentrated seawater with a reduced amount of sodium and extra magnesium and with all microorganisms that are present in the sea). The conventional farms A and B also feed corn and soya to the cows. The average Bovis value of the maize is 3,300 and that of soya only 1,655 Bovis. These two values are not shown in the figure.

The Bovis values of *concentrate* do not do justice to their name. Farm C shows the highest Bovis value (7,000 Bovis). He uses a special formula of concentrate. The concentrates at other farms show lower quality (4,200 to 5,000 Bovis). Farm F never uses concentrates, as it is a processed product and it is not 100% fitting well the pens stomach of the cows. They use a mixture of herbs as supplement (19,800 Bovis). They also give their cows Celtic sea salt (18,900 Bovis) as natural minerals, and they feed a grain combination of 14,300 Bovis.

Milk. In terms of Bovis value, farms A, B and C, are in the lower and middle range. Organic farms D, E and F in the high range. The milk

of farm F with a Bovis value of 27,100 stands out. This milk is used to produce whey (29,400 Bovis), ghee (35,500 Bovis) and cheese (38,200 to 40,600 Bovis). These products show an exceptionally high vitality. The cheeses have already been awarded several times because of their delicious taste and high quality, both by average consumers and chefs de cuisine. This fact suggests that the Bovis value is an interesting indicator of food quality indeed, if only for its taste.

Manure. The slurry at farm A (minus 4,100 Bovis) and farm B (880 Bovis) scores very low. Part of C's slurry comes from other farms. The manure quality of farm F stands out again, this includes solid manure. It has a significantly higher life force value (20,400 Bovis) than the grass and the top layer: so one may conclude that solid manure supports and strengthens land and soil life.

The *information* values measured also offer clear insight in the internal 'order' of the products and generate suggestions to improve the nutrient cycle. But it would take too much space to also present these graphs here. You can study them elsewhere .

All this information is available on the farm, the point is to get access to it. And getting access is not difficult. The only difficult aspect is the personal conviction – or prejudice – of the farmer, or the researcher or the food processing company. It is about trusting your intuition and adding the acquired information to what you know already. It also is about the distinction between knowledge and knowing, between intellect and conscious intelligence, in popular terms between left and right brain.

4.4 Intuitive listening to water

Frank Silvis is one of those sensitive people balancing their left- and right brain capacities. For years he was head of the engineering department and later director of a regional drinking water company in the Netherlands. Silvis was confronted with residues of medicines and crop protection agents in drinking water, a big issue in many water systems. The current water purification plants are not able to physically remove all residues nor remove the negative information

carried by that water. In 2008 Silvis discovered that water quality can also be viewed from an energetic and informational perspective. He participated in the 'Foundation Water, carrier of Life'[19] and discovered he could measure the life energy of water by sensing with his body. This fascinated him so much that he started his own company: Vortex Vitalis. He works with a combination of dowsing and intuitive information from nature. Some say this information has no specific source in space, it is just available everywhere, as in a holographic system. Others are convinced the source of intuitive information is metaphysical. Some people experience this metaphysical information as communication with nature beings. In India such beings are called deva. So many stories are told about intuitive information that I felt the need to explore it further.

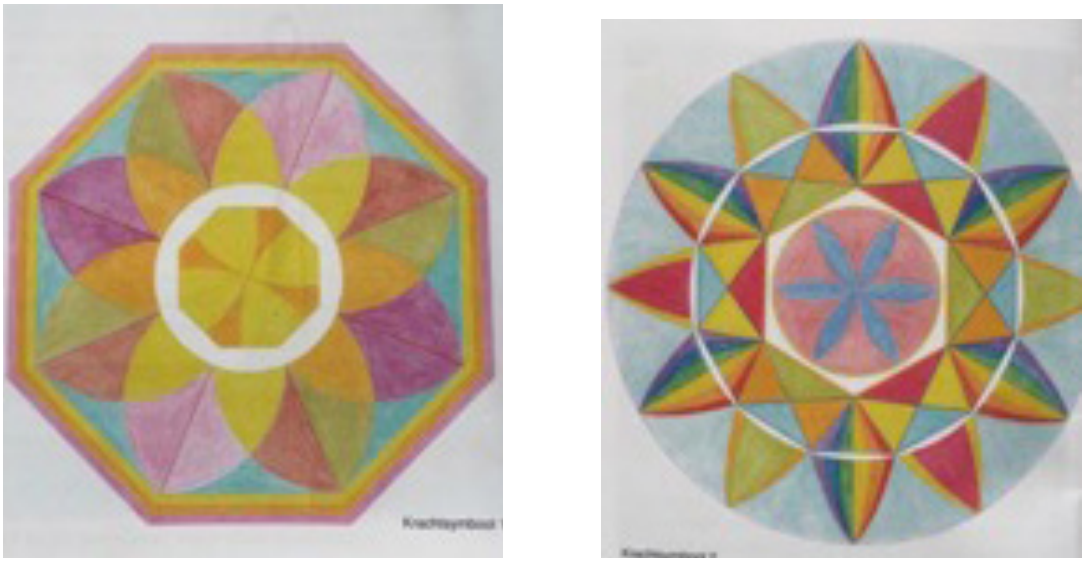
Silvis has developed 'a very nice and fruitful collaboration with water beings'. These nature beings are specifically committed to water. They always like it when people are aware of them and make contact: it gives them energy. The larger the variety of water plants, the more dynamic life is in and around the stream. The more fish in the brook, the more energetic nature beings become. The information Silvis receives is original and very practical. Moreover, the impact of this information can be tested. The measurements of life energy and negative information can be repeated and confirmed. I got convinced that something real is happening here.

In the world of water-management, the quality of water is determined by chemical and micro-biological disciplines. Most people are not aware of the added value of information. Silvis has measured the quality of drinking water in many places in the Netherlands. Despite the excellent bacteriological reliability, he did not find any drinking water that met his energy criteria. It was striking that water from 'holy wells' usually did meet these criteria.

One of the first instructions he intuitively received was, to design a sticker with an energetic symbol to vitalise tap water. Of course he measured the energies of the water before and after putting this sticker. Such stickers indeed increased the energy level of drinking water and greatly reduced negative information and electromagnetic information in the water[20].

Purifying water from medicine residues

The information aspect of water is very relevant in relation to medicine residues that are difficult to remove entirely from the water. Additional purification – after conventional cleaning - should extract the remaining medicinal information from the water before it is discharged into the surface water. Silvis intuitively received suggestions to achieve this: an octogonal power symbol for an extra purification step of wastewater, as well as a circular power symbol (both images below). Such power symbols do not physically remove the chemical residues from the water, together with a third symbol they bring these residues into a higher vibration. This neutralised their negative effect, nature beings informed him.



Octagonal and circular power symbols for the neutralisation of medicine information in wastewater and drinking water. Source: Vortex Vitalis.

As said, Silvis measures, calculates and draws graphs. His approach makes the subtle energies and the effect of intuitive instructions more tangible. He wondered what exactly has contributed to the increase in life energy of the water. When he asked the water beings, their answer came promptly: "Four factors are important: movement through the flow forms, the influx of cosmic energy and the work of nature beings and elemental beings."

"The cosmic influx", they explained, "is the transport of prana (life energy) from the spiritual world to the physical world. This energy

uses elemental beings to enliven the water." Such cosmic inflow is always there, but it increases when people consciously engage in it. Human beings are invited to strengthen this cosmic influx with love, attention and co-creative gifts. The more aware people become of these facts, the easier it will be for elemental beings to work with human people, and the easier it will be for the nature beings to improve water quality.

Another experience of impressive water improvement is documented in appendix 10. It is related to fish flow forms (FFF) in a brook in the south of the Netherlands. In their research proposal, the initiators wrote "it is a reality that the 'intention' of the researcher(s) in carrying out the research may influence the results. ... Energy research is impossible without a pure, unprejudiced intention. That is why every effort is made to ensure that all those involved - the field observers, the samplers, the laboratory technicians and the rapporteurs - do their work with a basic attitude of attention and respect for the water that passes through the FFFs, for the flora and fauna in and around the water and for the nature beings that are connected to this location".

The FFF also has a positive effect on the energy of the land around the water. Once I visited the FFF spot and I sensed the soil energy levels, as described in the introduction of this chapter. Near the watercourse I felt its radiation approximately 180 cm above ground level while gradually decreasing to approximately 140 cm at the border of the neighbouring farming field, some 20 or 30 meters away from the stream.

Silvis' last question to a water being reflects one of his major concerns. "For most water companies or scientists my measurements are difficult to accept. How could such measurements be more easily accepted?" The answer: "There are many people 'more awake' than scientists. Share your findings with awake people first and publish in regular magazines. Through such activities you gradually wake up the interest of the wider population and after a while they will put questions to scientists. And mind you: the FFF group has got a very nice package of regular and complementary research already well documented. This can be shared and published in many places. Just start with this." This message to humanity is why Silvis eventually agreed that I include his personal experiences in this book. I am grateful for his courage.

The information from nature beings apparently provides us with fabulous new insights. Actually, that is the core message of ancient cultures to modern man.

4.5 Listening to Nature

Can one listen to a cow? In other ways than hearing them mooing. Yes one can!

I experienced it myself during a training day 'Learn their language' by Marta Williams[21,] in the heart of the Netherlands. Williams' central message is: 'Trust your intuition'. You can grow in trust, by practicing with questions of which you can check the answer. We walked into the meadow with the invitation to get in contact with one of the cows – a cow you felt attracted to - and ask her how many calves she had, whether it were bulls or heifers and whether they were still present in the herd or not. I quickly found 'my cow', lying in the middle of the herd. I lay down in the grass, just one foot away from her. But it took me about ten minutes of trying to get connected. The cow just ignored me, quietly giving up and chewing her grass. Finally I got her attention, just by making smacking sounds as if I were chewing like she did. She immediately looked at me with her big black eye balls. In my mind I asked her: "Hello, can I ask you a question?" I felt on my chest that something opened, as a kind of increased space. Maybe that was a yes? OK, so I continued. "How many calves did you have? Was that one?" I felt no open space in my chest. "Was it two?" I felt no open space either. "Was it three?" In my chest I felt again this feeling of increased space. "Was it four?" It was as if that space closed. "So three calves …", and again that feeling of increased space in my chest. "Thank you! Your first calve, was it a bull?" No open feeling. "Was it a heifer?" Open feeling again. "Is she still in the herd?" Again that same open feeling, while she turned her head to another cow in the pasture, as if she wanted to show where it was. That was quite amazing. "Number two, was that a bull?" Open feeling. I didn't ask if he was still in the herd as bulls normally are being removed. "Number three was that a bull?" Closed feeling. "Was it a heifer?" Again that open feeling. "Is she still in the herd?" Open feeling again. "Thank you so much!"

Altogether I had asked her twelve questions. When I was done and quietly lying in the grass, still close to the cow, the farmer came along. He asked me what I found. As I told him, he listened attentively and spoke the still legendary words to me: "Completely correct!". I was stupefied, how small is the chance that twelve correct answers is just coincidence? Very small. Since that day I dare to rely more on my promptings and I no longer rationalize them as my own imagination or thoughts. It can be real information, shared with you by nature.

Conscious Nature

An even more fascinating aspect of intuition is that some people are able to engage with nature beings. I started to consider such connections as part of reality when I came across people - whom I thoroughly trust - who told me very candidly about their experiences. They convinced me of the possibility of human beings collaborating with nature beings, like Silvis does with water nymphs. He opens his mind, listens with his heart, checks with his mind and senses and measures with his body. Such check of subtle information is usually lacking among people that communicate with nature intuitively. That is probably one of the reasons why their stories often are difficult to believe.

Another reason why I elaborate on this Listening-to-Nature method is that these experiences all point to a forgotten dimension of our reality. A forgotten dimension that nevertheless is picked up by many people again, and developed into systematic methods that can be very useful in farming and gardening. For example people of Cooperative BioBalance in the USA, Findhorn people in the UK, Perelandra Gardening in the USA, Father Duno in Bulgaria, over a hundred Anastasia groups in Russia, Tamara in Portugal and Damanhur in Italy. They experiment with an intuitive and spiritual connection with Nature. Nature is often written with a capital N as if it were a proper name, as if it is conscious. Some suggest we may have to deal with nature beings as personalities indeed. In various ancient cultures this still approach of nature is common practice and such animated world view and – hence - the related techniques are still being maintained till today.

Openhearted awareness

An intellectual understanding of connectedness and oneness with nature seems to be difficult. Probably because it is not about achieving higher levels of knowledge and intellect, but it is about a different state of awareness and consciousness. You try to achieve an awareness of connection, the information feels like instant knowing and sometimes you experience a mystic sensation of oneness. To achieve such broader awareness, you have to move beyond the ego, it needs you to surrender. It is that non-ego-field and that state of mind where you can intuitively experience the connection with a plant or an animal and with subtle energy fields of all kinds. Almost all ancient cultures consider nature to be conscious and these people know how to communicate with it.

About twenty years ago I started to notice modern farmers working with their intuition. Farmers 'with their feet in the clay'. I am impressed how many of them trust their intuition in observing plants, animals and soil and take management decisions based on this subjective information. Several people have developed this ability into a professional quality. Based on personal experience, I am convinced these methods have something relevant to offer, not only to nature loving people but also to practical gardeners and farmers and foresters.

To show how widely these practices are being applied, I hint at some methods that strongly impressed me: Interspecies communication, gardening in co-creation with Nature, negotiating an Eco-Peace-Treaty when Nature seems to be threathening, and entering the web of Constellations in Nature. Even a toolkit has been developed for researchers to engage their body in scientific research.

Interspecies communication

Interspecies communication means that a person can get connected with the information another human or animal 'carries' along, and can get answers on specific questions. My opening story about the cows' calves is one. Anna Breytenbach in South Africa is a greater example, she trains people in animal communication. She sometimes is called an 'Animal Whisperer'. She shares beautiful videos about her way of

working and her results[22] . Her Black Panter story is fascinating. She believes that animals transmit feelings, thoughts, intentions and mental images in ways that don't always use the five senses. She tries to find out what it is like to be that animal.

Answers via body and mind

'So I might ask a leopard, "How does it feel to drag a killed impala up a tree?" The response I'll get is a very real sensation within my own body of absolute power, strength and latent potential. I could ask a sleeping lion how it is experiencing its body and its surroundings, and feel this fantastic sense of complete relaxation as if I'm meditating deeply myself. And, if I ask one of the antelope species about its favourite food, the answer might be a mental image of the animal stretching its neck up to browse a particular bush, or a taste in my own mouth of the acidity of a leaf.'

For Breytenbach, the goal is to mentor more communicators to help resolve the challenges of living harmoniously with animals. 'Interspecies communication brings about mutual understanding and respect, along with the possibility of co-creating solutions for even the trickiest situations where wildlife and humans come into conflict[23].' She believes that communicators can be especially helpful in enhancing relationships between medical professionals and their animal patients. 'For example, vets can find out directly – from the horse's mouth – what the animal's experience of their pain or discomfort is, where in the body it occurs, what might have caused it and even what might make it better. This is immensely helpful to medical practitioners who otherwise have to rely on observation and other diagnostic measures.'

Garden design in co-creation with Nature

You could as well design and maintain your garden in connection with Nature. Nature researcher Machaelle Small Wright has thoroughly described her experiences in communicating with nature to build and maintain her gardens, and she has developed clear protocols to help others on this discovery[24] .

At Perelandra, the Center for Nature Research that was founded by Small Wright, they call a conversation with Nature a 'Coning'. It does not matter whether your question is practical (you just start somewhere) or theoretical (for example you can ask for exact definitions). A coning involves four participants, two from nature and two from mankind. One Nature participant is the shaping force of a plant or of a location - like an architect -: the one who knows how to build broccoli, for example. The other Nature participant coordinates all players at all levels in Nature. This participant guarantees that no other players in Nature are harmed by the proposed action. The two human participants include your inner knowing – your intuition - and your connection with the consciousness of nature. 'When getting into such a conversation, our mind and consciousness move into the energetic world of Nature and we invite Nature's intelligence to cooperate with us.' You will receive answers, tailored to the wellbeing of all four participants. That alignment is important when we want to take all relevant aspects into account, including those we are not even aware of. In fact in a 'coning' that alignment is done by Nature's intelligence, not by ours.

Again answers via body and mind

How does Nature 'communicate' with a person in such a coning? When exploring a question, you follow a suitable protocol. You ask all kinds of questions in a certain order, well described in the Perelandra protocols. You get answers with *kinesiology*: through the muscles of your body related with your consciousness. You assume that your body awareness – as part of water and light and consciousness of nature - is somehow connected to the answer, to the intelligence of Nature. Mind you, we speak of intelligence of Nature, not of intellect, which is typically human! Someone tests the strength of your arm muscles, by pushing your stretched arm downward as far as possible. The answer is *yes* if your arm cannot be pushed down, it is no when your arm has no force. Others prefer to test themselves with the pink-thumb-ring test using both your hands. You formulate the exact question – aloud or only in your mind - and try to break that pink-thumb-ring of your dominant hand with the thumb-and-forefinger-ring of your other hand. If the first ring breaks easily, the answer is no, if you do not break that ring, the answer is yes.

Perelandra view on Nature

Small Wright also shares her view on Nature. Nature provides the means for such conversation. Not the living and tangible nature around us, but Nature as a dynamic principle. Nature has a certain kind of Intelligence, it has an inherent dynamic design principle. Nature not only offers order, organization and life force, it also has a certain consciousness. Nature has its own intelligence, but it has no free will.
Man, with his free will, can give direction. Take, for example, the design of your garden. Man starts his garden by defining the purpose of what he wants from nature: a garden of so many square meters, with this address, that produces healthy food for 6 persons. With such a clear direction in mind, you can talk to Nature about the precise design, the surface you require, the best combination of crops and the appropriate maintenance of your garden, etc.

Characteristic for man is 'free will' and direction, while for nature it is 'inherent balance' and coherent conditions. Following her way of thinking, the key for a deeply sustainable agriculture is *to get the free-will direction of man cooperating with that inherent-balance-tendency of nature*. Both need each other. In this co-creative way, inherent balance is reflected in everything, in outcomes you can observe and measure, in less disturbing side-effects from our inputs, in physical health of ourselves and in wellbeing of nature.

Eco-Peace-Treaty

Jim Conroy and Basia Alexander, from the Cooperative Biobalance Institute in the United States of America call themselves 'Tree Whisperers'. They published a beautiful guide in 'touching, healing and communicating with trees, plants and with all Nature.' The book gained wide acclaim in the USA. Their biggest idea is that an EcoPeace Treaty® makes the killing of any participants in an ecosystem superfluous and obsolete[25] . It is a metaphysical treaty, at a subtle energy level, between the human being and the information field of the deer or the insects that otherwise eat the harvest that humans need. Such information field could as well be called a deva, as is custom in India. Their book 'Live and Let Live' describes this collaboration in much detail. They provide many practical examples and show tangible

results. EcoPeace Treaties could become a powerful tool for recovering a fragile planet and a vulnerable humanity.

How does Conroy negotiate an Eco-Peace-Treaty?

"In a profound partnership, the tree and I co-create a new network-pattern in my consciousness through seeing, feeling, hearing, and knowing. With deep intuitive intentionality and some tapping with my hands on various parts, systems, and bio-energy layers, the tree and I can unlock the energy flow. That helps the tree 'install' a new healthy network-pattern which then restores the functionality in its physical parts and systems. It's a little like a computer operating systems upgrade. It is as if we are writing new programming software. The tree and I together get its root-cells to begin rapidly dividing. Then, we get uptake across the root tissues cleared, so we can start to get some water and nutrients flowing into its bio-energy field that is 'interwoven' with its physical structure. Then we attempt to clear the plant chemistry, to get the right balance of food from photosynthesis, nutrients and water in the tree. Photosynthesis and transpiration help pull fluids up. This helps circulation flow up the xylem and down the phloem. The process takes some time. Annual plants can do this in days, big old trees can take a year or two before the results will show up in the physical dimension. "

With a tripartite Eco-Peace-treaty, they have - for example - dealt with an invasion of larvae of the Emerald Ash Borer (EAB) in an ash tree forest plot. Such agreement is possible as soon as each member respects the right to survive of the other partners in the treaty and accepts certain conditions in its own behaviour that are required for the others to thrive as well. The larvae agreed not to harm the tree they are in. The Ash trees agreed to regain health and to support the larvae to survive, while the owners loved the trees, promised not to cut live trees and not to use chemicals on the land or the plants or the larvae. It worked.

Restoring lost connections

Conroy and Alexander are of the opinion that many connections between ecosystem members have been lost. That may be because of

pollution, global climate change, human interference, ICT networks, or previous 'attacks' by non-invasive but strong organisms. When ecosystem members are getting disconnected, an 'invasive' comes in and does harm to its weak, disconnected host. The rest of the members are not inter-communicating or inter-connected either. So the system and its members are so weak that it easily succumbs to the life-cycle activities of the 'invasives'. Once these members are re-connected - and communicating again – they start playing in sync and in order. The outsider – the 'invasive' – comes into the band and must play its instrument in harmony and on-beat with the rest. If it doesn't, it is booted out of the band.

The intelligence of Nature does not reside in any 'brains' of an organism, but in feedback connections, loops, relationships, interactions and beyond. That intelligence springs from the design of Life itself. This view on Nature looks like what Peter Wohlleben described in 'The Hidden Life of Trees' (2017) and what Suzanne Simard telss in her TED talk[26]. They examined how trees communicate and interact with one another in their "wood-wide web". Trees do so with the secretion of scents and by sound vibrations to warn neighboring plants of potential attacks by insects and hungry herbivores, drought, and other dangers. They both tackle the question of whether trees are intelligent and hope the day will come "when the language of trees will eventually be deciphered."

Each living being on the planet is composed of bio-energy and network-patterns of information which are both physical and non-physical. Conroy and Alexander also refer to entanglement[27,] although they suggest that the treaty occurs at a metaphysical level. The healing occurs in that 'place' of consciousness first and only afterwards you observe the results in physical reality. In a radio-interview[28] Conroy says "I know I am supported when I work. I ask for help before I start working and I always thank them afterwards."

Asking questions of Nature's living Beings is not a consultation. It's a dance. And dancing happens when the heart is in charge, not the head[29.] Heart-based living, or being guided by the wisdom of the heart, is love in action.

Nature Constellations

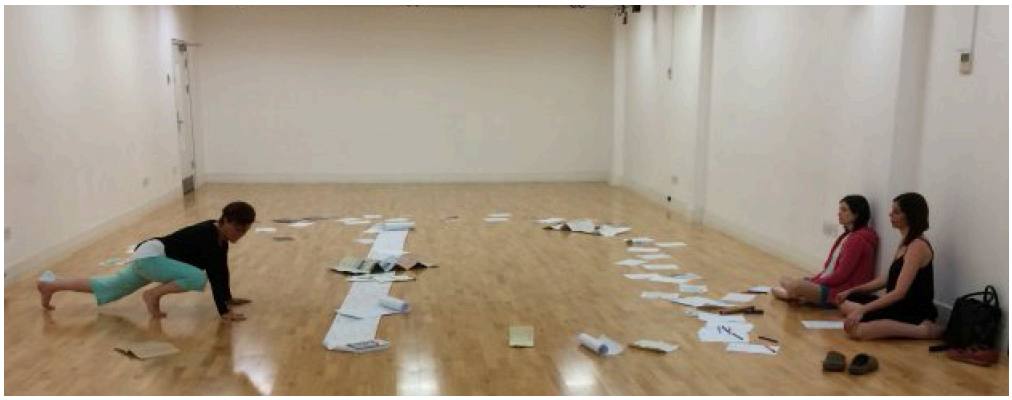
The method of Nature Constellations is another interesting intuitive method. Melissa Roussopoulos has facilitated and rigorously checked and documented the impact and effects of many nature constellation she facilitated[30]. Within half an hour it offers an intense experience of being a player in the information field of that very constellation. On her website[31] she shares well-documented studies of the method and its effects. In a constellation one explores a specific issue or question. The role of the constellator is to find the essential aspects of an issue - a family relationship, for example or an nature relateds issue - and to appoint a representative for each aspect and bring them into positions on the floor that feel right to all representatives.

In 2014, Roussopoulos guided me through a short constellation about a cactus I'd inherited through my family, which had grown inclined at a 450 angle, hanging over the border of its pot. I had just repotted it in upright position and put it outside on my balcony. But at night it started freezing and I wondered whether the cactus preferred to stay outside (as in deserts it may be freezing as well) or preferred to be put inside (as cacti like heat). That was my question for the constellation. The representative for the cactus, without knowing what she represented, leaned over at a 450 angle without knowing why, began to shiver and wanted to move towards my representative! I was amazed, this constellation was really about my specific cactus. Obviously, I had to bring it inside. So I did and the cactus thrives.
In such constellations, apparently mind and body together are informing us through some kind of metaphysical or energetic information field. Through connections most of us have forgotten.

Somatics Toolkit: engaging your body in research

The somatic practice mentioned here, probably also tunes in to such information field. Connecting with nature can start by connecting with your body, as your body is part of nature. Eline Kieft and Ben Spatz designed a toolkit to develop a stronger bodily awareness among ethnographic researchers[32]. The UK National Centre for Research Methods has funded the 18-month project to further develop the method for and with anthropology students.

Both researchers are intrigued by the possibilities of 'consulting the body as an additional tool for research. Their Somatics Toolkit translates insights from somatics to scholarly research.' The body can offer an innovative and creative way of tackling any problems that might arise during a projects' life cycle. These techniques can be relevant to anyone conducting research, regardless of their methodology. In the first place, the Somatics Toolkit addresses generic research activities such as literature review, data collection and analysis, and dissemination. The method enables an exploration of body awareness in service of a deeper comprehension of complex issues. You explore your physical intelligence, you become more aware of the way you conduct your research. It supports you in embodied literature review.



Dancing with your draft report, can help you to improve it.
Source: somaticstoolkit.coventry.co.uk

Moreover, the body can provide a source of mental and emotional support in the often challenging academic environment. Most researchers have a strong commitment to their work and their informants, but take very little time for self-care and self-analysis. The mental wellbeing of a researcher relates to the nuts and bolts of all research activities, including the literature review, the fieldwork, the discovery of patterns in the data, and to documenting and presenting the results. The emotional wellbeing – felt in our body - addresses how we relate to the scientific material. Do we feel lost in big data? Are we stuck, does it feel stressed or blocked or insecure? These emotional experiences in research are very common, but seldomly spoken about. So the methods also helps handling your emotions and your vulnerability in your research.

Kieft and Spatz hope to roll it out to other stakeholder groups as well. One interested stakeholder group could include farmers, gardeners and nature managers.

4.6 The relevance of openhearted awareness

The methods of Williams, Silvis, Small Wright, Conroy and Alexander, Roussopoulos, Kieft and Spatz point to a 'web of information and consciousness' that connects all forms of life and processes, a web to which mankind can apparently relate. These methods taken together, suggest a web of connections that is composed of two dimensions, a tangible physical one and a subtle meta-physical one. In slightly other words: the physical levels and consciousness levels of living beings are interlinked, all the time. If something changes in one dimension, it immediately adapts in the other as well. This observation underlines again one of the key quantum principles: that we should think less in particles, but more in relations between them. We should think less in moments and more in processes, less in photo's and more in films. It is not even on particles or strings, we could focus, but more on haps, *happenings,* things that happen.

Once you have developed a kind of openhearted connection with nature around you and within yourself, your awareness of informati-on-in-nature will increase. Indeed, we are nature as well. Your increasing trust in these intuitive connections will build a bridge between your conscious knowledge and your subconscious knowing, between the cognitive and the intuitive. You then realize that your body, mind and heart are important instruments, even in formal research. Once one has developed this intuitive quality, one can see more subtle phenomena as well. At least that is what farmers tell me. And this practical experience is confirmed by teachers of ancient cultures and by modern mystics. And in case one does not yet trust one's own intuition, one can accept the messages and drawings of other people that metaphysically and intuitively connect with Nature. People that have traced this forgotten connection again.

In case you are keen to explore this track yourself, you will feel supported by modern psychology literature that increasingly explores the connection between Ego and Eco. Ecopsychology in particular goes

into great depths[33]. Do you consciously use your body and mind as instruments to feel, to know, to measure and to inform? What would happen if you removed barriers and blockages of your mind to allow access for nature's sources of information and inspiration? What if you imagined Nature to be conscious?

The informational methods, desribed in this chapter, can generate a new impulse to the food production sector. The results generated so far give strong arguments to further develop the use of subtle energy and information patterns, and to design new methods to measure results, and to include this knowledge into agricultural education. Such methods can help in energizing farms, gardens and ecosystems, in early detection of diseases and in saving costs. Some methods result in clean and more vital water, in a more resilient natural environment and healthier living conditions for people and animals. They generate measurement methods for subtle aspects of reality, including additional quality standards for water and food vitality.

It demands the designing of new methods for subtle energy-related research. And linking subtle and subjective methods of observation to more objective measurement methods in order to enrich both.

These methods also support amazing contacts with plants and animals and nature beings that guide and strengthen ecosystems. Last but not least, they may as well generate new motivation among young people to become farmer or gardener with openherated awareness and with loving intentions in dealing with their place, their soils, plants and animals … and with Nature.

Professor of entomology and ecosystem management, Michael Samways of Stellenbosch University in South Africa, suggested to use our intuition again, as with our computer models we can barely oversee or even understand this complexity profoundly enough[34.] He hopes that developing our intuitive capacities can help us to take wise decisions in the management of ecosystems and complex farming systems. He supports PhD students in exploring this quality and potential of the intuitive and in understanding its mechanisms for the benefit of farmers, ecologists and nature lovers. Encouraged by him, Dr. Saskia von Diest wrote a thorough article for the Agricultural Systems jour-

nal: "Intuitive farming: finding the missing link toward regenerative agricultural knowledge and practices[35]".

The Information-dimension of reality also enriches our vocabulary in connecting with nature with 'respect, information and knowing from Nature'. All information is present everywhere in and around the farm, and the art and skill of the farmer is to consciously use this information. As Hans-Peter Dürr suggested[36] : the quantum information field is accessible indeed for the human mind. Although Al-Khalili and McFadden are prudent to correlating quantum mechanics to consciousness, they do not straigthforwardly reject the possible connection.

Footnotes

1 See www.presencing.org
2 First published - posthumously - only in 1955. And translated in English only in 1959.
3 More explanation can be found on www.vortexvitalis.nl
4 Some earlier research has dismissed radiesthesia alltogether. For example KNAW, the Royal Netherlands Academy for Sciences (1955). Other studies like 'Psychical Physics, a scientific analysis of dowsing radiesthesia and kindred divining phenomena' (1949) strongly support the method. It had been written by the Dutch geologist prof. S.W. Tromp. So science is inconclusive about the method.
5 Rajda, Vladimir, 2004. Metabolische Energie und Elektrodiagnostik der Pflanzenvitalitat. Kurzbericht fur die 10. Internationale Tagung Elektrochemischer Qualitatstest BTQ 2004, Teil 1. The first known recording of the electrical signal in plants is from John Burdon – Sanderson in 1873. The German nature researcher Alexander von Humboldt performed over four thousand experiments with animals and plants and concluded that the bio-electric nature of animals and plants is based on the same principles, according to Botting 1973. Jagadis Chandra Bose from India proved in 1926 that rapid movements in Mimosa and Desmodium leaves were coordinated by electrical signalling and also showed that plants produce systemic continuous electrical pulses. Info from Vivent, the producer of PhytlSign instruments.
6 You find further explanations at the website www.MusicofthePlants.com
7 See for example http://musique-pour-soigner-les-plantes.weebly.com/la-432-hz.html
8 See http://www.ecointention.com
9 In his second book 'The Universe loves a happy Ending' (2016) he delves deeper into the spiritual and philosophical backgrounds.
10 Piet Bongers, Zeeland. Pers.comm. (2007).
11 The farmer is Piet Welles, and his data have been published on pp 38-39 in the Dutch Pig magazine Varkens November 03, 2004 by Marc van der Sterren. The article was called: 'Esoteric technique results in hard euro's.'
12 www.tresjoliefruittuin.nl

[13] Other people can do such balancing as well. Often they are called geo-biologists.
[14] This field is the same that is accessed in family - and nature constellations. The researcher Rupert Sheldrake describes information fields as morphic fields (1981). He provides a scientific explanation for family constellations and the ability to work with information and energy at a distance, via a map of the system. In the terminology of this book, morphic fields can be considered as one kind of expression of the quantum information field.
[15] From a scientific perspective, Laszlo and Currivan (2008, 61) describe how the greater the initial level of order in a system (and therefore the lower its informational entropy), the greater the opportunity for differentiation and interconnection and manifestation.
[16] www.vortexvitalis.nl
[17] This negative information probably is comparable to disturbed 'order' in the sense Schrodinger meant it.
[18] On www.vortexvitalis.nl and on www.gaiacampus.com
[19] A Dutch foundation of the name 'Stichting water, drager van Leven'
[20] Readers may order such stickers at his website. His discovery is described in his article 'Water – een ontdekkingsreis' (Spiegelbeeld, issue 7, April 2016).
[21] www.martawilliams.com
[22] On www.animalspirit.org
[23] Quoted from Africa Geographic – sept 2010.
[24] See www.perelandra-ltd.com
[25] See TreeWhispering.com , TreeProtector.org , CooperativeBioBalance.org , www.PlantKingdomCommunications.com
[26] https://www.ted.com/talks/suzanne_simard_how_trees_talk_to_each_other
[27] The authors refer to Lynn McTaggart's 'The Field: The quest for the secret force of the universe' (2008).
[28] Available at www.gaiacampus.com as "Collaborating with Nature"
[29] Living from the heart is described nicely by Rollin McCraty et al (2005) in a short article 'The Resonant Heart'.
[30] See for example Roussopoulos, M., 2018. Nature Constellations. Exploring our Profound Interconnectedness with All Life. The Knowing Field (Jan 2018).
[31] www.forgottenconnections.com
[32] www.somatictoolkit.coventry.ac.uk
[33] One example is the book 'Ecopsychology, restoring the earth, healing the mind' edited by Roszak et al., (1995).
[34] Pers.comm. 2015.
[35] The manuscript was submitted to Agricultural Systems in March 2019. Also Nuthall and Old (2018) present their analysis in the paper 'Intuition, the farmers' primary decision process' (Journal of Rural Studies 58 (2018) 28-38).
[36] Pers.comm. 2006.
[37] Just two quotes from their book about quantum biology 'Life on the Edge', (pp 274-275). 'The combined approach of quantumcoherent ion canals and EM-fields is speculative but does present an acceptable correlation between quantum mechanics and classical physics in the brain.' 'External EM-fields - of comparable power and structure as generated by the brain itself - indeed influence the firing by nerve cells. In fact, the field synchronizes the cells until they all fire at the same moment. These results suggest that the own EM-field of the brain, generated by the firing nerves, itself also influences the firing as a kind of self-referential loop that apparently is an essential part of consciousness.'

5. A broader view of nature: Mass + Energy + Information

"Without matter, nothing is tangible, without energy matter is inert, and without information matter and energy are disorganised, hence useless."[1]

A farm is a system. In dairy farms, for example, nutrients cycle through the soil, through the plants, into the cow, and then via milk or meat into our bodies, via manure to the soil or via the sewage systems into the water or just evaporating into the air. Recycling nutrients is increasingly recognised as extremely important[2]. Considering all aspects in a farm nutrient cycle is a systems approach.

In spite of its value, such a nutrient system is not complete, even when you study Nitrogen or Phosphate cycles at a global level. Such view only considers Mass, it typically is a particle-based approach. If one thing became clear from the previous chapters, it is the need for an enlarged systems view, a view on nature that includes Energy and Information. Modern physics already hinted at it a century ago. Nevertheless, current agricultural knowledge is still largely based on a three centuries older Newtonian view on reality. That's what we still learn at school and university and what we hear from colleague farmers and advisors. This approach has shown its advantages but yielded its inconveniences as well. We could say now, that Newton told one side of the story. We have to complement this particle/mass-based vision with a wave/energy dimension. In fact, this is evident when we read the stories of Maxwell, Planck, Einstein, Bohm and Schrödinger etc.. With the concept of Quantum informed Agriculture, we integrate two fundamental innovations into agricultural knowledge, these are the dimensions of Energy and of Information.

And as growing food is working with nature, it requires an enlarged view on nature as well.

Enlarging the farm system quantum physically

Scientific publications increasingly consider matter as a trinity of Mass + Energy + Information, in short MEI. In search of a better "perception of reality" Van Wijk et al. for example[3], wrote 'What lies behind our perception of focalized metabolic molecular entities is a combination of matter, energy and information. This requires a shift in our mindset. (…) Matter and energy are interchangeable and information is contained in both of them. (…) In line with Jaros and Cloethe[4], we will name this inseparable triplet MEI that stands for matter-energy-information.' The authors build a convincing argument for this broader view on reality.

Life is full of energy

Let's begin with the most important source of energy around our planet, the sun. It beams enormous quantities of energy, not only in the visible part of the spectrum. Parts of it reach the earth and fuel many life processes. Energy cycles exist in ecosystems, in farming systems, in living bodies, and in food cycles as well. Even the mitochondria, the power plants in the cell, get much attention in cell-biology. But very little of it is applied in agriculture. In addition to the sun's energy, even the tiniest level in mass and energy quants, the photon, enters the farm - and food cycles. Most interesting is that farmers have the ability to "manage" the energy in these lower systems as well.

The energy management approach of farms and natural systems is hardly developed. British physicist dr. Mae Wan Ho is the exception, she suggested we can achieve higher rates of efficiency – in energy and nutrient cycles in agriculture - by consciously reconnecting diverse production lines. Ho calls this 'Smart Energy Farming Systems', and she relates her analysis to fundamental thermodynamics and quantum physics[5]. To be continued in 5.3.

Life is full of order

The concepts of 'information' and 'order' are fundamental in nature and therefore also in agriculture. Already in the 1940's quantum physicist Schrödinger reflected about the fundamental difference

between alive and dead matter. "The unfolding of events in the life cycle of an organism exhibits an admirable regularity and orderliness, unrivalled by anything we meet with in inanimate (dead) matter. We find it controlled by a supremely well-ordered group of atoms, which represent only a very small fraction of the sum total in every cell (he refers to DNA). (...) These facts are easily the most interesting that science has revealed in our day. (…) An organism's astonishing gift of concentrating a *'stream of order'* on itself and thus escaping the decay into atomic chaos - the gift of 'drinking orderliness' from a suitable environment - seems to be connected with the presence of (…) the chromosome molecules, which doubtless represent the highest degree of well-ordered atomic association we know of. (…) To put it briefly, we witness the event that existing order displays the power of maintaining itself and of producing orderly events[6]."

It is this order that informs life processes. It is this order that goes against entropy. It is with this information that farmers and gardeners can support their soils, plants and animals to 'drink more orderliness' from the farming environment. This is why Mass + Energy need to be complemented with Information to get the full picture of order in nature, the full picture of the farming environment.

Nature is more than ecology

Altogether, when we put farming, gardening and forestry in a quantum perspective between light and water, it is not enough to include some more ecology in the farm. The current trend towards *'ecologizing'* agricultural production, therefore, requires something more: the talent of farmers to understand their soils, their crops and their animals in terms of energy and information, and to understand themselves in these terms as well.

5.1 Energy and Information, new dimensions in agriculture

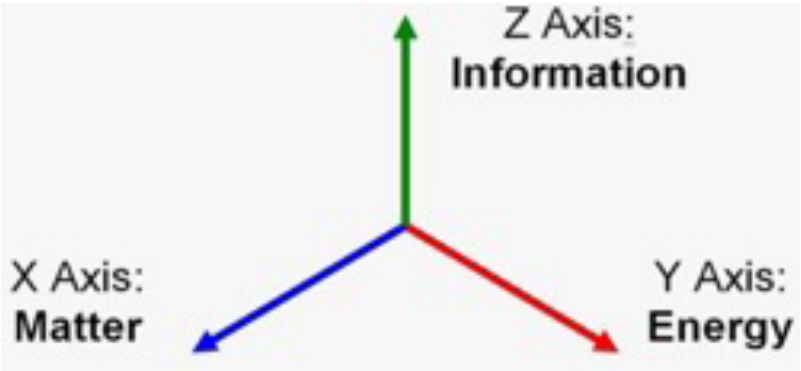
Quite some techniques broadcast or manipulate electromagnetic waves, or sound waves. Many people are experimenting with a broad spectrum of frequencies and energy. I have labelled these techni-

ques as 'Energy-family'. There was more technology I met in practice that astonished me, which I could not categorize under the wave/energy-family. I needed another 'family' to explain these methods. Indeed, waves do carry information, for example as modulated waves. But apparently information can also exist on its own. Some farmers inform their plants by non-material patterns, like Lovel does. Others engage with consciousness, not only of human beings, but of animal, plant, water and soil as well. I have labelled such methods as 'Information-family'.

Exploring these techniques in itself is just fascinating. But what motivated me most to study these techniques, was that both 'families' of techniques, according to farmers, enable higher yields, increase input efficiencies of nutrients and energy and of pesticides, suffer less diseases and save costs. And - according to some researchers – the techniques improve the internal coherence in food, shown by longer shelf life. Moreover, they appear to be positive for nature, for the farmer and gardener themselves, and for the environment around them! They increase vitality all over the place.

M + E + I : the core concept of this book

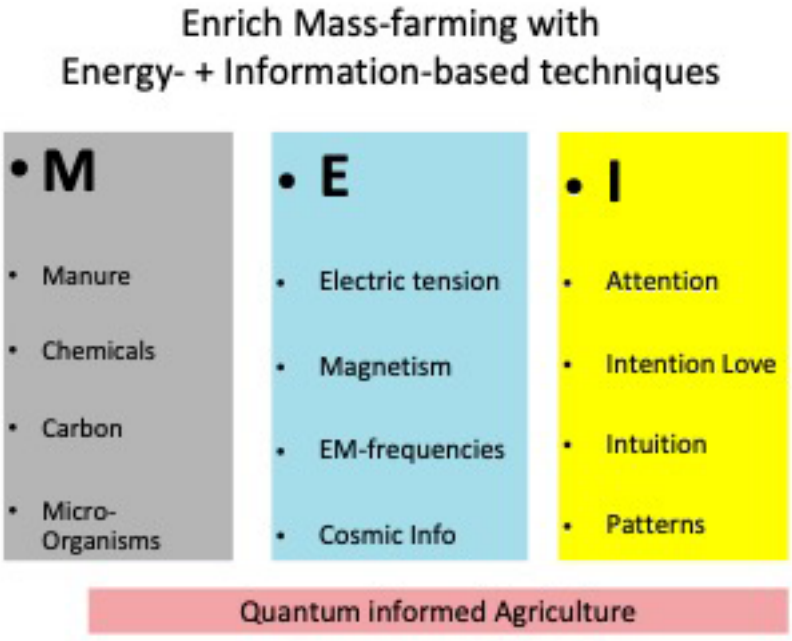
We can imagine that such visions of Einstein, Rubbia, Schrödinger, Oettinger and others, have lead to the concept of MEI: everything is composed of the combination of Mass + Energy + Information, and these are always mutually related. Stuart Umpleby, an American cybernetician, was one of the early people who illustrated this concept in three axes.



The MEI-concept: reality is composed of matter + energy + information. Source: Stuart A. Umpleby, 'Physical Relationships among Matter, Energy and Information[7]*.' www.cosmicfingerprints.com*

One clarification about matter and mass is needed here. For me it was confusing that Umpleby included matter as one component of matter itself. From the double-slit experiment – a fundamental experiment in quantum physics - we know that matter can express itself as wave (with energy), or as particle (with mass). Hence, the concept of matter covers both energy and mass. Therefore, in this book I interpret the MEI-triplet as *Mass* + Energy + Information, instead of *Matter* + Energy + Information.

Many people ask what is the key of quantum informed agriculture. I think it is well expressed in this MEI-concept. The current farming techniques of the 'Particle- or Mass family M' are being complemented with techniques of the 'Energy-family E' and methods of the 'Information-family I'. The diagram below shows the MEI-concept for agriculture. Every column mentions four specific examples of techniques or relevant principles behind these 'families'.



Diagram, showing the conventional particle- or Mass-based techniques, being enriched with Energy- and Information-based techniques.

As you can see in this diagram, the bottom-line 'Quantum informed Agriculture' only partly covers the Mass-view, it includes M obviously, but it focuses our attention mainly on the two complementing families of Energy and Information. Like what I do in the book.

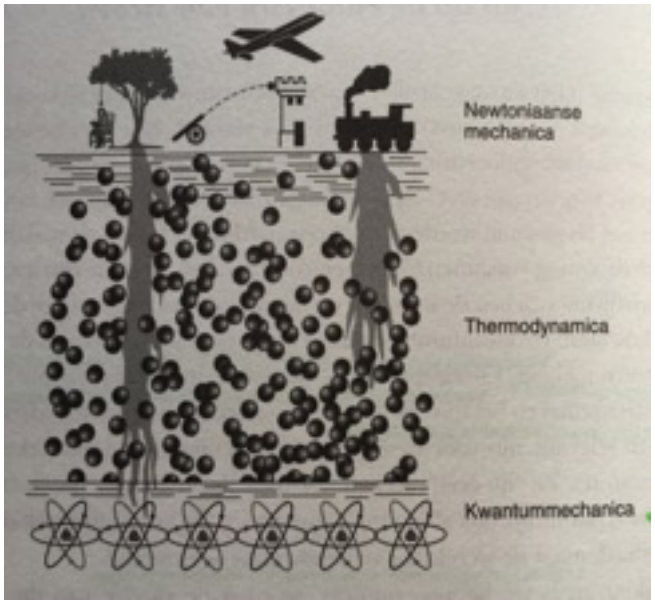
5.2 Quantum principles for agriculture

Applying quantum principles in food or wood production, requires the flexibility to make a big step in thinking. Fortunately, several publications and trainings on these techniques appear. The first author launching the term Quantum Agriculture - that was around 2004 - is the Australian BD farmer, farm advisor and researcher Hugh Lovel. In 2015 his book "Quantum Agriculture, Biodynamics and Beyond" was published. He shared his insights with thousands of producers already, all over the world. The announcements of his Masterclasses hint at the courage that is required from farmers or researchers to make such a big step in their thinking.

A second book that paves the way is "Light in Shaping Life, bio-photons in biology and medicine" (2014) by Roeland van Wijk. He – a cell-biologist who worked intensively with Fritz Albert Popp, the father of modern bio-photon research - gives a complete insight into the actions and the meaning of photons in biology. Or formulated slightly different: how light, in the form of particle and / or as wave, may provide coherent information to plants and animals (as discussed in 2.2 and in appendix 5). Since the 1990s they have observed that living organisms and food products emit very weak light: light from bio-photons. In this branch of cell-biology it is increasingly understood that coherence in the behaviour of photons is a good indicator of the quality and vitality of a product. Measurements have been documented for many food products, for eggs, apples, milk etc. For example, the method can discriminate milk qualities of individual cows, it can detect vitality effects of season, of feeding and of farming style, of pasteurization procedures, of processing into yoghurt, cheese, butter or milk powder. Even changes in brain activity, in intentions and consciousness levels – another field of research - have a recordable influence on the coherence of photons emitted.

ICT-technicians are developing the quantum computer that is able to transfer messages without a time-lapse and without the possibility to be hacked. It makes sense to suggest that quantum principles are also valid in life processes. Indeed, another star appeared in 2015: the first book on quantum biology 'Life on the Edge' was published[8]. It applies quantum physics in biology. The book was writ-

ten after the first global congress of eleven quantum biologists in 2012. The book explores six biological phenomena from a quantum physics angle, phenomena that - up until now - were not well understood by conventional science. The authors describe how quantum theories complement and underpin the processes in thermodynamics and even the mechanical laws in the cosmos as formulated by Newton. This underpinning is nicely explained in the following picture.



In the above left corner an apple falls at Newton's head. It falls according to Newton's law. The apple tree however, is rooting deeply in the quantum level of reality. The locomotive -at the right side - is only 'rooting' into the thermodynamic level of reality. Source: Dutch translation[9] of 'Life on the Edge'.

The original English version of this picture, instead of the locomotive and the tree, shows a ship navigating at the Newtonian level and with its keel deep into the quantum level. The authors use this sailors' analogy for a fundamental remark about what life is: 'Life navigates at the edge of the quantum and classical worlds. The living cell is like a ship whose narrow keel penetrates right down to the quantum layer of reality and can thereby capture phenomena such as tunnelling or entanglement to keep itself alive. This connection to the quantum realm has to be actively maintained by living cells harnessing the thermodynamic storms – to maintain, rather than disrupt, quantum cohe-

rence.' One of the authors of 'Life on the Edge' must be a sailor. By the way, this way of presenting compares well to what Schrödinger wrote about order in life processes seventy years ago.

Quantum theory deals with waves and frequencies, magnetic and electrical fields and the behaviour of very small particles. You can not exactly define the boundary between this small quantum world and the larger tangible world we are used to observe, but the authors locate the boundary roughly between the level of the atom and the much larger cell. Below this limit, different physical laws apply, strange laws that often go against your logic and even your intuition. The authors suggest life is happening precisely in this border area between small and large, between quantum phenomena and thermodynamic laws. This suggestion is nicely reflected in the title of their book: 'Life on the Edge'.

Quantum principles

The box below holds the key quantum principles that I consider relevant for farming and gardening. Most probably there are more, as I have internalized only a tiny part of this huge field of knowledge.

Key Quantum principles for a new agricultural perspective.

The particle-wave duality is fundamental: the quantum principle that matter can express itself both as particle and as wave. Both particles and waves always complement each other. Louis de Broglie re-calculated the mass-based Periodic System of Elements into the frequencies of all elements. Electromagnetic frequencies are simply part of everyday reality, also in nature and farming. The tangible plant and the visible animal always consist of, emit and are sensitive to vibrations and frequencies. This theory induced the design of various devices that indeed influence plant and animal life.

The uncertainty principle was formulated by Werner Heisenberg, one of the first pioneers of quantum physics. No matter how much you try, you can never simultaneously get a precise measurement of both the speed (or momentum) and the position of that particle. The more you focus on its speed, the less certain you can be about its lo-

cation, and vice versa. This principle is important for the awareness a) that you cannot record everything from the physical reality with precise measurements and b) that the future is not completely fixed. This leaves open the option of human influence on further evolution of matter and nature. (Hans Peter Dürr . pers.comm. 2006).

The observers-effect deals with the discovery that photons or electrons behave like particles as soon as they are observed and behave like a wave phenomenon if not observed. As long as still being in the stadium of 'wavicle', both options remain open until they are observed. Observing by itself therefore apparently affects the behaviour of photons and electrons. It is said that the potentials of the wavicle then 'collapse' into either a wave or a particle. This observers-effect might offer a foundation under the experienced fact that attention, the mind power or love indeed affects plants or animals. Would this maybe have to do something with attention and 'green fingers'?

Recently, the entanglement principle has been proven - 'loophole-free' . Quantum physicist Hans-Peter Dürr formulated what this means: "The cosmos is a whole unit, or everything is connected with everything, also things and events." In fact, Schrödinger has suggested that entanglement is not one of the interesting aspects of quantum theory, but the aspect. In 1975, theoretical physicist Henry Stapp called Bell's theorem "the most startling discovery of science." In this theorem, Bell formulated the test to prove or reject the reality of entanglement. It was his answer to the thought-experiment of Einstein, Podolski and Rosen stating that entanglement would be impossible. Einstein's protégé David Bohm stated that quantum mechanics shows that reality is an undivided whole in which everything is strongly connected with each other, with prevailing limitations of space and time being transcended.

The principle of entanglement offers an explanation for techniques that treat crops, fields and herds at a distance, such as radionics. This principle also suggests we should not only study objects in nature but primarily relations.

One of the leading quantum physicists, Edwin Schrödinger, introduced the concept of **'order'** that is required to inform life processes.

Absorbing nutrients, water and air is not the total picture. Life also 'sucks order' from its environment. This order is invisible but real. A comparable idea has been proposed by quantum physicist David Bohm. He suggests an 'implicit order' (the hidden, unobservable physical universe) from which the 'explicit order' (which we do observe) originates. The folding and unfolding of these forms of order are the cause of the diversity of the quantum world. This concept of an (implicit) 'order' comes close to the concept of an immaterial or metaphysical **quantum information field.**

Other principles have been suggested in literature. Like '**superposition'** and **'tunneling'** and '**quantum-computation'**. Those principles are documented in 'Life on the Edge' to explain the high efficiency of the photosynthesis process.

All life processes

With quantum theory scientists can better explain the high efficiency of capturing solar energy in photosynthesis, storing it in particles and molecules with mass. The one process that supports all life on earth is photosynthesis. Agricultural research could invest more in understanding this phenomena. I got convinced that quantum theory will deepen the foundation for agricultural science and practice. And this statement not only holds for photosynthesis, but for all life-processes in soil, plant and animal. Including processes and techniques we may not yet fully understand.

5.3 MEI-Farming, high in order and low in entropy

In spite of the fact that quantum physics as a theory exists already over a century, it is rarely applied in analysing or designing farming systems. The application of quantum physics in biology is a first step, a very important step towards application in plant and animal husbandry. Lovel is one of the people that made that step (described in 2.1), he started from practice. British physicist dr. Mae-Wan Ho, of the Institute of Science In Society ISIS[12] is another one, she started from theory.

'Abundantly productive farms with zero input and zero emission powered by waste-gobbling bugs and human ingenuity. Indeed, sustainable development is possible.'

This statement is Mae-Wan Ho's. Her thinking and vision are inspired by both thermodynamics and quantum physics. Ho's point of departure is this: the most sustainable systems are the ones that require the lowest levels of energy input – apart from the sun - and realize the lowest levels of losses into the environment.

She presents it as the alternative for the dominant model of supposedly infinite growth. To achieve zero-energy consumption, she argues, it is required to reconnect various food systems. She wants any system to become locally or regionally *self-supporting*.

Ho felt inspired by the Dreamfarm model developed by George Chan, who himself calls it an 'Integrated Food and Waste Management System', an IFWMS. Chan supported the development of dozens of farms around the world, based on his model. On the web you will find examples implementing this model, all very productive farms [13]. On his retirement, Chan spent 5 years in China among the Chinese peasants, and confessed he learned just as much from them as he did from professors at University. Chan left China in 1989 to work with ZERI through consultancy services[14].

Their integrated farm typically consists of crops, livestock and fishponds. Its integrated set-up allows the nutrients in farm wastes to spill over into production of algae, chickens, earthworms, silkworms, mushrooms, and other valuables that bring additional income and benefits for the farmers and the local communities.

One of Chan's model farms in Fiji. Source: zeri.org

Ho designed a more complex – more connected and integrated – system, a zero-emission and zero-waste model[15]. Into Chan's system, she explicitly incorporated renewable energy to completely free the farm from fossil fuel input. Waste is not a waste but a source. The result suggests a highly productive farm that's more than self-sufficient in food and energy and that saves substantially on carbon emissions.

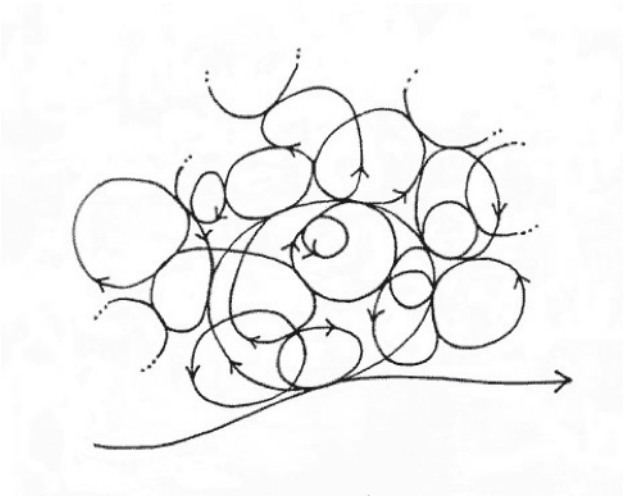
Minimize entropy

I remember a lecture of prof. G Hamming in 1966. For me he was the first to talk about (neg)entropy in agriculture. I had just started my studies. He wrote a fascinating article at the occasion of his retirement, called *'Vrijheid in Gebondenheid'* (Nested Degrees of Freedom). Since then, the word entropy has always vibrated somewhere in the back of my mind. Hamming was on exactly the same fundamental path already 40 years ago, as Ho explored very recently.

Ho started with the thermodynamically fundamental ambition for continuity: to minimize entropy-generation. Entropy is a basic concept in physics of matter and space. Entropy is high if mass or energy are widely dispersed, not concentrated. It is a tendency inherent in the physics of dead matter. On the contrary a vital living system absorbs and concentrates mass and energy to support its natural reproductive cycle. A living system attracts water, nutrients and energy as well as information from its environment. Such system increases its order, which by definition decreases its entropy. In Ho's optimal far-

ming model, entropy generation is minimum, while also the export of entropy to the environment (call it chaos or pollution) is minimum. In such an ideal situation, the organism would not get older and would not die, which is impossible. But it is a target to be approached as close as possible. Her Zero Entropy Ideal means that the sum of changes in energy in all systems equals zero.

This ideal can best be approached by connecting various sub-systems that maintain their energy and order as part of the wider system[17]. The zero-entropy cycle of a sustainable system (like a farm) is coupled with and embedded in wider environmental cycles. Ho labels them 'Zero-entropy model of sustainable systems at work'. She basically searches for farming systems that keep nutrients and energy and order in the cycles. This requires optimal coordination by the farmer and well-informed mutual relations among the connected systems.



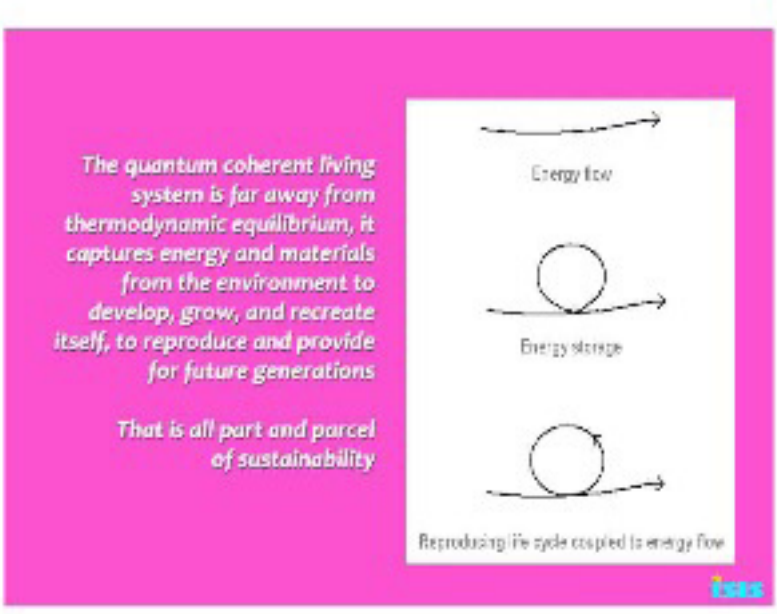
The picture Ho shows when she talks about connecting food systems for zero-waste and zero-entropy. Source: Ho (2008).

The minimum version of an integrated farm includes a farmer, livestock and crops. Obviously including land, water and light as well. In principle, these levels of embedding can go up to including the entire earth and the solar system. These are all systems, nested in each other. In turn, each cycle is made up of many smaller cycles within it, all working by reciprocity and mutuality. It is a kind of farming in a holographic reality.

When various cycles are embedded, you start thinking in nested systems of different dimensions, somehow in a hierarchical relation to each other, but all with comparable properties. Ho's thinking is fundamental (not only thermodynamically, also practically) for designing robust systems that tackle some current challenges in agriculture worldwide. Astronauts, once back on earth, insist on their new awareness of seeing the world as one system and they invite humanity to respect this principle in all aspects of life. 'It is the only earth we've got'.

Quantum coherent living systems: far away from thermodynamic equilibrium

In terms of quantum theory: a quantum coherent living system is far away from thermodynamic equilibrium (that state of a living system means it is low in entropy). To reproduce its life cycles, the system captures and internalizes energy and mass from the environment. Appendix 19 describes the biological significance of Bose-Einstein condensation of photons to explain coherence and local order. In this context, Ho does not refer to 'sucking Information' from the environment, but she does mention Coherent Domains and introduces new jargon, like Characteristic Space-Times and Fractal Order. It is the most fundamental theoretical design of sustainable farm systems I can think of. Relevant theory, as it is already being applied on farms in practice. Below I will try to explain some of Ho's jargon.



The simple drawings of Mae-Wan Ho illustrate how energy may flow through a food system and how energy-loops can hold and store energy in food systems. Source: Ho's powerpoint presentation at 'The Art of Healing' in 2010, Driebergen NL.

All living activities are organized in cycles, with their specific biological rhythms, which occur everywhere in the living world. Cycles are also ubiquitous in the physical universe. Ho talks about Space-Times, meaning that every phenomen and every cycle exists both in space – somewhere - and in time, as every cycle in space is related to a time dimension. The time dimension ranges from the tiniest milli-seconds to years and centuries. The heart beats every second, nerve cells fire in a tenth of a second, protons and electrons jump in billions of a second. Cells divide in minutes and physiological processes have cycles of hours, a day, a month or a year. Living processes are organised by their characteristic space-times in a coherent fractal hierarchy. Processes with matching space-times interact most strongly - through resonance - and also link up to the entire hierarchy.

Communication by water

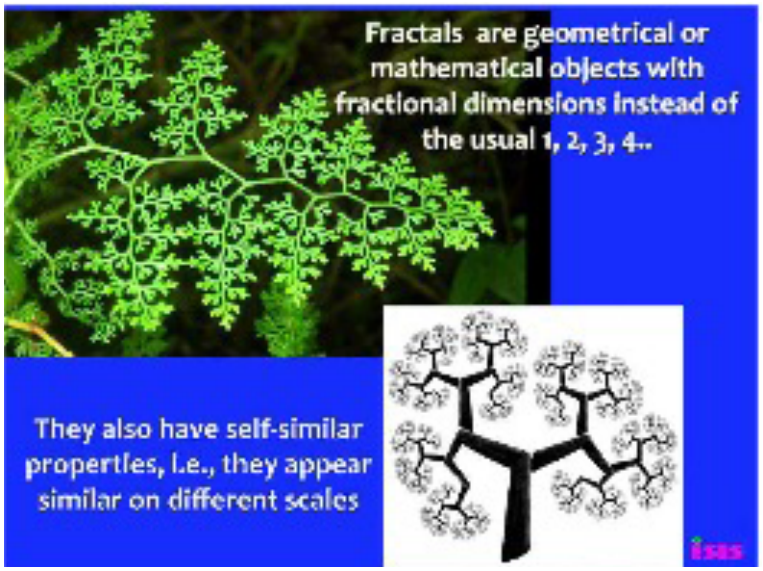
Of course, Ho had to answer the question how these space-times with their specific rhythms, communicate among each other. That's by resonance. She finds an explanation in the behaviour of water, essential part of all living systems, and more specifically, its capacity to form so-called Coherent Domains (mentioned in 3.1). This condition is quite similar to water in its fourth phase. In the Coherent Domain water molecules are energetically excited to 12.06 eV, just below the ionizing potential of 12.56 eV. The Coherent Domain has a plasma of almost free electrons. So, it is sensitive to the ambient electromagnetic field. Indeed, coherent domains can trap electromagnetic frequencies from the environment to orchestrate and activate specific biochemical reactions through resonance. She suggests, this mechanism might also work for the most precise regulation of the gene function[18]. The Coherent Domain could become a key concept in the quantum electro-dynamics in living matter.

Nested systems of fractal nature become self-organizing

Ho mentions the fractal structure, a type of internal organisation that is common in nature. The more coherent the internal fractal of a living system is, the more energy it can store, and the longer particles can stay in the cycle. This means that both energy and nutrients are kept in the living system and allow for achieving zero-entropy and zero-emission. Such systems will be the most productive as well, as this huge variety of living beings and forces in nature do most of the work for farmers and gardeners, if we allow them room to follow their nature.

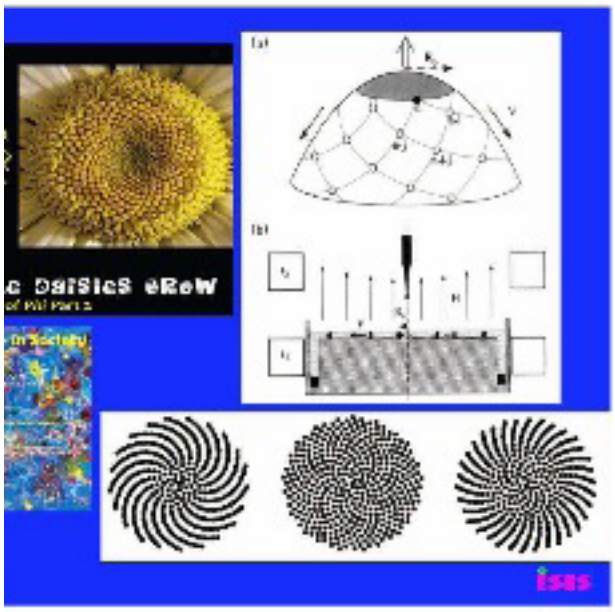
Cycles enable their Mass and Energy to be coupled together, so energy yielding processes can transfer energy directly to processes that require energy. And the direction can be reversed when necessary. This cooperativity and reciprocity is the hallmark of a sustainable system. The coupled cycles together form a nested fractal, a self-similar structure: each small circle has similar smaller circles within, spanning characteristic space-times from sub-nanometre to metres and from 10^{-15} seconds to hours and years. Every circle is itself also part of a wider cycle. Cycles confer dynamic stability and autonomy to the system on every scale. In perfect cycles, no net entropy is generated; hence such a system maintains its self-organization and its reproduction capacity.

Fractals are a beautiful example of the relevance of patterns in living systems, patterns that farmers can influence with information techniques.



Fractals are key in living organisms. They are key to understanding the physical universe. Source: presentation Ho, op cit.

Ho also elaborates on the self-similar *phi* patterns in plant life. Like the pattern in the cosmos. Here she confirms the thinking of Hugh Lovel. Both have made a very fundamental step towards the deeper understanding of Life in terms of energy, order and self-organisation.



Ho intensively studied the fact that many forms in nature apparently are organised according to a phi-pattern. Source: Ho, op cit.

One great example of her systems thinking is the 4000 years old rice-cultivation systems in the delta of China's Yellow River. These practices have been carefully documented by the American agronomist F.H. King in his book 'Farmers for 40 centuries, permanent agriculture in China, Korea and Japan.' (1911). It is interesting that also Chan felt so much inspired during his period with Chinese farmers.

A beautiful example of a living system, storing energy and nutrients for centuries. This means a vital, productive and healthy system.
Source: presentation Ho, op cit.

Circular systems

Ho in fact argues that only circular systems can achieve highest efficiencies, 'by closing loops in food, water and energy systems'. Closing these cycles creates a stable, autonomous structure that is self-maintaining, self-renewing and self-sufficient. Productivity and sustainability always go together in a sustainable system. Why? Because the different life cycles are essentially holding the energy and information for the whole system by way of reciprocity, keeping as much as possible within the system[19].'

In current society this recycling objective requires quite some reorganisation. It requires designing much closer links between land, producers, food industry, consumers and waste-handling systems. And it requires a fundamental repositioning of animal production. It is encouraging that some universities start to follow Ho's and Chan's vision that natural resource use and emissions associated with modern food systems can be substantially reduced by shifting towards circular food systems.

The booklet "Circularity in agricultural production" (2018)[20], provides a scientific basis for Wageningen University and Research and for its statement that "We – farmers, citizens, policy makers, industry – may once again be on the eve of a radical shift in our European food system, in this case towards a modern circular food system." As the mission of Wageningen U&R – where I enjoyed my study 50 years ago - is "To explore the potential of nature to improve the quality of life", I look forward to the time the University will also be inspired by a more fundamental MEI-approach in understanding the potential of nature.

Footnotes:

1 Anthony Oettinger, quoted from infostory.com
2 It is about saving as long as possible the dwindling reserves of phosphorous. They will become physically scarce within three centuries, but scarce in the market within three decades.
3 Van Wijk R., Yu Yan and E.P.A. van Wijk (2017). Biophoton technology in energy and vitality diagnostics. (pp189-202).
4 Jaros, G.G., and Cloethe, A. 1990. The biomatrix: The web of purposeful processes or teleons. In Koizumi, T., and Lasker, G.E. (Eds), Advances in Education and Human Development II: Social Systems and Processes. International Institute for Advanced Studies in Systems Research and Cybernetics, Windsor, Ontario.
5 Ho., Mae-Wan (2008).
6 From 'What is Life?' (1944, chapter 7).
7 Systems Research and Behavioral Science, vol 24, no 3, pp 369-372. (2007).
8 'Life on the Edge, the coming of age of quantum biology' was published in 2015 by Jim Al-Khalili and Johnjoe McFadden.
9 Hoe leven ontstaat. Op het snijvlak van biologie en kwantumleer. 2015. Atlas Contact.
10 Quantum physicist and former head of the Max Planck Institute in Germany.
11 Hanson & Hensen of the University of Delft (Nature, October 2015).
12 https://i-sis.academia.edu/MaeWanHo
13 http://www.i-sis.org.uk/DreamFarm.php
14 www.zeri.org
15 She elaborates on it in chapter 7 of her book 'The Rainbow and the Worm. The Physics of Organisms' (2008).
16 He was professor at Wageningen University, and director of the Dutch Institute for Agricultual Economics LEI.
17 Ho in 'The Rainbow and the Worm'.
18 Ho: 'Illuminating Water and Life' in Entropy 2014, 16, 4874-4891.
19 Andy Jones et al, 2012. 'Virtuous Circles; Values, Systems and Sustainability'
20 By prof Imke J.M. de Boer and prof Martin K. van Ittersum of Wageningen U&R.

6. Physics of Life

With every new technique I came across, I wondered how it might work? Many farmers apply unconventional techniques on their farm just 'because it works' while they can't explain why. Policymakers, researchers, teachers, and farmers or gardeners as well, need more scientific backing, both in theory and in measuring effects. How far have we got in explaining the way these techniques function? Do we have reliable hypotheses? Can we measure the more subtle energy qualities? Are we clear about what 'information' is?

Over the last 15 years, I have explored many theories, some of them already widely accepted but not yet applied in agriculture. The number of publications on these topics is strongly increasing. The variety in suggested explanations is still a bit confusing, as it always is in periods of emerging new insights.

An expanded view on nature is supported in various scientific domains:

- Electric and magnetic phenomena enrich our understanding of plant and animal;
- Quantum physics and quantum biology offer suggestions to understand life processes in addition to thermodynamics;
- The specialties of water may explain aspects of life we did not know;
- Geobiology explores the impact of geological phenomena on life processes;
- Studies of our body and consciousness in relation to nature.

The last domain will be dealt with in chapter 7. In this chapter 6, I focus on the first four domains. One leading question is how plants and animals - including man – are able to sense and capture vibrations and how these signals influence the physiological metabolism in plants and animals.

The matter of matter, some basic terms

First a short summary of basic terms. The concept of particle includes terms like mass, molecules, atoms, electrons, photons etcetera. Electrons, ions and molecules have an *electrical charge* and *magnetic polarity.* Already about a century ago, Max Planck, a German physicist, showed that electricity and magnetism are inseparable. He started talking about electromagnetism. The dynamo on your bike and the motor in your electric car are based on his discovery. Planck also showed that energy cannot be split up into smaller quantities than a *quant*. Carlo Rubbia got a Nobel prize for Physics in 1984, because he calculated how many quants of energy are required to keep up one particle. That's the incredible number of 9,746 x 109 quants. This is called Rubbia's constant. So, billions of quants of energy 'carry' one particle with mass!

The concept of wave deals with vibrations, frequencies and energy. The energy carried by very short waves is expressed in electronVolt (eV). The behaviour of electrons and photons can be studied from a particle-perspective as well as from a wave-perspective. Therefore, in quantum-theory one speaks of 'wavicles'. This is not meant as 'hybrid' between wave and particle but as options for becoming either wave or particle. Over the last 5 years, many short videos have appeared on Youtube, explaining this particle-wave duality.

A photon is a quantum of light energy, that means the smallest quantity of energy of which light consists. To calculate energy impulses E from radiation, you multiply its frequency f times the constant h of Planck: E=hxf. This formula shows the linear relation between frequency and energy: the higher the frequency, the stronger the energy impulse. You may also remember the formula in which Einstein expressed the relation between energy and mass. The energy of a particle equals the mass of a particle times the speed of light squared: $E=mc^2$. But be aware: Einstein mentioned a condition that is often forgotten: the transformation of mass into energy is only possible when the particle nearly has the speed of light. This is the case at the quantum level with electrons dancing around in atoms, that means everywhere.

6.1 The Electric and Magnetic

Bio-electronics

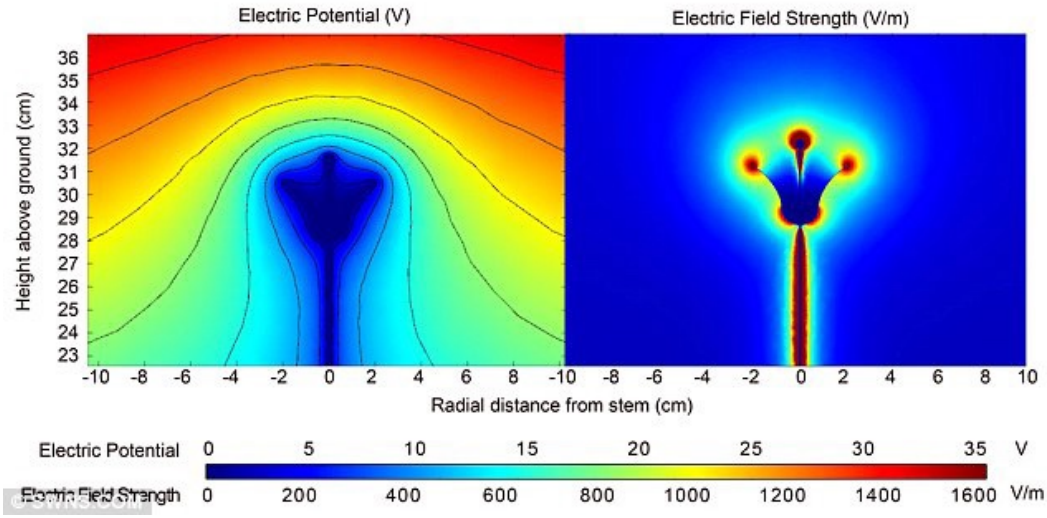
In the domain of *bio-electronics* plant and animal are perceived as an electrical phenomenon. The Midi-synthesizer that generates Music of Plants is just one example built on electrical principles (4.1). Plants, animals and people, with the electrical charges and magnetic polarity throughout their bodies, are fundamentally sensitive to all electrical and magnetic influence. Techniques and experiments discussed in the previous chapters prove this. Several studies, described below, shed additional light on the role of electricity in life processes.

Tomatoes react on electricity

In 2012, in South Africa, dr. Pieter van Zyl obtained his doctorate on the effect of electric current on the growth and production of tomato plants[1]. Van Zyl experimented with three different ways of administrating electrical frequencies. All three resulted in higher production i.e. 1395, 1603 and 2003 grams/plant, compared to untreated tomatoes (which yielded 1284 grams/plant). Van Zyl seeks an explanation in the enhanced activities of potassium and calcium ions at the border of the cells. These ions determine the exchange of other ions through the cell wall. His thesis is that electric frequencies resonating with 16 Hz increase the activity of potassium ions and (to a lesser extent) activate calcium ions as well, as these are sensitive to 32 Hz. Exposing plants to such frequencies, leaking from electrical current, would speed up the exchange of ions through the cell wall, increase the cell metabolism and - hence – plant production. That's how van Zyl explains the yield increase he measured.

Bees observe changes in electrical field strength

A second example of bio-electronics. The colour picture below shows the electric potential and the electric field strength around blossoming flowers. The proposition here is that bees observe this gradient of electrical voltage around the flower. They do not only react to the frequency of colour or smell. The picture below is published by the University of Bristol, UK.

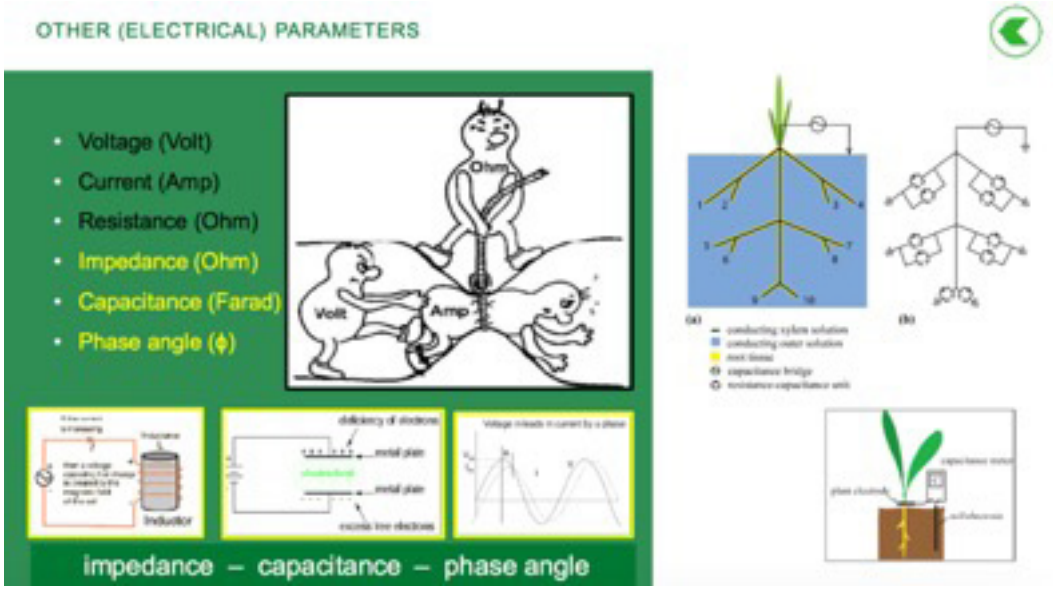


How flowers communicate with bees. Electric Potential lines (Volt) on the left hand picture and Electric Field Strength (Volt/meter) on the righthand picture, both around flowers. Source: "Detection and Learning of Floral Electric Fields by Bumblebees", School of Biological Sciences, University of Bristol, UK[2]. Picture from dailymail.co.uk February 21, 2013.

This kind of electrical approach of physiological processes in plants and insects has already resulted in many experiments. Trees also show very clear variations in voltage (4.1), that may be related to the internal metabolism, as well as to its physiological reactions on changing conditions.

Plant robustness from an electric perspective

The cartoon below shows the relation between Volt, Ampere and Ohm in electricity. Mister Volt pushes mister Ampere through the narrow belt of mister Ohm. Such processes also happen in plants, so you can design an electric diagram of a plant, as in the right-hand part of the picture. Many devices are available to measure these common variables in plants.



The basic law of electricity correlates the electrical current (Ampere) with the electric tension (Volt) and the resistance or impedance (Ohm). The right-hand part of the picture shows how you can perceive and study a plant as an electrical system. Source: Ed Moerman, pers.comm., 2016.

Researchers - among others at Koppert Biological Systems[3]- explore ways to make plants more robust by increasing their resistance against diseases and plagues. One of them, Ed Moerman, is focussing on this domain. He likes to quote the Hungarian scientist Albert Szent-Gyorgyi[4] who apparently has said:

"What drives life is a little electric current, kept up by sunshine. All the complexities of intermediary metabolism are just 'minor' additional phenomena."

Moerman starts at the very beginning of life: photosynthesis. He calls plant growers 'chlorophyll-managers'. Sunlight hits a plant leaf, excites electrons and then, stored in molecules by *photochemistry,* is transported to parts of the plant that need this energy to grow. This process may induce some fluorescence or suffer a little loss of heat. This process can be perceived as an electric process in plants, where electrical parameters like Ampere, Volt and Ohm (impedance) play a role. These electrical parameters apparently relate to acidity, redox potential and frequencies, parameters that indirectly indicate

the health of the plant. In electricity, all the magic is in the transfer of electrons. Reduction (= gaining electrons) and oxidation (= losing electrons) combine to form redox-chemistry. As electrons jump from atom to atom, they carry energy with them, and this transfer of energy makes all life on earth possible, indeed starting with photosynthesis.

Farmers who understand the electrical signals of action potential or slow wave potential, add it to their knowledge of the more familiar hydraulic and chemical signals in the plant. Hydraulic signals include changes in turgor pressure, pressure waves or mass flow. Chemical signals are best known: acidity, reactive oxygen species, Calcium and Potash anion signalling, phytohormones, MAP-kinase or inositol triphosphate. The combination of electric with hydraulic and chemical signals in a plant gives a more complete picture of the plant's health. Taryn Bauerle[5] mentions a series of common electrical signals in plants: 'action potential', 'slow wave potential', 'system potential' and 'wound potential'. Each one of them has its own function in the plant, as shown in the graph and included text below.

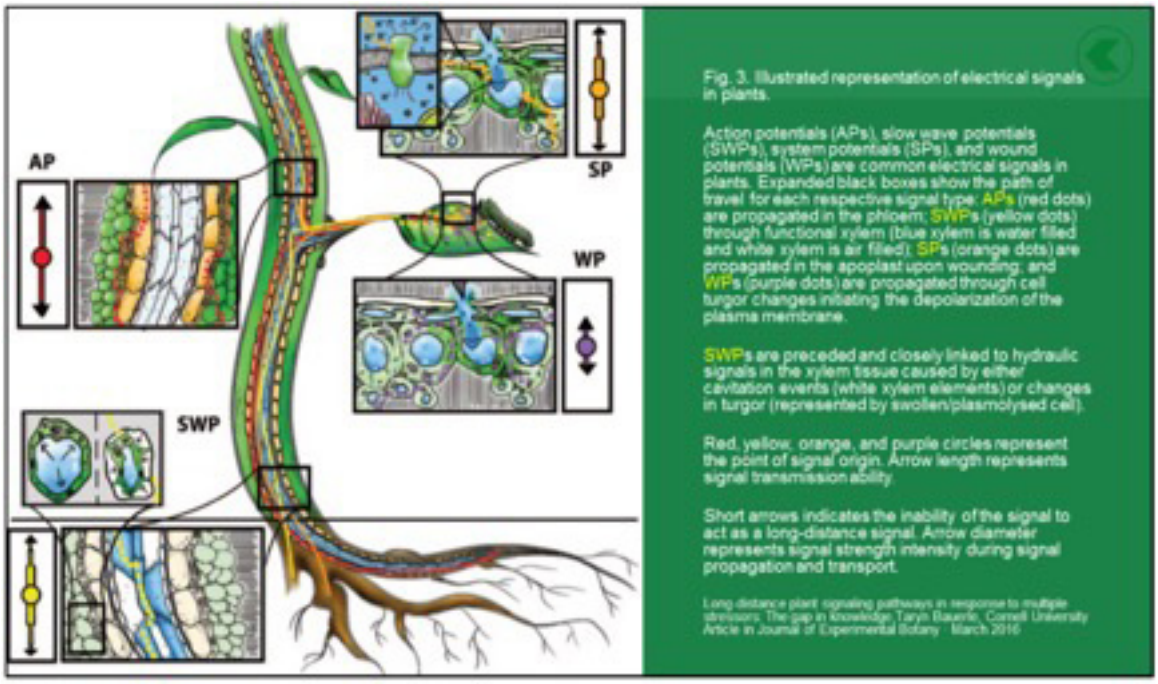
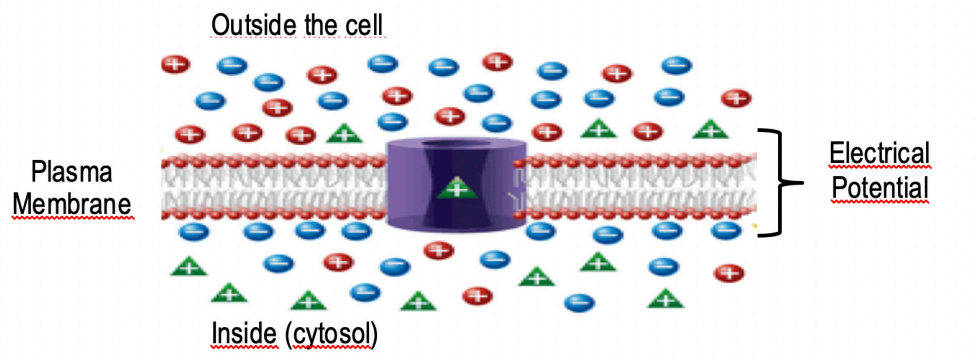


Fig. 3. Illustrated representation of electrical signals in plants. Action potentials (APs), slow wave potentials (SWPs), system potentials (SPs), and wound potentials (WPs) are common electrical signals in plants. Source: Taryn Bauerle, op cit. (2016).

In a plant, the electric potentials are very low, between 30 and 600 millivolt. Sometimes even above one Volt. Nevertheless, such low potentials have a lot of meaning. In short: below 50-100 mV the plant is relatively weak and above 150-200 mV it is active and vital[6].

Bio-electronics is a fundamental aspect of life processes indeed. All life processes are sensitive to, and always subject to electric and electromagnetic influences. The practical question now is in the more precise determination of the impact of specific impulses on every plant and animal and in the better interpretation of specific electrical signals. And the search is already happening. For example, the Swiss company Vivent[7] is developing PhytlSigns devices. They try to understand the meaning of typical shapes observed in electrical signal measurements in plants, and they focus on the electrophysiology of the cell membranes. Vivent staff visualizes this focus in the following picture.



Their measurements suggest the electric tension over membranes in animal cells ranges from 30-90 mV. While in plant cells they measure tensions between 150 and 200 mV. By following the movement of a typical signal through the entire plant, they also were able to conclude that the speed of electrical signals through a plant exceeds 27 meter/second. Imagine a high tree and realise that an electrical signal in the leaf will reach its roots within one second.

Magnetic interactions

The Beeswax magnet antenna capacitor had a positive effect on the potato yield (picture in 1.2). *Magnetic resonance* is able to influence

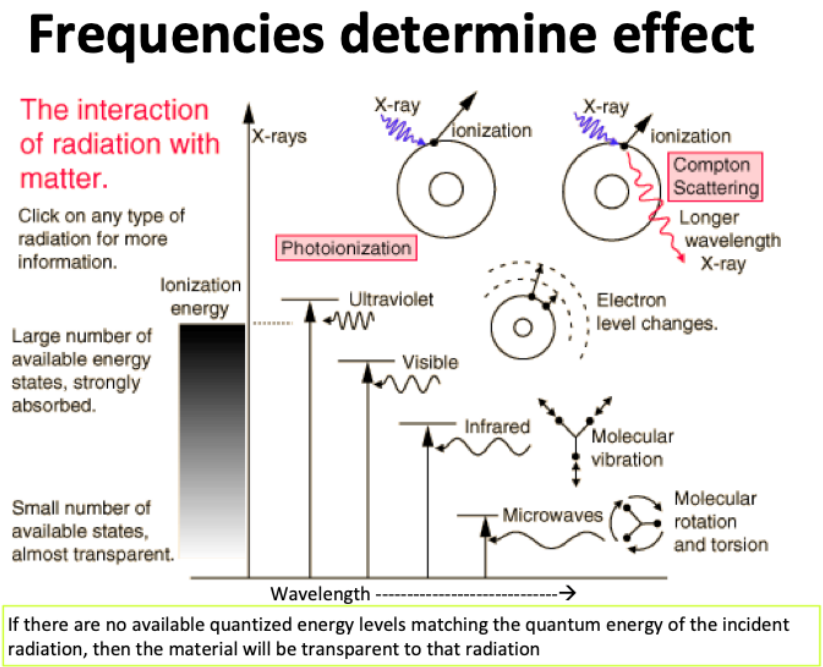
DNA. This is shown for example in magnetic treatments of seeds[8]. One can observe and measure the physical effects of such resonance during the growth of that plant. Variations in (electro-)*magnetic fields* also influence solid and liquid crystals in plant or animal body, not only in the brains of pigeons or whales that orient themselves in the earth's magnetic field. Part of the explanation is that fluctuations in electric voltage or in magnetic fields can generate *piezo-electrical* interactions in plants and animals: the receptors for it consist (among others) of a magnetic crystal (magnetite Fe_3O_4) that reacts to changing electric or magnetic fields. These receptors even react on variations in the weak geomagnetic field with a field strength of only 0.1-1 Gauss. Such electrical or magnetic impulses - weak as they may be - do inform plant metabolism or animal brain functions. These crystals have been photographed, so there is a visible foundation for the explanation of crystals as 'communication instruments' in nature.

The conclusion is that static and dynamic magnetic fields do influence liquid and solid crystals in the bodies of plants, of animals and of human beings. The electric results of changing magnetic fields - in turn - influence their metabolism and their behaviour. This phenomenon is in line with the suggestions in 3.1. that Coherent Domains in water behave as if it were liquid crystal, which makes them sensitive to electrical or magnetic influence.

Energy impulses determine electron reactions

Electrons respond to impulses of energy. It is important to realize that *different frequencies transmit different energy impulses*. The quantity of energy, transmitted in these impulses, determines the reaction of electrons and molecules in the chemical or physiological metabolism. At lower frequencies, molecules start to rotate or vibrate. At higher frequencies, electrons can jump to higher energy levels or even jump out of the attracting force of the nucleus of an atom. In hospitals, very high frequencies are applied for example to burn cancer cells in the human body. The energy impulses of every frequency can be calculated and the physical effect of such energy impulse can be verified in stone, plant or animal. These verifications together build a picture of the impact of vibration on matter and living tissue.

Space researchers in the Netherlands and in South-Africa and other countries - collaborating in LOFAR - are investigating all kinds of cosmic radiation. This search is not surprising if we look at the sophisticated research on the effect of light and sound and ultrasound on metals and minerals, like the work of Prof. Mason in Coventry University[9]. The influence of energy impulses on soil minerals is obvious from Mason's work on minerals. So it is evident that also cosmic radiations deserve further exploration, as cosmic radiations may as well have positive as negative impact on life. One of the outcomes of their research is a clear overview of different types of impact of energy impulses on the behaviour of electrons, as shown in the figure 'Frequencies determine effect' below. The shorter the wavelength – moving to the left side of the graph - the higher the frequency, the stronger the physiological impact can be. The low frequencies of long waves cause rotation or vibration of molecules. Around visible light frequencies, electrons can jump to a wider level while absorbing the added energy impulse, like is suggested in photosynthesis. Frequencies above visible light can cause ionization. Exposure to UV-light can cause burning of our skin. Much higher frequencies induce X-rays or gamma-rays, like the ones used in medical treatments.



Overview of the different reactions of electrons in atoms on various energetic impulses. Moving from left to right, the longer the wavelength, the lower the frequency, the lower the energetic impact and the less rigorous the reaction of electrons. Source: LOFAR, space research, South-Africa.

Technical radiation in agriculture

Nowadays mobile telephony is becoming an issue as well. These frequencies are below the frequencies of visible light, but higher than those of radio or micro-waves. Dutch researcher Cees Kamp[10] discovered in his tests that cress didn't sprout better with vitalized water, as he would expect, compared to non-vitalized water. He wondered why and supposed the introduction of 3G frequencies for mobile telephony might disturb the vitalization process. As soon as he changed the basic frequencies of his water vitalization treatment, the vitalization worked well. This would mean that technical radiation from the surrounding environment also plays a role in growing crops. Kamp assumes that crop growers may expect comparable effects as well from transmission masts with higher frequencies used in 4G and 5G communication.

Raymond Lescrauwaet, a Dutch horticulture adviser[11,] measures electromagnetic radiation on irrigation water and crops. He offers Aqua4D water systems to improve the water structure that has been deteriorated partly due to technical radiation around us.

With a simple device, a so-called mains filter, the impact of electrical radiation can be considerably reduced, as is clearly demonstrated here, from 160 (left hand picture) to 10 units (right hand picture).
Source: http://www.lescrauwaet.com

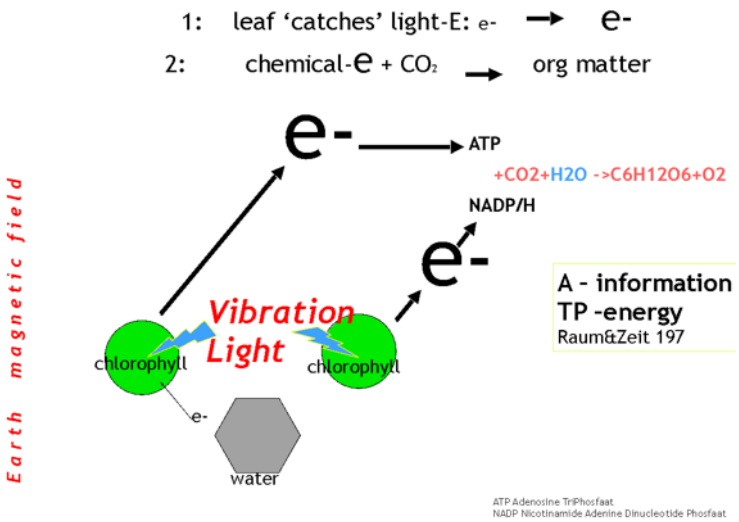
Plants can suffer from electromagnetic fields generated by common electrical networks with low frequencies of 50 or 60 Hz, resulting in

lower plant quality or less plant resistance. High frequency electromagnetic waves are broadcasted by wireless equipment and transmission masts. At molecular level, water is sensitive to both types of radiation. Many greenhouse growers install more and more electrical equipment, but they often forget (or just don't know) that this may have negative influences on their water and their crops. That's why Lescrauwaet works on building awareness among his clients.

To support Camp's and Lescrauwaet's fundamental point of departure, I share a drawing (below) of my understanding of the photosynthesis process, showing the excitation of electrons by light energy impulses. The excited electrons have a negative charge and will be sensitive to interaction with magnetic fields, whether it is naturally existing or technically generated. It is evident that photosynthesis, as an electrical process, is always subject to (changes in) the earth's magnetic field. The picture also makes clear how important water is, not only in keeping plants upright, but also in delivering the first electrons to be excited by the sun's photon energy.

The magazine Raum & Zeit nr. 197[12] published the interesting suggestion that the Adenosine in ATP would carry the information involved in the electron and that the TriPhosphate would carry the energy. If this could be confirmed, it would be a nice example of nature's capacity to handle both energy and information in one go.

Again, a solid conclusion: electrons and photons respond to energy impulses that influence physiological reactions in plants and animals. The energy impulses can either be generated by light, sound or other electromagnetic vibrations, or by cosmic radiation. The eventual result can also be influenced by variations in the earth's magnetic field.



Picturing the photosynthesis process at its start. The electrons e⁻, taken from water in chlorophyll, are being excited by sunlight into **e⁻** *and integrated in ATP and NADP/H molecules that in turn shape carbohydrates. As the electrons carry an electric charge (minus) they are sensitive to interaction with magnetic fields.*

This is a field of knowledge hardly developed in agriculture. It might, among others, provide an interesting perspective for understanding the role of cosmic forces in biodynamic agriculture, in Field Broadcasters and in the functioning of paramagnetic rock powders. I expect a strong growth in this research. Not only do we need better understanding for a responsible use of electromagnetic technology in agriculture, and life in general, we also have to take into account the potentially disturbing effects of unwanted or yet unknown radiation. Appendix 13 presents a bit more background about the electromagnetic influence of an office desk and about the heating impact of a mobile phone on brains.

Apperently it is very relevant for society at large to develop a common understanding of what types of radiation are risky and what types of radiation are healthy. "Due to a lack of knowledge," Nikola Tesla would have said[13], "mankind is increasingly polluting his electromagnetic environment with radio waves, microwave radiation, radar and other parasitic electromagnetic radiation that is in disharmony with the frequencies of living beings and of our solar system".

What is (not) safe?

The question on what doses of electromagnetic radiations are safe, raises a controversial issue. It is not only LOFAR who wants answers. The safety standards of various organisations differ enormously. The Dutch Working Conditions Act (Arbo) has taken relatively high radiation levels for acceptable[14.] The World Health Organisation WHO[15] looks more objectively to health risks and advises much lower levels. Housing and geo biologists suggest more severe norms, although these are still much higher than natural background values of radiation. These are the 3 levels of norms for electrical tension gradient and magnetic field strength, judged to be safe by different institutions, as compared to natural background radiation.

Electrical tension gradient [Volt/meter]

Arbo	<	20,000	V/m
WHO	<	5,000	V/m
Housing biology	<	5	V/m
Natural	<	0,0001	V/m

Magnetic field strength [nanoTesla]

Arbo	<	5,000,000	nT
WHO	<	100,000	nT
Housing biology	<	100	nT
Natural	<	0,0002	nT

Governments in some countries do not easily recognize the potential risk of electromagnetic frequencies used in ICT. One reason could be the money for the treasury generated by the sales or auctions of frequency bands. In March 2019 this was an issue in Brussels[16] where the federal and the regional government could not come to an agreement about how to share the revenues of making 5G publicly available. Of course, they also forwarded other arguments. Brussels' Environment Minister stated that "The 5G antennas rarely are beyond the experimental stadium of research." And "Brussels inhabitants are no laboratory mice whose health I can sell for profit." The call for European regulations on this point grows stronger.

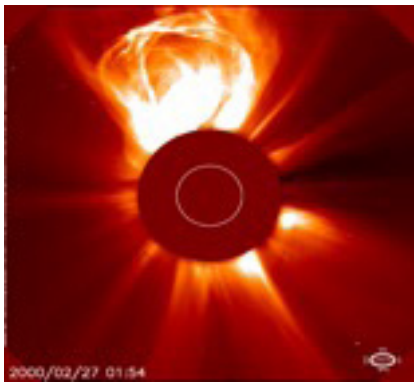
Barefoot doctors required

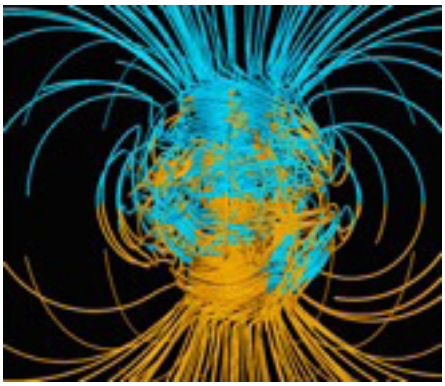
The enormous differences in safety norms and the treasury's financial interest, make it relevant to know how one can personally measure the energies of technical radiation. Various devices are available for this purpose, and a lot of advice is available on the internet. If you don't have any instrument available, become aware of the reactions of your body and mind and monitor them. For example, you can observe the impact of radiations on your body by using *kinesiology:* you test your body's muscle strength or weakness standing within or outside certain EM-fields, as explained in chapter 4. The weaker your muscles, the stronger the impact of that field on your body.

The next question is then how to protect your house, your stable, yourself and your cattle? Is there any 'barefoot' method? One way is by imagining in your mind that the thing you want to protect is 'immersed in a field of white light'. It can be a computer, an antenna, a person, a field, a house, a herd, anything. Or invite a geobiologist to do it for you. It only takes some minutes. A different one is to place grounding mats underneath your computer. And last but not least, you just walk barefoot, as your animals do. This way you will get rid of much stressed energy. Walking barefoot on stone, grass and sand will help you grounding. This does not work well on wood as it isolates.

Natural radiation and geo-biology

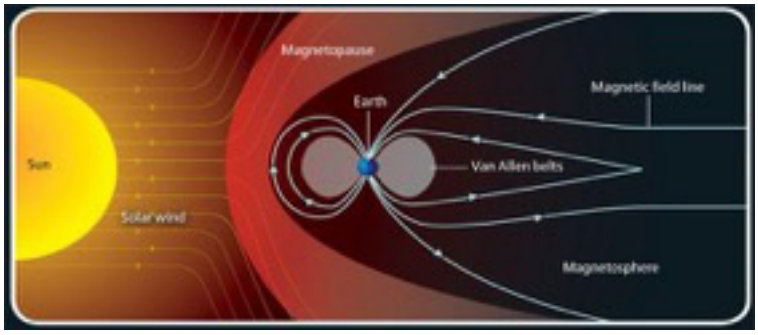
It is not only technical radiation that influences life. We know about the natural energies of the sun, of the earth and the moon. The omnipresence of earth energy fields in itself explains why ancient cultures have developed techniques to sense and handle such energies for various purposes. The issue is not whether or not these fields are real, the question is why modern men ignored their existence.





Left: a picture of a highly magnetic coronal mass eruption from the sun. Right: a computer-model of magnetic field lines in and around the earth. Source: NASA: earth's electromagnetic fields, www.wikipedia.com

Coronal mass eruptions from the sun regularly influence space traffic communication. Pilots are being warned timely as such eruptions can - after 8 minutes - disturb flight communication. These eruptions involve strongly magnetic impulses. Fortunately, the Von Allen Belts shield the earth from almost all harmful radiation, as shown in the image below. The radiation dose received by an astronaut on the shortest Earth-Mars trip – hence outside these protective Belts - would be equal to a whole-body CT-scan every week. And as the moon has no atmosphere and a very weak magnetic field, it offers only little protection against these eruptions. So, astronauts trying to live there would have to construct their habitat underground to protect themselves from an overdose of solar radiation.



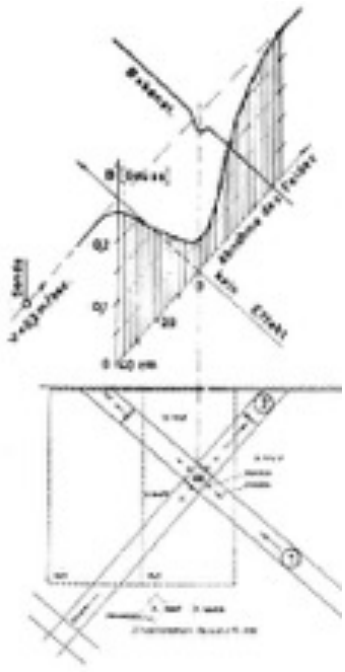
Cosmic radiation is relevant for life on earth. In this picture the earth is represented by the small blue globe in the centre of the magnetic lines. Without the shielding Von Allen Belts, shaped by the Earth's magnetic fields, every form of life on the earth's surface would be burnt. Source: www.journeytothestars.wordpress.com

Some research has been done on the influence of the Sun's or the Earth's magnetic fields on people, but less on animals and plants. That's probably why the tradition of intuitive sensing of earth energies has developed and maintained itself based on personal experiences and tacit knowledge of thousands of people in every country.

Geobiology – about natural energy lines

People, able to sense the subtle energies, have no doubt that several natural energy nets exist in, on and around the earth. The most famous nets are the Hartmann and Curry nets, they can be sensed anywhere in the world. It may be a controversial issue, not yet backed by scientific measurements, but I report on these nets as I feel them myself.

The Hartmann grid was discovered by the physician Ernst Hartmann in 1954 and described in detail in his book *Krankheit als Standortproblem* (Illness as a Location Problem). This grid is associated with the Earth's magnetic field[17].

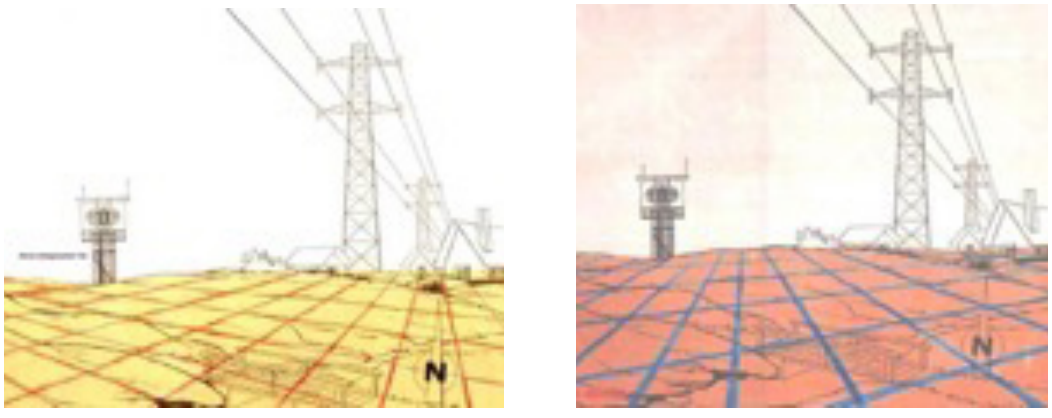


The experiment of Hartmann with a magnetic sensor in a cross point of the grid. It is based on the magnetic flux density. In N-S direction the deviation is clearly measured. In the E-W direction the deviation is minimal. Source: www.erdmagnetfeld.pimath.de

The grids are steady oscillation states of the earth magnetic field with a certain frequency. The lines in the Hartmann-grid measure between 20 and 30 cm. in width approximately. And they are spaced about 2 m. apart in the North to South direction and about 3 m. apart in the East to West direction. However, these values can vary immensely depending on geographical location, I have sensed the lines in the Netherlands as well as in Sri Lanka.

Although the Curry grid is named after Dr. Manfred Curry, an American doctor born in Munich, who published it in 1952, this grid was actually discovered by Siegfried Wittmann in 1950. The Curry grid runs diagonally to the Hartmann global grid, that is NorthEast to South-West and North-West to South-East. Its lines measure between 30 and 40 centimeter in width and are spaced between 2,5 and 3,5 meter apart. Like the Hartmann grid, the Curry grid also encompasses the entire Earth. Moon cycles influence the intensity of the Curry grid. At full moon, energy levels are particularly strong where it intersects with the Hartmann Grid. During the day, its intensity wanes, but at night it can lead to insomnia. The Curry grid probably originates from cosmic radiation rather than radiation coming from the Earth[18].

These nets are under stress, probably related to the way we use the earth. Both for animal and human health, it is important that these lines remain healthy.



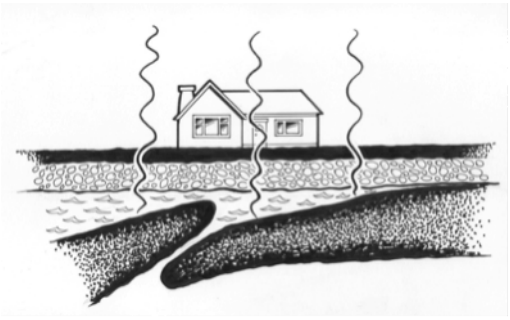
Pictured left: Hartmann-lines oriented North-South and East-West. Pictured right: the Curry-net crosses the Hartmann lines at angles of 45 degrees. Source: www.hooijerwoonbiologie.nl

Ancient knowing

In positioning churches, the builder had to know where water veins cross each other, in order to know the position of the baptismal font. In many churches built in Europe before the year 1300, such energy spots can still be sensed. In the past, the pastor had to keep these lines healthy for his area and his community, which was also very important for farmers. Cows are sensitive to the geomagnetic field as well. In earlier times one would build the house only on a place where cows prefer to lie down.

Physical signs of geopathic stress include unusual plant growth – for example, stunted growth, sick plants, fruit trees that do not bear fruit, cancerous growth on tree trunks and twisted or awkward growth when it is not the norm – as well as cracks in concrete and walls, crumbling plaster, dampness and mould, swollen timber and loosening wallpaper.

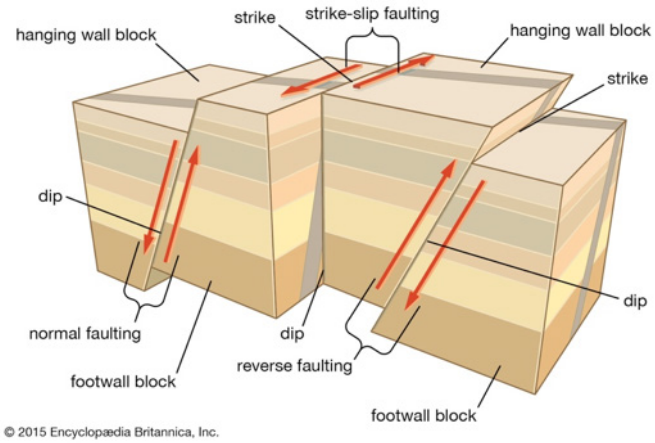
Remember that these energies, even when felt to have a negative impact, are not good or bad. Something that may be harmful to humans may actually be beneficial for other species. Some plants and animals thrive on geopathic stress. Some stress-loving trees include oak, ash, willow, elder, elm, plum, nectarine, elderberry and apricot. Trees that avoid geopathic stress include pear, walnut, birch, plane, conifer, fir and pine. Animals and insects that thrive on geopathic stress include ants, wasps, bees, beetles, termites, bacteria, viruses, cats, owls and snakes. Conversely, animals that avoid geopathic stress include dogs, horses, sheep, oxen, pigs, mice, fish, goats and chickens[19].



Geological faults may generate noxious rays that affect those living above them. Source: Patrick MacManaway.

Ancient China had developed a complete science on earth energies: feng shui, which still is applied today in the design of gardens, houses, burial places, offices and cities. Every culture has – at least in its margins - conserved such type of knowledge. Dr. Zaboj V. Harvalik, a physicist and scientific advisor to the US Army's Advanced Material Concepts Agency, discovered that the organ's responsible for sensing these changes in the earth's energies were the adrenal glands and the pineal gland[20].

Geological faults and water veins



Representation of geological vaults.
Source: EncyclopediaBritannica, Inc. 2015.

Most houses are subject to energy from geological faults in the earth. A geological fault usually develops an electrical tension[21] that can become disruptive, but it can be neutralised. Different rock layers have different fields of electrical voltages. When these layers move along each other, creating a geological vault, it results in higher concentrations of electromagnetic radiation on the earth's surface. Such radiation may affect animal and human health. Geopathic energies pass through walls, windows and closed doors – they do not recognize boundaries.

Water veins serve as paths for such geological energies. As they are very sensitive to external influence, they can also be disturbed with negative energy from human technologies or even intention.

The positive news is this: if you are strong and stable in your energy, radiation does not affect you too much. You can compare it to an allergy: allergic people suffer from it, others hardly notice it. Children generally are more sensitive to radiation than adult people. The same sensitivity holds for animals as animals have such bio-energy fields as well, only these have been studied much less. The impact of natural energy lines is not only 'energetic' (i.e. exhausting or reinforcing) but also 'informative' (i.e. shaping body processes or causing disease or influencing psyche). Pulsed radiation specifically has strong negative effects.

The work of geobiologists is increasingly important for society. These experts try to correct the pathogenic effects of the electrical or magnetic and subtle energy fields. In their jargon: they trace and clean up electropathy and geopathy. They investigate a dwelling for pathogenic properties to make the dwelling 'healthy' for the dweller. In practice, this mainly comes down to radiation search, both in the house, on the farm and in the field. A geobiologist can also strengthen healthy energy levels.

The conclusion is that the electric and the magnetic do influence plant, animal and human life on earth. The higher the frequency, the stronger the impact. Moreover, several earth energy fields have effects on the behaviour of animals and people. Cows love places where people also do well. Places preferred by cats or ants may harm people. This conclusion shows how relevant it is to understand these fields and their forces. Until recently, dealing with these energies is considered an art or a talent, sometimes unfortunately even an occult practice. The further understanding of E and I components of life processes, together with the health problems increasingly reported from technical radiation, will most probably generate a lot more support for the domains of electrophysiology and for geobiology. The tacit knowledge of generations will increasingly be supported by modern explicit knowledge.

6.2 Quantum principles in life

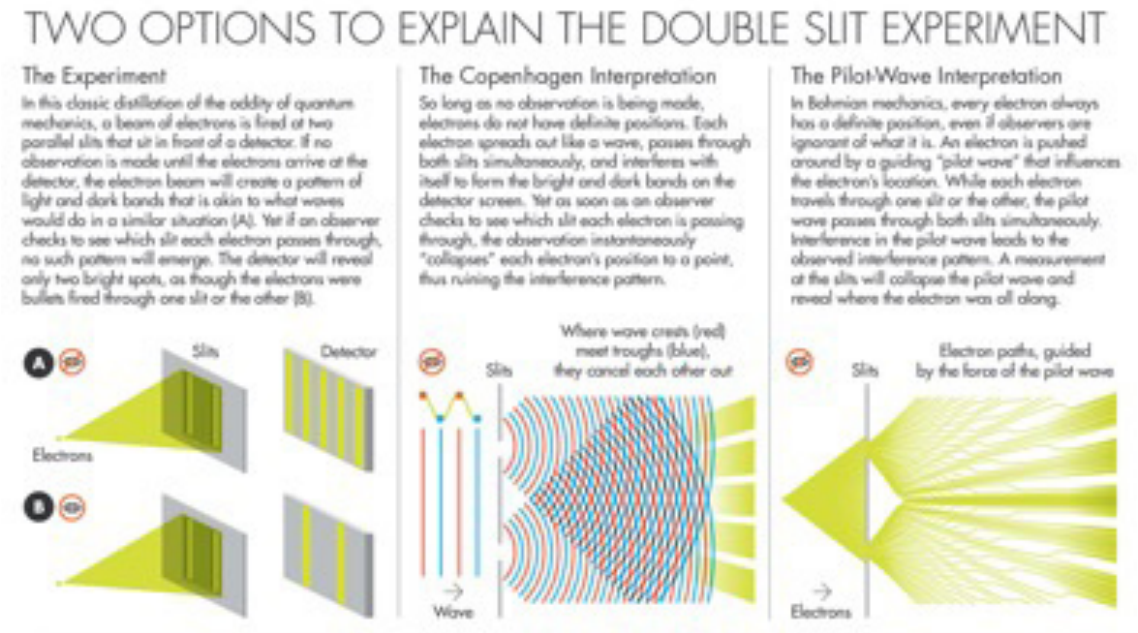
For a further expansion of our view on life, we dive a bit deeper into the famous particle-wave duality and into quantum computation, into

Schrodinger's concept of 'order' and into entanglement. Most of the quantum principles are difficult to imagine, but in spite of their weird character we need them to understand nature at a deeper level.

Particle-Wave Duality

The discovery of Sternheimer, with Genodics as its technique (1.1), gives a good example of the practical application of the particle-wave duality. Specific intervals of specific frequency waves steer the synthesis of particles in amino-acids into proteins. In quantum physics theory, discussions still continue how to best understand these quantum-level processes.

For our agricultural purpose we don't have to fully grasp this principle[23], it is enough to be aware of this particle-wave duality and to have a clue about its meaning. This duality[24] was discovered through the so-called double-slit experiment. Therefore, this experiment deserves a little explanation.



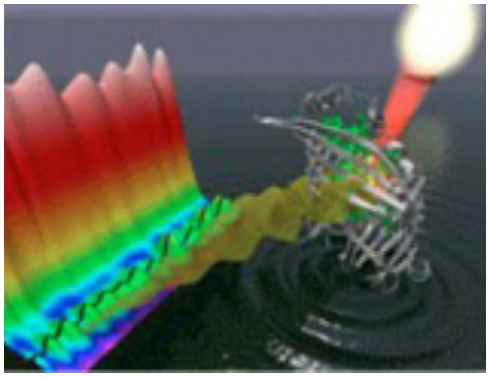
At the left side the set-up of the double-split experiment: in situation A the electrons are not observed, which results in a typical wave-pattern on the detector screen. In B the process is measured (which is a kind of observation) and results in two bars on the detector screen, a typical particle-pattern. Source: Lucy Reading-Ikkanda for Quanta Magazine, quoted in a paper of Dan Falk on quantamagazine.org , May 16, 2016.

The *particle-wave duality* makes clear that any tiny particle can also behave as a wave. It is unavoidable to conclude that waves can influence the behaviour of particles as these can behave as waves as well. Frequencies are an expression of all matter. The vibration frequencies of each element and molecule are known, they have been calculated by Louis de Broglie already in the 1930s. Atoms and molecules and cells - and all tissues formed from them - must be sensitive to frequency patterns. This principle offers a valid basis for working with waves and frequencies in agriculture and horticulture. It is justified not only in theory, it is proven in practice as well.

The particle-wave duality is a valid starting point for the move in thinking from particle-based techniques to wave-based techniques. Sternheimer's discovery offers one explanation of the 'how'. All forms of life containing amino-acids and proteins, react on frequency intervals specific for these proteins. Waves can have effect on biological processes. An unavoidable consequence of the particle-wave duality.

Quantum computation and superposition

Quantum computation plays a role in photosynthesis, and probably in many others processes as well. It would explain the high efficiency in absorbing solar energy in ADP and ATP in the leaves[25] . The principle of quantum computation means - for example - that energy impulses from sunlight on a plant do not follow a straight path in the chlorophyll, but they follow various paths at the same time. The principle has been discovered because researchers recognised wave-like behaviour of photons in photosynthesis, as shown in the following picture. This wave-shape, appearing in the red peaks at the left side of the picture, looks like the detector screen in the unobserved double slit experiment and therefore suggests that photons behave as if they are waves.



The wave-alike behaviour of sunlight particles (the red peaks at the left) was recognized in plants while capturing the sun's energy (represented by the white spot at the right). Source: Photosynthesis by Quantum Walk, Scientific American News, April 13, 2007.

Researchers not only refer to quantum *computation*, they also refer to *superposition* as an option to explain the behaviour of light particles. Superposition means that an unobserved particle exists in all possible states at the same time. Once being observed or measured it exhibits only one state, its potential has 'collapsed' into that state. If we wish to better understand photosynthesis, it would make sense to pay attention to its quantum-physical aspects. It is of great importance for all plant and algae cultivation. And we can go beyond photosynthesis: a wave-approach in all life processes will create an important additional body of knowledge for agriculture.

Order and Vitality

For a long time, we thought we need energy for its calorific value alone. Later on, order came into the picture of food quality. Organisms maintain themselves by continuously 'pulling order from' their surroundings, not only energy and nutrients. This 'order' fits well in the MEI-picture, it is an aspect of Information that plants require for living. In other words, internal order is the result of vitalizing information. The degree of order can be visualised by photon cameras (appendix 5). Plants are 'light-keepers-of-extreme-quality'. The more coherent the frequencies of light emitted by an organism are, the better the organism can hold its energy. If the plant sucks in sufficient order , its internal order[26] is enhanced, its coherence is high, and so

its vitality. And such food has a long shelf life and it boosts the health of its consumers, animals and people.

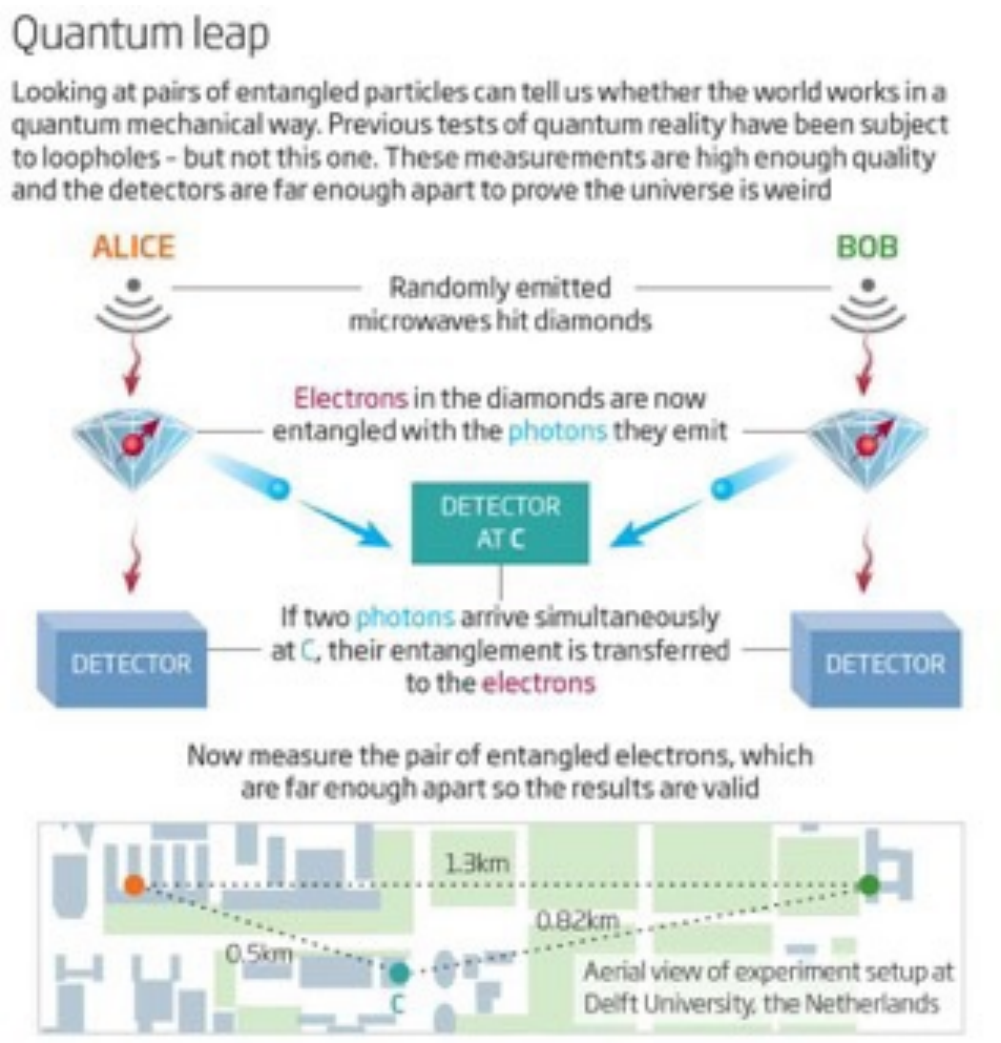
Photons in life-processes respond to impulses of energy and intention. Measurement of coherence in photon-behaviour – based on Delayed Luminescence - gives a reliable indicator for the vitality of food. The *vitality* of a plant or a food product is measurable as coherent patterns in the behaviour of biophotons (2.2). This theory is key in understanding *order and coherence* in living systems. And it is confirmed by many studies[27] [28.] This technique has the potential of a breakthrough in the current impasse found in discussions about food quality that is limited to a particle/mass approach. Furthermore, it rehabilitates the old concept of vitality of food that has been buried about a century ago, because vitality could not be observed before. Now it can.

In addition to bio-photon behaviour, 'order' can also be related to coherent domains in water, and to fractal patterns in plants and to states of low entropy and high vitality. We can expect order and vitality to become key concepts in future agricultural and food knowledge.

Entanglement

A simple picture[29] can help to explain the quantum principle of entanglement. The picture was made to clarify the great news in 2015 that the entanglement principle had been proven 'loophole-free', by a Delft University group in the Netherlands, coordinated by Hanson&Hensen. The experiment measures the time difference between a change of spin of 'electron one' and 'electron 2', immediately after the spin of the first electron had been twisted by the researchers. If quantum theory would hold – meaning entanglement is real – the experiment would not measure any time difference.

While in case the classic theory of maximum speed of light would hold – meaning that Einstein c.s. were right to reject the idea – a time difference would be found. The classical theory was dismissed as the Delft team has not measured any time-difference between the change in electrons one and two, positioned at a distance of 1,3 km of each other.



The set-up of the entanglement experiment.
Source: New Scientist, August 28, 2015.

Finally, the principle is proven 'loophole-free'. This means that in the 1930's, Einstein, Podolsky and Rosen were wrong stating that such 'spooky action at a distance' could not exist. The successful demonstration of entanglement does not mean however, that scientists have a clear idea how it works or what are the forces that make this principle functioning in reality[30] or whether forces are involved anyhow.

Based on this flow of arguments, I assume the quantum principle of entanglement comes closest to an explanation of the working mechanism of distant treatments in Radionics, Ecointention and mind power. For scientists it certainly is a challenge to understand the wor-

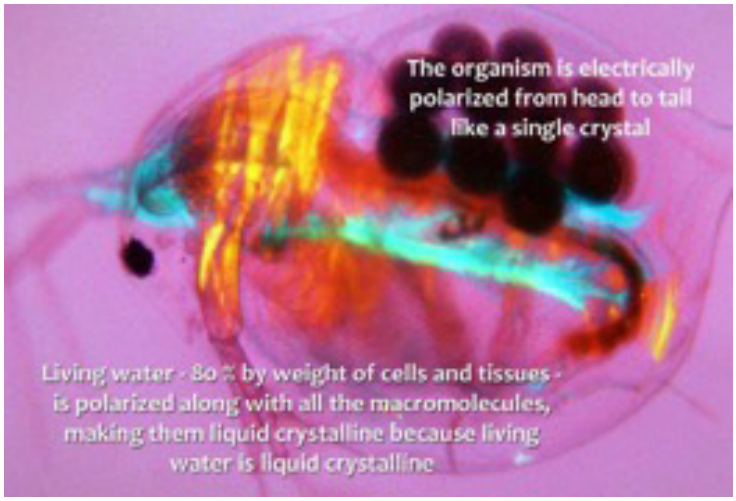
king mechanism of entanglement. Farming practice convinced me that this 'unconventional' principle indeed is working.

6.3 Informed water

As the special characteristics of water have already been discussed in chapter three, here follow some brief reflections only. Water is never without information. It is always polarized to a certain degree. New insights help us to understand the sensitivity of water and educate us to be careful with it: water behaves as liquid crystals, it forms coherent domains and organises itself in clusters. It is extremely sensitive.

Living water acts as Liquid Crystal

British researcher Mae-Wan Ho (2008) profoundly studied the liquid crystal character of water. Specific properties of solid crystals, like being receptive for certain frequencies, also hold for liquid crystalline water. The high levels of order in the configuration in crystals can also be recognized in the configuration of water molecules in vital water. In this condition, water changes: its electric charge is reconfigurated, it becomes more conductive and it gets more sensitive to external electric, magnetic or electromagnetic influence.



Electrically polarized water behaves like liquid crystals. This view explains specific qualities of water that relate to well-known characteristics of crystals. Source: Mae-Wan Ho, www.i-sis.org.uk

Ho also refers to the importance of Coherent Domains of water that are found everywhere in nature and are sensitive to electromagnetic influence. And as water is the dominant part of all living beings, all organisms are easily electrically polarized. And she adds an aspect to our earlier definition of vital water: it is liquid crystalline.

Form clusters

Crystals have a strongly ordered spatial structure. In geology, one knows a specific stone from its specific crystalline structure, visible under a microscope. One could say, in other words, they possess specific form clusters that repeat themselves regularly over the entire crystal. Water also can organise in spatial clusters, composed of groups of 50 to 400 molecules that are magnetically attracted to each other in orderly forms. But they remain liquid, more flexible than in a crystal. Because of their polarity the molecules are able to 'copy' form or vibration patterns, stick together and hold that form for a while and pass it on. The shape of water clusters may be relevant, as their shape could determine their ability to pass through membranes and to enter or not into chemical compounds and cells. Compare it with a key in the lock. When its shape fits exactly, you enter and go inside, or it doesn't and you stay outside.

The clustering tendency of water could explain the effectiveness of homeopathic medicine: such water has copied and consolidated the form of the original chemical compound. Its spatial configuration is internalised in the water during the stirring process of every next dilution and is maintained in spite of the chemical compound itself not being present anymore. You could say that water 'remembers' the presence of the medicine, by maintaining its spatial configuration. This way such 'informed' water could still have the same effect the chemical matter itself would have had.

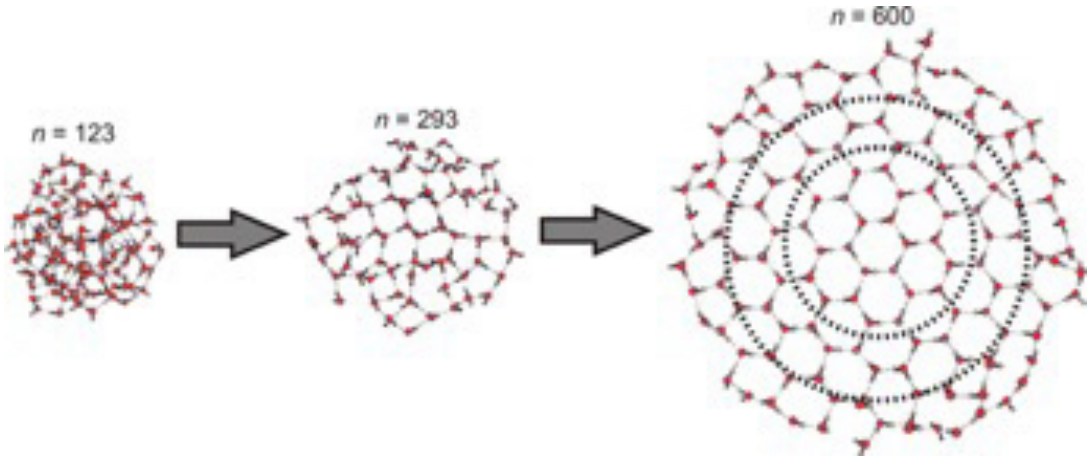


Illustration of the emergence of the crystalline core in water clusters, containing more than 123 water molecules. The pictures of 293 and 600 water molecules show central slices of the clusters. Source: Victoria Buch, Cristoph Pradzynski and Udo Buck in 'Chemists find smallest number of water molecules needed to form an ice crystal' at www.phys.org

The clustering of water through its hydrogen bonds and its liquid crystalline character may explain as well how water maintains the information received in the vitalizing processes. And how it can still exert these vitalizing effects in fields being watered through kilometres long pipes.

Form-resonance

The capacity of water to organize itself in clusters of special configurations, can explain how water can share form-information in the plant or animal body at levels of cells and protein (including DNA). That's why one could probably also speak of form-resonance.

Form-resonance cannot yet be rejected as a possible working principle in the Information category. On the other hand, form-resonance has not been investigated thoroughly, as 'form' is not developed as a determining factor in physiological processes. It is mentioned sometimes though, like in the work of French biologist Francis Halle[31]. He says that "Knowledge of shape and form – of any object, any plant or animal – gives access to much more essential information than any analytical and quantifying investigation." A hypothesis that might prove to be relevant.

Footnotes:

[1] Zyl van, Pieter J.J., "Radio Frequency Energy for Bioelectric Stimulation of Plants"(2012). Dissertation M-TECH in Faculty of Engineering and the Built Environment, University of Johannesburg, South Africa.
[2] http://science.sciencemag.org/content/suppl/2013/02/20/science.1230883.DC1
[3] www.koppertus.com
[4] I have not been able to find the source of this quote.
[5] In the article "Longdistance plant signalling pathways in response to multiple stressors: The gap in knowledge", Bauerle (2016) from Cornell University
[6] For example Rajda, Vladimir, 2004. Metabolische Energie und Elektrodiagnostik der Pflanzenvitalitat. Kurzbericht fur die 10. Internationale Tagung Elektrochemischer Qualitatstest BTQ 2004, Teil 1.
[7] www.vivent.ch
[8] Souza, A. de, 2006. Pre-Sowing MagneticTreatments of Tomato Seeds Increase the Growth and Yield of Plants. Bioelectromagnetics 27:247-257.
[9] Mason, T.J. "Power ultrasound in food processing—The way forward." (1998) In: Povey, M.J.W. and Mason, T.J. Eds., Ultrasound in Food Processing, Blackie Academic and Professional, London, 105-126.
[10] www.watiswater.nl
[11] http://www.lescrauwaet.com
[12] See raum-und-zeit.com
[13] A prudent formulation as this technical quote is difficult to trace at internet.
[14] On www.kennisplatform.nl you click on EMV or Elektromagnetische Velden. This is the joint platform of seven Dutch institutions.
[15] At who.int you find reliable information about electromagnetic fields and public health.
[16] L'Echo Belge, Le 29 Mars 2019.
[17] For example described by Klaus Piontzik in 'Gitterstrukturen des Erdmagnetfeldes'. Books on Demand GmbH, Norderstedt, Germany. And partly accessible at www.erdmagnetfeld.pimath.de
[18] Source: swissharmony.com
[19] Geomancyaustralia.com
[20] Naturaltherapycenter.com
[21] Piezoelectricity, appearance of positive electric charge on one side of certain nonconducting crystals and negative charge on the opposite side when the crystals are subjected to mechanical pressure. This effect is exploited in a variety of practical devices such as microphones. Piezoelectricity was discovered in research on crystals. On quartz, tourmaline and Rochelle salt, along certain axes, a voltage was produced on the surface of the crystal. The converse effect occurs as the elongation of such crystals upon the application of an electric current. Source: Britannica.com
[22] One of such very experienced people is Patrick MacManaway from the UK. He assesses natural and subtle energy situations for people, places and projects of all kinds with applications to domestic, commercial and agricultural environments. He also teaches geobiology. www.patrickmacmanaway.com
[23] Well described on britannica.com under electromagnetic radiation.
[24] The two most quoted interpretations are the Copenhagen interpretation based on the Schrödinger equation, and the Pilot-Wave Interpretation based on the work of Louis de Broglie in 1927 and further developed by David Bohm in 1952.

[25] Scientific American News, April 13, (2007). 'Photosynthesis by Quantum Walk'.
[26] Schrodinger, "What is Life" (1944).
[27] Especially Van Wijk e.a.
[28] British researcher, Mae-Wan Ho (www.i-sis.org.uk), also puts the concept of coherence at the heart of her research into the health of biological processes and living bodies. A healthy organism is "quantum coherent". (Ho, M-W. 2014).
[29] New Scientist, August 28, 2015.
[30] See however the infographic by Karl Tate 'How Quantum Entanglement Works' on www.livescience.com April 08, 2013.
[31] In his book 'Eloge de la plante. Pour une nouvelle biologie'. Seuil, Paris 1999.

7. Intriguing views

The knowledge of the physics of life, as described in chapter six, is supported by empirical data and therefore their relevance is evident. The views explored in this chapter, however, are intriguing but not yet widely accepted. As they fit in the M+E+I model, they may become relevant in understanding unusual farming techniques. Future research will distinguish the strong from the weak theories.

Strings are most fundamental in the hierarchy of the subatomic world. All the tiny particles would in the end be composed of networks of minute vibrating strings. String theory explores the vibratory functions of the smallest particles like electrons and quarks. This theory would fit well in wave-based techniques and it might - in the background - support quantum biology. But in this book I will not pay further attention to this theory, as today no farming technique is based on this scientific perspective.

The second part of this chapter deals with intriguing views about consciousness in the web of life. Most intuitive techniques require an open-hearted awareness of Nature, as suggested in chapter 4. Such awareness and consciousness are fundamental in the entire fabric of life. I assume that some theoretical background may help readers to better understand the techniques and maybe even dissolve subconscious hesitations for opening of heart and mind. As for myself, it worked that way.

For now, I will focus on the potential of Global Scaling theory, Information Ecology and Torsion Fields.

7.1. Intriguing in physics

Several scientists from Central and Eastern Europe are familiar with concepts and theories that are based on a wider world view, and that may – eventually - support more robust farming systems. They deserve to be explored further.

Global Scaling®

The first chapter (1.4) referred a horse health centre designed according to Global Scaling theory, and its potential role in animal husbandry. Global Scaling suggests that everything has its optimal scale, hence its optimal wavelength and its optimal frequency[1].

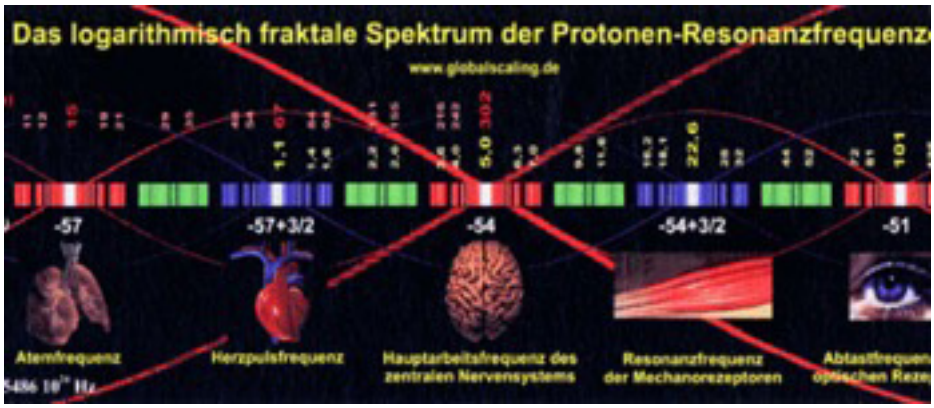
Almost 40 years ago biologists (a.o. Schmidt-Nielsen, Schnoll, Cislenko and Shirmunski) discovered this basic principle. Organisms, whose body sizes proved to be within specific ranges of magnitude, seemed to have higher chances of survival and reproduction. Surprisingly, this appears to be independent of the type of species investigated. The decisive discovery came from the Ukrainian biologist Cislenko. In 1981 he published the results of 23 years of research that showed that biologically favourable measures and dimensions are situated at equal distances along a *logarithmic scale*[2]. This was probably one of the most important biological discoveries of the 20th century[3]. Cislenko was able to prove this fact for an impressive range of living beings: over four thousand different mammalian species, over five thousand different kinds of reptiles, over four hundred bird kinds, almost two thousand kinds of amphibia, almost four hundred kinds of sweet water fish, over two hundred fish of the northern polar sea, more than twenty-one thousand kinds of insects, as well as numerous plants, fungi and bacteria.

Nowadays, this phenomenon is recognized as *logarithmic scaling in the frequency distribution of biological species* with reference to the body size and body mass of organisms. At about the same time physicists discovered a similar phenomenon of *scaling* (logarithmic scale invariance) *in the frequency distribution of elementary particles* based on the mass of particles in rest. In 1982 German physicist and mathematician Hartmut Müller - inspired by Cislenko - was able to show this logarithmic regularity for all known particles, nuclei and atoms, but also *for asteroids, moons, planets and stars*. One thing is clear, that logarithmic scaling is a global phenomenon, it might be the very blueprint of the universe itself, as some of these researchers suggest.

The phenomenon of scaling cannot be explained from a biological point of view, but is well known to high-energy physics. But why

would mature animals of very different species find advantages in special sizes, that fit certain intervals on the logarithmic scale? Cislenko assumed that competition in plant and animal worlds is not only about food or water, but also about best body sizes. He supposed that each species tries to occupy the advantageous intervals on the log scale, and he realised as well that mutual pressure of competition also gives rise to crash zones to be avoided. Later Müller recognized the cause in the existence of a standing pressure wave in the logarithmic space of the scales/measures. There are 'attractive' sections which are occupied by a great number of completely different natural systems; and there are 'repulsive' sections that most natural systems will avoid. Growing crystals or organisms that reach the limits of such sections on the logarithmic line will either stop growing or will begin to disintegrate, otherwise it will accelerate growth in order to overcome these sections as quickly as possible. The borders of 'attractive' and 'repulsive' segments on the logarithmic scale are easy to find because they recur regularly with a distance of 3 natural logarithmic units. This distance also defines the wavelength of the standing pressure wave: it is 6 units of the natural logarithm (in the picture below the sinusoid curve between -57 and -51).

Underlying the Global Scaling phenomenon *are standing waves dimensions, ordered on a logarithmic (not linear) scale of measures.* The mathematical realisation that the distribution of natural measures and dimensions is determined by standing wave processes does in fact manifest in the physical world.



A typical fractal structure from Global Scaling theory. Natural optimal values for scale and wavelength are not random, but are concentrated in certain optimal dimensions of existence. Source: www.longevity-systems.com

The picture above gives 5 examples of parts of the human body with their optimal frequencies c.q. wavelength: the lungs, the heart, the brain, muscles and the eye. Deeper theory and scientific references are presented on websites about Global Scaling. One practical way of testing the strength of this theory, would be by checking the results of treatments in the horse health centre in Uzwil, Switzerland[4].

Information Ecology

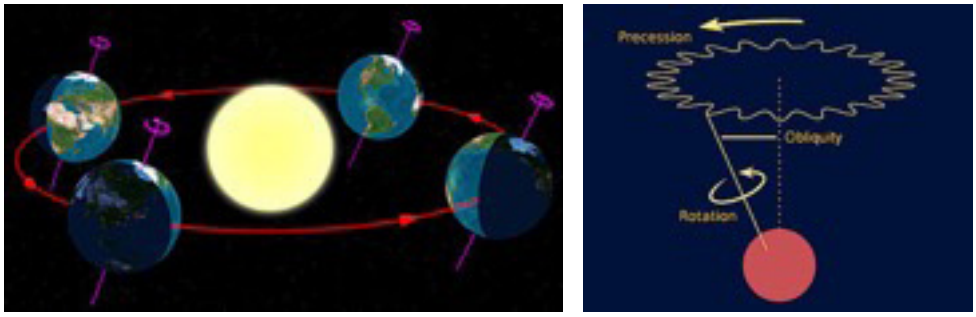
Information Ecology looks at natural systems as webs of information. The term is mostly used in ICT-environments, but scientists in Bulgaria, Ukraine and Russia have applied this informational systems concept to biology and ecosystems. Urikova[5] describes *Information Ecology* as follows: 'The world is seen as an energetic structure in which the universe, the earth and human beings are connected. The entire evolution process is based on the exchange of energy and information. Prof. Bratanov[6] frames it slightly differently: We live in a world of energy-information-interaction, which happens through interaction of electromagnetic and other waves. Every living system is an open system and is constantly exchanging substance (mass), energy and information within its environment. This theory seems fully in line with the MEI-concept.

In 2007, prof. Vladislav Popov, head of the AgroEcological Centre in Plovdiv's Agricultural University in Bulgaria summarized, at my request, the most relevant scientific and agronomic developments published in Russian language on Information Ecology and torsion fields. Many publications in Russian are hardly accessible in other continents. For people able to read Russian, the literature section in this book includes some relevant publications in Russian language, quoted from Popov's report.

Torsion Fields

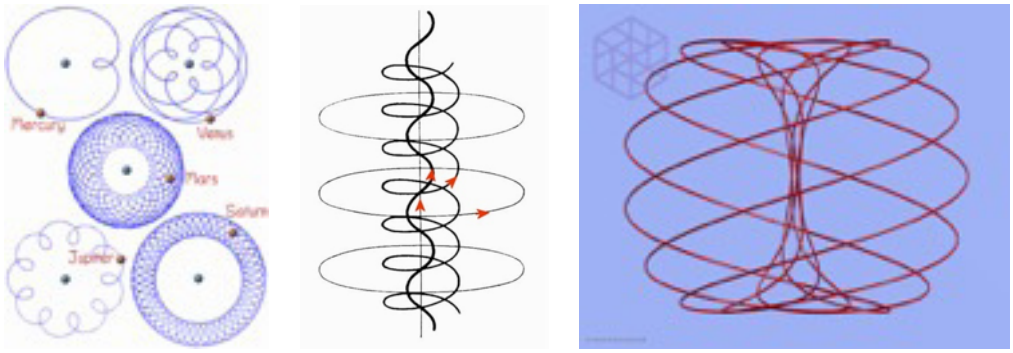
The Torsion Field theory is in its early stages, but with some proof and with measurable characteristics. It seems to be a promising hypothesis to better understand the interactions between mass, energy and information in life processes, as well as understanding the impact of differing states of consciousness on matter.

Torsion is one of the fundamental forces in nature according to Victor Schauberger. He used it to understand the vortex order in flowing water. Any object or particle that participates in two different cyclic movements, produces torsion waves and possesses its own unique torsion field. This is just basic physics. The earth is one example, as it turns around its axis and it circles around the sun. Moreover, it spins around its own axis.



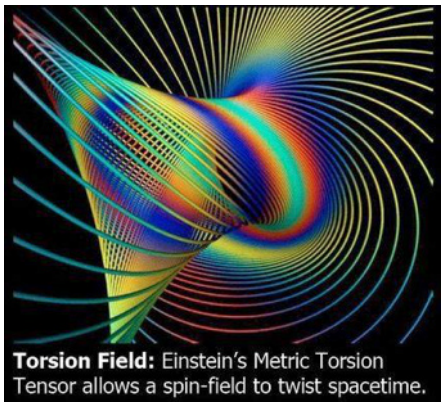
The triple cyclic/elliptic movements of the earth (left). The earth rotates once a year around the sun and once a day around its rotational axis; this axis itself rotates slowly, completing a rotation in approximately 26,000 years. At the right, the sinusoid shape of a point at the surface of planet Mars: a wave phenomenon. Sources: NASA at marsed.asu.edu and 2.bp. blogspot.com.

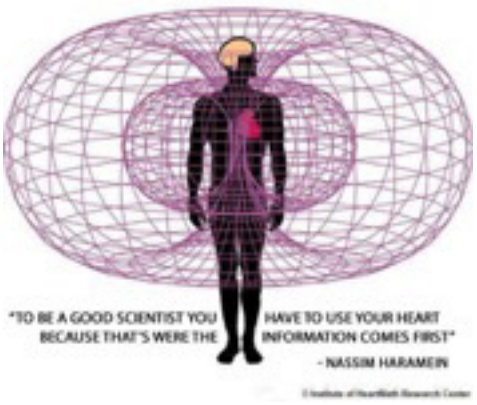
Less evident is the suggestion that every cell, every plant, animal and human being has a complex torsional system with a very specific, individual torsion field. Such field forms a specific information space, that carries all the information of this organism. Even thoughts, emotions and feelings from human beings can be considered as torsional energy[7]. If someone has negative thoughts, he makes left-turning torsion fields, that have a negative influence on the creator of these fields himself and on his environment. Torsion fields might influence the material world and guide all processes[8].



At the left we see the 2-dimensional projection of these torsion-like movements of planets. When you design these movement lines of a point on a planet in 3-dimensional space you get torsion shape movements like the middle and right figures. (Sources: Wikipedia, mrich.maths.org and Don E Mitchell at pinterest.com)

As English language is more accessible for me, I looked into the work of Susan Joy Rennison, who studied geophysics in the UK. She analysed the available knowledge about torsion fields and concludes that "The concept of torsion field is fascinating, but the use of this mysterious force is not new at all. Mystics, yogis, shamans and healers have worked with these forces for centuries and well documented studies have shown that people are able to manage these forces. Several scientists have correlated these forces with the torsion field theory, originally developed by Einstein Albert and Elie Cartan in 1913. It seems to be a kind of energy that only contains information and would have no measurable power. Torsion waves – with their inherent information - travel in space. Their force is related to the density of the spin-impulse momentum, according to Cartan."





A toroidal shape of a torsion field and the torus-shaped magnetic field around the human heart.
Source: www.picstopin.com and www.heartmath.com

What properties do Torsion Field have? A torsion field is not the same as a gravity field or electromagnetic field; it is generated by the density of spin-impulse momentum. They have an axial symmetry, explaining why both clock-wise and anti-clockwise torsion fields exist. They transfer information without transferring energy; torsion field signals would travel 10^9 times faster than light. This means they would exist

beyond 'normal' space-time. Every physical object has its own torsion field and can be influenced by other torsion fields a.o. of permanent magnets. Strong torsion fields can be generated by high electromagnetic tension and by devices with spiralling electromagnetic processes. Torsion fields can be generated, measured and switched off. The torsion field can extend without loss. And a torsion field has memory[10].

Around 1900, Nikola Tesla was the first to experiment with two spiral coils (caduceus shaped). He fed the two coils with opposing alternating currents so that they would create electromagnetic fields that would be self-cancelling. Although the electromagnetic fields were cancelled out, he demonstrated that his coils were able to transmit energy over long distances[11].

Kaznacheev, a researcher from the Novosibirsk Medical Institute in Russia, carried out research in 1981 using anti-clockwise and clockwise turning torsion fields generated by a special torsion generator. Counter-clockwise rotating torsions caused accelerated cell division. Fields that rotate clockwise reduced cell division.

Tests conducted in the proximity of a torsion field generator, by The Ohio State University Engineering Microwave Laboratory USA, have detected wave emissions in the range of radio waves (4 MHz) and micro waves (2 GHz). This information can be very useful for further research on torsion field detection. As a component of the electromagnetic field, the torsion field may influence the physical characteristics of different objects or substances. They may have a good or bad impact on living bodies, depending on the field's turning direction. The torsion fields transmit information without transmitting energy, but they alter the spin state of the physical media and this would be an explanation of their influence on health[12].

Shapes and symbols and vortices

ECOintention techniques (4.2) sometimes make use of mandala shapes or pictures of geometric crop circles to inform life processes. *Agnihotra techniques*, based on ancient Vedic knowledge, work with pyramid shapes and fire at two special moments of the day: at sunrise

and at sunset[13]. The method seems to clean and vitalize both air and water. Some techniques upgrade or conserve food in larger pyramids structures. In various cultures, farmers and their priests make use of symbols and sacred texts to prevent and cure diseases.

Also Carl Jung documented that mandalas apparently influence life processes and psychic mind force[14]. Shapes would influence mind force, which in turn influences plant and animal life. Vortex-shapes appear in many natural processes, if only in water streams and in water vitalising devices[15]. Researchers at the university of Edinburgh studied how a vortex helps dandelions fly[16]. Vortices often are related to torsion fields. These shapes also appear in many drawings of energy and magnetic processes.

Fractal-structures are recognized in many plants. Mae Wan Ho suggests they are fundamental in nature[17]. Further study is recommended to better understand the real scope of using shapes and symbols.

We have not yet arrived at the border of all knowledge, we probably never will. Many fields of knowledge currently under exploration (although some of them are controversial) may appear relevant for a deeper and better understanding of natural processes, such as string theory.

7.2 Consciousness in the web of life

Most people who communicate with Nature intuitively know Nature is conscious. They have activated their right brain, so to say, for this purpose. Others may ask for some more scientific backing to help removing intellectual blockages of the left brain that prevent access of their right brain to the intelligence of Nature. And if so, how?

In several professions, intuition plays a very clear role and is even fundamental. Famous Dutch trend forecaster Lidewij Edelkoort is such an example. She describes how she gets her forecasting insights. "I am very sensitive for the zeitgeist. This 'spirit of the current era' beats me already before it beats society. … To a certain extent I am an oracle, *as that intuition, it's not mine. That intuition is universal. I am just one of those receiving it and broadcasting it in turn*. This instrument is getting

stronger, it is absolutely reliable. I even noticed I am able to predict a trend in taste for food industry. The taste of cherry, slightly bitter, will become important. I cannot always predict exactly *when* it will happen or *how* strong it will grow. Twenty-five years ago, I published a book about 2020. It all happened as I did forecast. It's weird indeed[18]."

What do we call consciousness? Everything that is sensitive to the environment in which it lives, that can interpret the environmental signals and can recognize abstractions or forms, has consciousness. This definition goes far, it also applies to bacteria. Several quantum physicists assume that even subatomic particles have a certain consciousness.

There is a major question behind: what is *reality*? Do we perceive the world as only physical or also metaphysical? If we perceive it as only physical, it will be very difficult to accept even the possibility of communicating with nature. Modern mystic Michael Roads tells his audience that the deeper communication with Nature is only possible through our metaphysical body, which he calls our light body. Nature is conscious while people rarely are, he jokes.

Whatever the view on consciousness in Nature is, it remains interesting to understand a bit more how it influences life processes. Somewhere and somehow the metaphysical has to influence the physical. Is it in the 'light bodies' indeed? Does the mystic Roads mean the same thing as the bio-photon researcher Popp when they talk about a 'light body'? And how does it work when the mind of a healer influences plant, animal or human life? How do sensing capacities of our entire body receive and absorb nature's information?

The reflection on consciousness of quantum biologists Al-Khalili and McFadden was already quoted[19]: 'The approach in which quantum-coherent ion channels and EM-fields play a role is certainly speculative, but anyhow it provides for a plausible relationship between quantum mechanics and classical physics in the brain….' Theoretical physicist Max Planck regarded consciousness as fundamental and matter as derivative from consciousness. Eugine Wigner, another famous theoretical physicist and mathematician, emphasized that it is not possible to formulate the laws of quantum mechanics in a fully consistent way, without reference to consciousness[20]. Both of them imagined a clear

link between quantum physics and the human mind. Maybe, one day, quantum physics will meet metaphysics[21]. It is certainly a person's state of consciousness that determines the energy and expression of their torus[22]. The human torus can range from energetically beautiful to being very disturbed and malformed.

If we further explore the deeper connections between man and nature, we can use the following hypotheses:
- The human body and consciousness are able to connect with electromagnetic and subtle energies and with information available in nature and with kinds of consciousness of plants, animals and places.
- The human mind and brain and heart are able to influence plant growth and animal health.

In slightly different wording: human beings are able to communicate with plants and animals. When I wrote this down, I realised it is ancient knowledge, known almost everywhere in the world. But I still wondered what the working mechanisms could be. Is it located in one of our body organs, like the brain or the pineal gland? Is it happening in the 'light body' or in the water? Or are all beings in connection with a larger body of knowing, something like a quantum information field?

The pineal gland and the brain

The pineal gland is an inner antenna for the outer world. It plays a key role in consciousness as well. The pineal is a tiny gland shaped like a grain of rice, in the midst of our head, just below the brain, behind our eyes and between the top of the ears. It seems to play an important role in both intention and intuition. The pineal is sometimes called our cosmic antenna. An antenna that also connects with consciousness in other living systems.

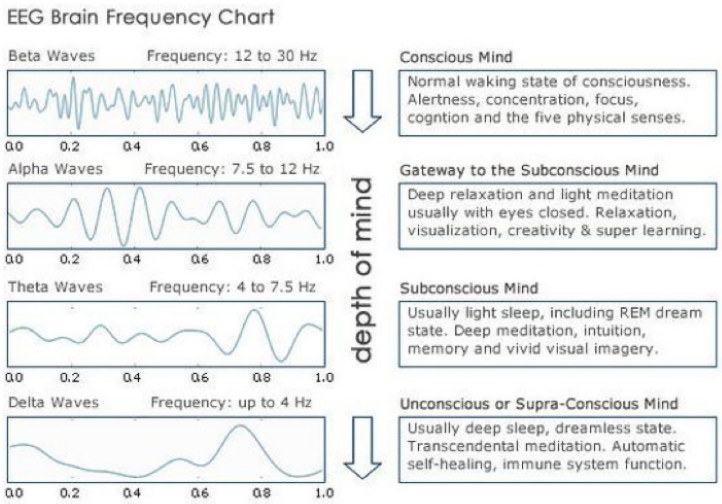
The pineal is sensitive to light, sound, magnetic fields, pulsed radiation, coronal mass ejections of the sun and other cosmic radiation. Magnetite crystals, among others, pick up this kind of signals. Very tiny crystals of calcite, aragonite and hydroxyapatite have been found in the pineal. They are measured in nanometres (1 nm = one thousands of a millimetre).

Changes in intention of the mind are measurable, they induce different brain frequencies in Electro-Encephalo-Graphs. These aspects get further explanation with some graphs in appendix 14.

Consciousness and photons

Living cells communicate with each other in different ways, a.o. through photons[23]. The connection with consciousness might be *created* by interference patterns of the different light signals. Absorption of photon energy can affect electrical fields in the brain or pineal, because light-sensitive substances are present everywhere. Astronauts, for example, are exposed to strong cosmic radiation, which can cause them to see many flashes of light with their eyes closed. This means that electrical activity of neurons can be converted into photons and vice versa.

Frequencies of electromagnetic brain waves can help to categorize different states of consciousness. In daily life one usually observes *beta* and *alpha waves* of fairly high frequencies between 60 and 8 Hz, which correlate with active brain functions. In deep peace and meditation these frequencies drop to between 7 and 1 Hz, in theta or delta-waves. The figure below shows these different frequencies typical for special states of consciousness and depth of mind.

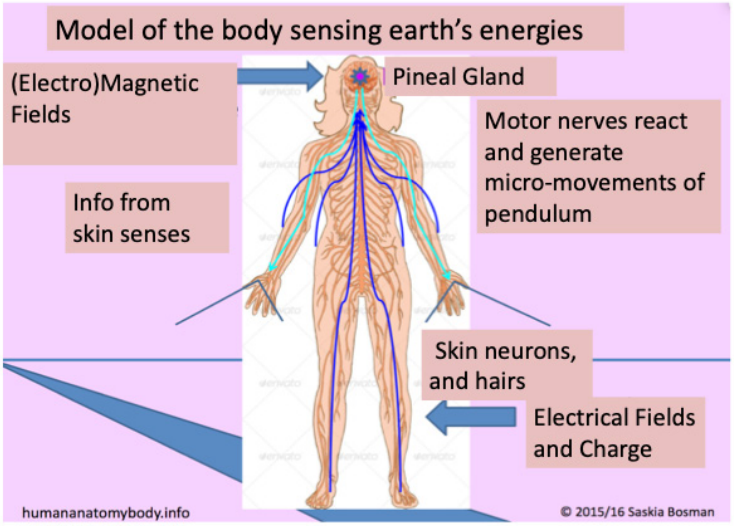


The four most frequently mentioned frequencies of brain waves in the EEG at the most common states of consciousness. Source: eliezerganon.wordpress.com

Frequencies are altered by prolonged periods of darkness, deep meditation, breathing techniques or by electric fields. These changes can be verified and measured. Both hormones and frequencies can influence the state of consciousness and vice versa. Breathing techniques appear to have a strong influence on the frequency of brain waves. Breathing techniques offer a simple way to calm your brain or to activate it[24]. Quite relevant, as a calm mind is a precondition for any communication with nature.

The body as our antenna

When you are sensing subtle energies from cosmos, earth, trees or soil, the signals come together in, or pass through, the pineal. The body is a sensitive instrument, some of its parts react like a needle in a magnetic device, causing electrical or photonic signals that induce micro movements in muscles. The nerves in the skin perceive vibrations as well. The pineal gland picks up subtle energies and controls muscles so that very small movements of the pendulum or dowsing rod can be induced. The degree of movement of such rod may be correlated with the strength of the signals received in the pineal. Chakra energy lines, the neural system and the hormone system also come together in the pineal. Crystals in the pineal are not only sensitive to electromagnetic waves, they are also sensitive to more subtle energies. Dutch researcher Saskia Bosman[25] condensed all this information into one picture shown below: The 'Model of the body sensing earth's energies'.



The body functioning as an antenna. The skin senses and energy lines in the body are connected to the pineal, the gland that also registers many other energetic, neural and hormonal influences. Source: www.inspiradiance.nl/actueel/scientific/wetenschappelijk.

In chapter 2.2 we accepted the hypothesis that the network of collagen tissue could facilitate communication in the body, and act as an antenna for external subtle radiation. Adding this suggestion to Bosman's picture, I get an image of the entire body as a great antenna, comparable to antennae of moths and mosquitos. Those sensitive networks in the body, taken together, have a function of information handling.

Old physics meets new science

Already many centuries ago, ancient cultures pictured the role of the pineal in sensing subtle energies. Subtle energy terminology is found in all kinds of cultural, religious, tribal and scientific texts as well as in modern science. Subtle Energy Sciences for example describes forty-five terms used for subtle energy. The SES website also presents a very clear definition of subtle energy. "Subtle energy is a term that refers to any type of energy that has some empirical scientific support for its existence, but nonetheless lies outside of the four forces accepted by mainstream science: the strong and weak nuclear forces, electromagnetism and gravity. There is evidence that subtle energy is intimately related to consciousness[26]." Dr. Claude Swanson referred to the field of subtle energy as 'the natural bridge between the old physics and the new science of consciousness'[27].

Why has the tradition of sensing energies been able to maintain itself in spite of being rejected by scientists for centuries? Probably because it is something real. For example, because the sun might radiate energies that we cannot yet measure with conventional instruments[28]. The light from the sun and the inner light of the mind would be merely two different aspects of the same thing. Dr. Lawrence LeShan introduced a novel theoretical model[29] in 1974. He related field theory of altered states of consciousness with surprisingly similar views of mediums, mystics and physicists. Electrons in living tissue continually absorb and emit photons, and in doing so they would also emit subtle

rays presently unrecognized by science. The interaction of light and matter would produce secondary emissions of subtle energies, which although not physically measurable, nevertheless play an essential role in inner perception. This idea becomes a bit more acceptable by recalling the fact that matter itself is made of light. On the other hand, the different frequencies of light are measurable while more unsubstantial forms of energies such as CHI, Qi, and Orgone etc. are not (yet). These could exist 'on the other side' of light as by-products of the physical interaction of light and matter.

So, we end up with two energy perspectives of the same world, one comprised of electromagnetic energy that is measurable and partly visible by the physical senses and a duplicate version, comprised of subtle non-physical energies, perceptible through inner vision. It would be in line with the idea of the 'light body' as intermediary between the physical and the metaphysical. A challenging vision, worth to be further explored.

The philosophy of Ervin Lazslo fits here. I am inspired by his publications 'The Self-Actualizing Cosmos' and 'The immortal mind' (2014). The latest theories in quantum physics suggest that the spacetime realm is not all there is: there is a deeper dimension in the cosmos. Consciousness could reside in that dimension, and only manifest itself in space and time. In the Standard Model of particle physics, for example, the basic entities of the universe are not independent material things even when they are endowed with mass. They are localized crystallizations or nodal points in a unitary matrix. The realization that dawns today is that the unitary cosmic matrix is beyond spacetime: it generates space-time. In current theories, advanced by Craig Hogan, Brian Greene, Juan Martin Maldacena, Leonard Susskind and Gerard't Hooft among others, spacetime is a holographic projection of codes at its periphery. The codes themselves maybe at the spacetime boundary, or perhaps in another universe. What is clear is that they are not in spacetime, but beyond it. The emerging view is that spacetime, and all the things that emerge and evolve in space and time, are holographic projections of a deeper dimension. In Laszlo's view that dimension harbours the consciousness we encounter in us and in other living beings. All forms of consciousness are manifestations of the integral consciousness that is beyond spacetime, that is

the integral logos, the absolute and unchanging reality the Hindus call Brahman. Erwin Schrodinger would agree: consciousness is one, it does not exist in the plural. Our consciousness is a holographic part of the cosmic consciousness, a part that embraces and contains the whole. It does not vanish with the demise of our brain, it only shifts from a localized to a cosmically integrated nonlocal form.

Mind power, intention and intuition

Good intentions can have a healing effect on plants, animals and soil. This effect is experienced by several people, farmers and gardeners included. The question how this could work has fascinated researchers for a long time. Could it work via our light body, as its frequencies are informed by the intentions of our mind and the love of our heart? Bio-photon researchers present photos[30] that show different intensities of photon light emitted from leaves treated by a healer as compared to untreated leaves. The healer exerts a measurable influence, probably via his or her own photon field. After treatment by an energy healer - who 'emits' energy and intention - the photon emission in the treated leaf gets more balanced and lower in intensity: the plant leaves hold photons better. This indicates an improved communication between cells in the leaf and between leaves and a higher internal coherence.

If the link between photon emissions and the pineal can be made, we have a beginning of a scientific basis for the functioning of energy healing in which the pineal and the collagen lines in the body play their roles. A positive or healing intention causes an electromagnetic field that encompasses your body, your heart, your brain and pineal. You might as well call it a light body. Once you are in the mental state of healing, you show a coherent field of both the brain and the heart, made visible in EEG's and ECG's and bio-photon pictures. Such coherence of brain and heart can be compared with a group of djembe players producing harmonic music by playing different rhythms that are 'in sync'. In the same way, heart and brain work at different frequencies, reinforcing each other if they are coherent, and 'in sync'.

Earth magnetic energy, tree energy and human energy fields have a comparable shape and they always interact. Sources: www.dharmacafe.com and www.hearthmat.com

At a distance of about 2 metres, a healer can make another person's field more coherent. The Institute of HeartMath[31] has measured this phenomenon. But what about creating coherence at larger distances? Several studies show that healing and energetic improvement also work at great distances. This remote treatment is difficult to explain from an electromagnetic viewpoint, one could consider the quantum information field with its non-local phenomena instead. In quantum theory the hypothesis of entanglement suggests that particles remain coupled independently of their distance. There is one condition: they were connected before they got separated. If one particle starts spinning in another angle, the entangled particle also shifts its spinning angle, even if it would be on the other side of the globe, and it does so immediately. Many experiments have confirmed entanglement, already decades ago. Quantum physicists have stated that everything is actually intertwined. This statement however is no more than a suggestion, the working principles of entanglement have not yet been discovered, only the principle is proven to exist beyond doubt[32]. Maybe the mind can connect, or entangle, with any subject or object anywhere, when it focuses its intention on that specific picture or name or map.

Radiesthesia is an ancient experiential science on the subtle energetic dimensions of reality. More background about this world is presented in appendix 15. Subtle radiation works over large distances, it cannot (yet) be understood as one of the known fundamental forces, but it can be sensed intuitively. Could entanglement help accepting the experienced fact that several (well trained) people are sensitive to subtle energies of earth, cosmos and other living beings and are able

to influence other beings with energy and information? Or are subtle energies just specific expressions of energy we do not yet know, as suggested earlier? One thing is sure, dowsers feel something real, they can also feel it at a distance. Thousands of farmers and gardeners use this technique locally and rely on it. According to professor S.W. Tromp, the author of Psychical Physics, it is a valid practice that we should not deny or neglect.

Until more objective methods become available to measure the subtle energy expressions in food and the farming cycle, we are bound to rely on the ancient and experience-based and systematized method of intuitive measurement, including radiesthesia. Farmers and gardeners and food industry can focus on higher Bovis values (Life Energy) and lower negative information levels, meaning higher 'order' (Information) in our food and check these measurements with random control by bio-photon analysis.

Thought-fields

Plants and human beings communicate. Fred Dijkstra[33,] a talented Dutch physicist, wanted to know how that might work. He explored the power of the brains from a purely physical angle. He states that thinking is located both inside and outside the human body, in what he calls a *thought-field.* His theory is based on both quantum mechanics and brain sciences. Dijkstra assumes that *gravitons*[34] can be released by the spin of atomic particles. Each particle rotates around its own axis. This causes a minute magnetic pulse, a *spin*. This magnetic aspect is important, because any magnetic change can influence the greater whole. '*Bosons*' stand for a number of different particles, including the graviton. Bosons are able to 'interact'. They hold properties of matter and living organisms (as information) and they are sensitive to magnetic changes. They can strengthen or weaken each other, depending on their energy and resonance. In that sense, they communicate.

Dijkstra defines thinking as an interactive process between the environment, the field of thought and the body/brain. More of the background is available in appendix 16. Each individual human being has his or her own unique world of thought. Brain waves consist of photons

with different energies, which together shape an information field in which thinking takes place, in and around the brain. These waves are measurable, it is the physical aspect of thinking. This thought-field is very unstable though, it is constantly changing due to external and internal stimuli.

Different heart rhythm patterns have different effects on our cognitive and emotional functioning. When we are stressed or experience negative emotions, both our heart and brain get chaotic. Emotional stress such as anger, frustration and anxiety, creates an incoherent heart rhythm pattern, shortness of breath and tensions in your abdomen. your brain cannot clearly think, remember, learn, reason nor make effective decisions. Your body functions inefficiently, causing organs to work poorly together. This is accompanied by high brainwave frequencies, well above 10-15 Hz (the so-called beta waves).

Many activities such as breathing, physical exercise and positive thoughts influence our autonomous nervous system and create more coherent and more stable wave patterns in the heart rhythm. So, if you can make your breathing and heart rhythm coherent by evoking positive feelings and emotions, then not only will it benefit your body and mind, but it will also have a clear effect on how you think, feel, perform and interpret. Positive emotions, such as appreciation, satisfaction, joy, and love, lead to a well-flowing and regular heart rhythm. This is what we call *heart coherence*[35]. In such conditions, brainwave frequencies are lower, between 8 and 10 Hz (the so-called alpha waves). The body consumes its energy efficiently and the organs work in tune. Your concentration, learning, performance, creativity and your intuition are optimal. You feel comfortable and can think clearly. Such a coherent heart rhythm also influences the strength of your thought field. And then, your energetic impact on plants and animals and people may increase.

The mind and the plant

Our personal attitude towards plants shapes our thought-field. Our thought-field is inherent in the quantum information field which is accessible everywhere. Photon-researcher Popp comes close: as soon as the light waves of one organism have been absorbed by another,

the light of the first organism begins to exchange information in synchrony, as if it 'communicates' with the other organism. We know that plants recognise danger and warn each other[36]. That means they are able to emit, receive and process this information, inevitably also from human beings. They do so with odours through the air, through fungal threads in the soil, and through electromagnetic fields and vibrations. 'Bio-information' fields take part in this communication. Such fields exist around and in every human being and around and in every plant. And such fields, even weak ones, inevitably influence each other[37]. That means a person's mind and heart do influence plant growth. You can heighten a plant by loving it.

Focused intention strengthens a thought-field.

Brain areas become more active when you focus. Brain cells start firing faster and an increase in photons and gravitons makes your thought-field more powerful. Your intention counts. Do you see a plant as living nature, as a means of production or as masses of dead matter? Your feeling of connection, your intentions plus your focus on the plant, influence the vibrations of your brain and heart and the sum of both determines the power you 'emit'. Feelings of beauty and appreciation produce different frequencies, other hormones and neurotransmitters, which in turn determine how intensively and how coherent the neurons in the brain will fire. This has a direct influence on a person's thought-field. If a plant's bio-field is embedded in our field of thought, it is thus influenced by our thoughts and intentions.

The conclusion is that the combination of *intention of the mind + intensity of the heart + your focus* determines your influence on the plant. The more concentrated the neurons fire, the more coherent and stronger the field of thought, the more likely it is to have an impact. An impact that becomes much stronger when the heart is in tune with the mind. The heart's electromagnetic field is many times stronger than that of the brain. And the other way around: focused and positive attitude of heart and mind may also increase your sensitivity for energy and information you may receive from nature.

This connection indeed also works the other way around. The awareness of this permanent connection between man and nature can revolutionize our understanding of the influence of nature and green space on human well-being. Its stimulating impact is called vitamin G[38] . In this book we argue that positive health effects of being in nature no longer have to be explained *indirectly,* such as 'the forest invites people to exercise, and exercise is proven to be healthy, so the forest is healthy'. Its health effect can be explained *directly* from the interaction of the bio-electric and electromagnetic fields of the plant world and our human bio-energy field[39].

Such interaction of bio-fields and thought-fields might shed light on how a plant can have 'memory': certain vibration patterns could be held for a while in water. As soon as an angry human mind – or a predator - comes close again, the plant's biofield recognizes the vibrations and reacts: its magnetic, electric, or light signals change and the plant cannot but also adapt in chemical or biological reactions.

Green fingers as farming tool

A person can influence a plant or an animal with mind and heart. As soon as you accept this idea, new questions will arise, such as how we can develop and strengthen our mind power. Quantum mechanics offers no immediate insight into this, we'd better ask the mystic and the meditator. The only thing that brain science and the electromagnetic view of reality can offer here is an explanation for the strengthening effect that the heart's love exerts on the mind's intention. Intention and love may become a new production factor for gardeners and farmers, in addition to the economic trinity of soil, labour and capital. This is called 'green fingers'.

'Green finger people' report strong differences in intensity and quality of a plant's energy. These energetic qualities inform them about the vitality or stress of the plant. This experience - which we could hardly accept because we had no theory for it - can now be internalized to some extent. Now one can comprehend thousands of farmers relying on intuitive farming techniques. Moreover, the theory opens a platform for dialogue between scientists and farmers worldwide. Both could learn from the wisdom of two hundred ancient agri-cultu-

res who are on the verge of extinction but will hopefully survive[40] with their insights in the energetic and informative qualities of nature.

So a farmer or gardener, walking through the fields or through the herd, can indeed influence them with focused attention and an intention of love. This can happen via the bio-field, the electromagnetic fields of the heart and brain and the thought-field. It is reasonable to assume that both paths of 'communication' - via thought-fields and via entanglement - exist side by side. When you are not walking on your field but sitting far away from them: send your good intentions via the quantum information field! You just imagine the animals or the crops in the place they are, you love them, see them flourishing and entanglement will do the rest.

Footnotes:

1 See www.globalscalingtheory.com
2 'Structure of Fauna and Flora with Regard to Body Size of Organisms.' Lomonosov-University, Moscow.
3 According to music scientist Thomas Vaczy Hightower on his site vaczy.dk
4 www.healthbalance.ch
5 Urikova N.V. 1998. In 'Factors affecting ecological status of a system'. (no publisher or country mentioned)
6 One of the important resource persons for Popov was his fellow countryman Prof. Bratanov of the Institute for Colours and Metallurgy, who did a lot of research into the documented issues himself.
7 According to Urikova, 1998, Karpenko, 2006.
8 Over half of the publications on torsion field theory are of Russian origin, according to A.E. Akimov and G.I. Shipov in their article "Torsion Fields and Their Experimental Manifestation," Proc. of the Internat. Scientific Conf. on New Ideas in Natural Science, St.-Petersburg, Russia, June 1996.
9 She shares her conclusions in her book 'Tuning the diamonds'. 2008. Joyfire Publishing UK.
10 As summarized by Susan Joy Rennison.
11 He may actually have discovered a new form of energy. Remarkably, Tesla's waves did not lose their energy at the inverse square of the distance as normal electromagnetic energy does, even over long distances no loss of energy was noticed. Probably this is the same form of new energy that was independently discovered in the nineteen fifties by Russian astrophysicist Dr. Nikolai A. Kozyrev (1908-1983). In the Soviet Union thousands of academics have delved into this subject after Kozyrev's initial discovery of this new form of energy. Some however consider his ideas as controversial. It was only after the fall of the Iron Curtain that Kozyrev's discoveries, and the critics about his ideas, trickled down to the West.
12 In: G. A. Florea, A. Dinca, and A. Gal, from Romania (no date).
13 Effect of Agnihotra energy field on water purification. By Ulrich Berk, President,

German Association of Homa Therapy & Shailendra Sharma, Principal, AIMS College, Dhamnod, MP, India.

[14] Jung, Carl G., (1985), Man and His Symbols. Paidos. Jung, Carl G., (2009), The Archetypes and the Collective Unconscious. Paidos. Jung, Carl G., (2009), The Relations Between the Ego and the Unconscious. Paidos.

[15] Olof Alexandersson wrote a very informative book 'Lebendes Wasser' (1976) about the discoveries of Victor Schauberger.

[16] See their short video 'How a vortex helps dandelions fly' at www.nytimes.com

[17] See chapter 5.3.

[18] Interview in the Dutch newspaper Volkskrant, 06 oktober 2018, translated into English.

[19] Al-Khalili and McFadden, in their book on quantum biology 'Life on the Edge' (op cit. pp274-275).

[20] www.nlpmind.top

[21] Mystic Michael Roads in the chapter 'Connection and Separation' in his book 'Entering the Secret World of Nature' (2018). Roads was rather thrilled when he heard a quantum physicist talking about things he had often seen in his metaphysical journeys. During his metaphysical journeys in both Nature and the world of humanity, he had seen the torus – thousands of them - but he had not the vaguest idea of what it was. He was delighted when he saw a three-dimensional graphic image of a torus and to hear it named.

[22] See picture in 7.1.

[23] Bokkon (2008) argued in favour of this hypothesis.

[24] You'll find many examples and exercises on Heartmath.com .

[25] www.inspiradiance.nl .

[26] https://subtle.energy This site provides much scientific support for subtle energy.

[27] In Swanson C., 'LIFE FORCE, The scientific Basis' (2011).

[28] This is for example the suggestion of Donald H. Wolfraim in his article 'The other side of Light'. March 2019 on Academia.edu

[29] In his book 'The Medium, the Mystic and the Physicist' (1974). Skyhorse Publishing.

[30] These types of intention experiments are reported by the University of Arizona, Tucson USA (Katherine Creath and Gary E. Schwartz).

[31] www.heartmath.com

[32] Hanson&Hensen. 2015.

[33] With Nicoline Hooijmans authors of the book 'The Thought Process'. Amazon.

[34] A graviton is a particle that could be responsible for gravity.

[35] www.heartmath.com

[36] Like Peter Wohlleben described so well in 'The Hidden Life of Trees', as did Susanne Simard in her TED-talk 'How trees talk to each other'.

[37] The question of whether information can be shared – the answer is yes - is now shifting to the question 'how does it work? In this context, Fritz-Albert Popp's theory is interesting, that light (as photons) is the most important communication channel of organisms. Experimenting with all kinds of organisms, he discovered that individual organisms can absorb the light of other organisms.

[38] www.Terrapinbrightgreen.com presents a nice overview of 14 aspects of nature's influence on human wellbeing.

[39] This reasoning was developed in my article 'Intuitive Farming, Towards a new vision on nature' (ISHS, 2015).

[40] See FAO programme GIAHS, Globally Important Agricultural Heritage Systems.

8 Quantum leaps in agriculture

The quest for a new approach of agriculture is felt all over the globe. The current agriculture sector is strong in showing its positive achievements in food production. At the same time these productive successes generate problems. These problems, according to me, are inherent in today's worldview.

If we would only apply the techniques presented in this book, this would not suffice to face the challenges. More is needed. In addition to these unconventional technical contributions, we also need a different perspective on our world, a perspective of values and culture, and of new ways of *comprehending nature*.

Would a MEI-perspective on agriculture meet some of the challenges that food production is currently facing? My conclusion is positive. One condition is that these techniques are explored and developed further. One other condition is that we change our personal attitude towards life, exploring a deeper connection with nature and the region we live in.

The billions of farmers and gardeners all over the world together are the largest group of professionals intensively working with nature. They can make or break it. So the time has come for a new contract between food growers and society. This challenge demands for investment, both in culture, technology and in personal attitude. Good farming has become a matter of intention, evolution and civilization[1].

8.1. Meeting the challenges in food production.

Our current style of modern agriculture is an expression of the way our western culture perceives nature: as a source to be exploited. We increase entropy as we spoil energy and minerals. We are far from comprehending and respecting life and nature. Agricultural studies argue for more robust farming systems, healthier food and social investment. We need 'attractors' to turn the page. Not the attractor of permanent growth, but attractors that focus on the cycles and the order of this universe.

Challenges on *human health* include:
- less zoonose infections of people from animals
- less antibiotic residues in food and an increase in mineral content in food.

Challenges in *environment and nature* include:
- less pollution of nitrates and phosphates in water or ammonia in the air
- higher Nutrient Use Efficiencies,
- closing nutrient cycles at the smallest scale,
- less residues of chemical plant protection and insecticides in water and on food,
- improved animal wellbeing,
- increase in biodiversity and landscape quality,
- survival of bees and birds.

Challenges for *climate* include:
- reduced methane emissions from dairy and rice,
- reduced fossil fuel consumption and lower CO2 emissions,
- increased CO2 sink in soil organic matter.

Challenges on *social costs* include:
- European farm subsidies that tackle these challenges,
- diminishing tax money spent on restoring environment and nature,
- decreasing health insurance costs related to food quality and air quality.

Preferably, economic policy would force food market players to internalize the costs of externalities[2] of the food production methods in their product prices. Most policy studies on future farming call for a more fundamental shift: from quantity to quality, from maximizing yields at lowest costs to sustainability and robustness at fair prices. Some studies suggest a choice between eco-modernistic agriculture or nature-inclusive farming. The first option bets on improved technology to control nature. Nature areas are completely separated from agricultural regions. The second option relies more on cooperation with nature. The production levels achieved in both systems do not differ much, if both options would get the same policy support and funds for R&D. Nature-inclusive agriculture is increasingly in the picture.

This short overview of challenges is enough to serve as frame of reference to judge the relevance of a MEI-approach in facing these challenges.

The MEI perspective

Would the application of MEI-techniques help both options? Would it result in lower costs for environmental cleaning[3] and - in the end - less money spent by citizens (on food in the supermarket + taxes paid for environmental cleaning)?

The results of wave-based and information-based techniques as documented in this book, show the potential of a MEI-approach. Most of these techniques increase yields. Experiments suggest an average of 30% increase is possible, while saving at least 50% on nutrient inputs. Techniques reduce energy input and CO2 emissions and improve Nutrient Use Efficiencies. This efficiency is especially important in facing dwindling reserves of fossil fuel and phosphate rock. Some techniques even have shown to enable crop production in slightly saline water.

Some other MEI-techniques clearly contribute to less pollution of soil, water and air as they emit less gases, nutrients and insecticides. This way they help to diminish the costs for society. Techniques also contribute to more robust crops and animals, generating less diseases, improving animal welfare and decreasing the need for antibiotics. Some techniques also yield more vital food, which decreases medicine expenses.

Last but not least, these techniques generate breakthroughs that are relevant for society. Food *vitality* indicators complement classic food quality indicators. The agriculture sector generates more nature-inclusive farming options.

An M+E+I inclusive world view generates a fundamentally innovative impulse in agricultural education and research and would support the Licence to Produce for the food sector.

Obviously, not all diseases can be prevented or treated and not yet all morphogenetic and metabolic processes can be supported or influenced. This will take time. Much more is to be invented, discovered, researched and developed. Within one or two decades many more techniques will be available to help meeting the challenges.

In summary, I believe that wave-based and pattern-based techniques will contribute to the desired fundamental shift towards food quality, robust farming systems and vital ecosystems.

Imagine MEI-Farming

The Swiss food company Soyana[4] shares her vision on food vitality:

"Our food has to be full of higher energies. These energies carry and transfer life, they carry sophisticated information. Reality is full of light, of soul and is highly intelligent. We do not want to sell food as "products", because real Lebensmittel (means for life = food) have consciousness and the intelligence of a beautiful being, they are full of life and beauty of its Creator. That's why we as colleagues always work with awake awareness in deep connection with the cosmos. Soyana-staff do daily efforts to maintain these connections. Our Lebensmittel nourish the life of our consumers."

Imagine how agriculture would look like if such vision is shared by farmers, processing companies, supermarkets and consumers.

The best technology is not enough.

As an international agronomist, I have spent 40 years debating food security and food sovereignty. Every 15 years or so, I heard solemn promises that we – as the international community - would solve the hunger problem within the next 15 years, by joining hands in common policy and financial efforts and with the most modern techniques of that time (see appendix 17 if you like). It is not realistic to believe that a technological approach in itself will solve world hunger and maintain biodiversity.

The liberal market increases entropy

The liberal market mechanism is not helpful either, because it does not organize recycling. And it does not internalize the hidden costs of agricultural production methods, costs that are now externalized to people (who are paid too little) and to nature (whose buffer capacity is stressed that far it can hardly regenerate) or to society (that in the end has to cover the costs anyhow). The current 'free' market system, by its very nature, increases entropy, it cannot offer a solution. We need market principles that respect people, locality and nature, a market based on the principle of negentropy. Principles that include a fair price for the farmer, and vital food at a price that includes the externalities of the production system.

Nature-inclusive in its broadest sense.

Even a quantum-physics based technology is not sufficient: broader and deeper moves will be required. We could grow towards closing nutrient cycles, towards Dream Farms and beyond. We require more than a good-feeling panda as symbol for our world-nature ambitions. We need more than saving the bees and the birds and their biodiversity and landscape. We should move beyond nature-inclusive farming and expand 'nature-inclusive' to its broadest sense, that is including its energy dimension, including its information dimension and including the subtleties we do not yet understand. It is to become nature-inclusive +++.

This is an achievable option, as it is supported both by practical farming examples and by fundamental theories of thermodynamics and quantum physics. Moreover, many businesses are popping up, advising farmers or gardeners on wave-based or information-based methods. Several internet shops start selling 'energetic' high value food, such as Soyana.

An innovation chain is emerging.

8.2. New guiding principles ...

We have now broadened the Mass-approach in farming systems with Energy + Information. We recycle nutrients as complete as possible. We aim at zero-entropy, and at highest order in food production. We recognize vital water as key in all life. We work with the electric and electro-magnetic and vibrating aspects of plants and animals. And this is not all. We also use coherence in bio-photon measurements as indicator for the vitality food. That means using light as an indicator for health and vitality. We apply laws of musical harmony in plant and animal life. We understand that life requires order and information and patterns. We try to understand the subtle energies and BOVIS values or equivalent measures. We try to grasp how entanglement might function. We employ our body as a sensing instrument, develop our intuition and add that new information to our cognitive knowledge. We are aware of mind power, of positive intentions and a loving attitude in growing plants and animals, of co-creation with nature beings. With full consciousness we contribute to the evolution of the universe.

Information, order and vitality

The concept of vitality gives us a new quality indicator for food. Could we present it in such way that it interests the consumer and the food business? Could we determine the correlations between content matter in food (like grams weight), the life energy (like Bovis) it contains, and the coherence of the light it emits (bio-photons information)? This light-information offers an indicator for the internal order in the food that informs us.

The vitality of soils and waters contributes to the vitality of plants which determines the vitality of animals and food for people. In other words, the level of vitality travels through the food chain. Life processes begin with coherent information, which combined with mass and energy creates form and structure and informs life processes. A vital food production system is carried by a chain of coherent light that connects the stages of life and food etc.

The light bodies of food and water in turn will inform the human light body that enables increased awareness and consciousness and supports mankind in developing farming and gardening techniques that apply these principles. We may hope that such farming and gardening styles will fulfil the teleological perspective of evolution of consciousness. In the end it will support our sensitive attitude towards a full connection with all life we are part of. It will reposition mankind in nature on this earth in this cosmos.

One basic principle in physical processes is the natural increase of entropy. In biological processes it is the contrary, its tendency is towards increased 'negentropy', increased concentration and order. But we hardly understand where this order is generated or how it exists. Is it an accidental and unique moment of coincidence of water and light, long time ago? Could it have a source? When quantum physicist David Bohm wrestled with these questions he came up with his 'implicit order'. Creationists refer to a Creator or a complete array of Hindu gods. Others refer to subtle energy patterns or nature spirits, again others to a holographic projection of a deeper dimension (Laszlo). Schrodinger's suggestion in his book What is Life (1944) - that nature sucks order from its environment - indeed requires follow-up.

Man is a 'light being' carried in water?

Is this the key story that biophotons tell us? The human light body probably connects the physical functioning of the person with the information in external energy fields[5]. Could it be that this light body (or bio-field) illuminates human intention, love and gratitude? If so, our light body is an energetic expression of our level of consciousness. And in the end this energetic expression of our consciousness will transform into physical expressions in the style we garden and farm with nature. The other way around, this light body may as well feed our intuitive knowing of nature as it could mediate between the 'external' bio-fields and our personal biofield / light body. Van Eijk[6] hints in this direction while von Diest (2019 op cit) describes the practical relevance of developing intuition to make inclusive and conscious decisions about our acting in nature and farming.

It seems obvious that we have to widen our perspective beyond the traditional materialistic paradigm - which has become obsolete even by standards of modern physics[8]. Matter would not really exist. The concept of a bio-energy information field is interesting, but only at its beginning. How does it relate to similar terms like Sheldrake's "Morphic Field", to „aura field", Indian „Prana", Chinese "Chi", Reich's „Orgon" etc. Berk wonders: could physical concepts like "torsion fields" further enlighten what biofields and subtle energies are? In the West these concepts are still regarded as pseudoscience. In this domain, Eastern European and Asian scientists are ahead. Korotkov's so-called GDV-machine makes biofields visible, which would offer a useful diagnostic tool for the health of a bio-field. Also in India the Madras Institute of Magneto-biology is working on this matter. Maybe these biofields are torsion fields that could have magnetic characteristics.

I hope this kind of further work will finally enlighten us as well on the correlations between 'conventional' energy and more subtle energies.

8.3. The biggest challenge is the internal one

MEI-techniques do contribute to meeting the external challenges - to a certain extent. When we embrace a new vision and a fundamentally different attitude - and use technology that fits – we will be confronted with the biggest challenge of all: the 'internal' one.

This 'internal' challenge has two components. The first component is our conviction that we, human beings, are living in permanent connection with all life around us. It is passing beyond the particle-based vision of reality. That's work for our mind.

In fact, we may re-discover the connection we had (in earlier times) but lost. The disconnection probably occurred when Copernicus and Galilei dared to say out loud that the earth is moving around the sun in times where the church said the contrary, based on ancient Biblical texts. To avoid excommunication by the church, some clever scientists suggested they should focus on the physical and tangible aspects of reality - the domain of the senses - while the spiritual dimension was the domain of the theologists in the church. At that moment the split

started between matter and spirit, a split that still dominates our sciences today.

Three hundred years later we can reconnect. Although it is difficult to imagine that implicit order behind the explicit, we can try to trust our intuition again. We acknowledge the knowing of the mystic, the existence of nature spirits – even when we are not able to see them - and listen to their advice.

The second 'internal' component is living this "being-connected-all-the-time", both with the very small and with the enormous. Human beings can influence this reality with our mind and intentions, with our attitude and actions of love. That's work with our heart.

When you are in connection with a tree for example, it is striking to notice that a tree reacts energetically to human love: its energy field expands. It is striking that this plant reacts even stronger when we share our gratitude. Love is sent, but gratitude requires a connection and a bonding with the tree. Somehow the tree is conscious.

One can try to live in resonance with the world in different ways. It can be a personal awareness and attitude of connection and love. In such relationship you become sensitive for feed-back loop information from your environment. Circular systems are helpful, the more local or regional the scale the higher nutrient efficiencies are possible. Conscious living in your region, and eating from it, will offer you a scale of relevant action for both man and nature to remain healthy. At this scale the economic can relate again with the ecologic. And with the personal.

With such a world-view we might support the ongoing evolutionary process in this cosmos. We could engage in these connections and strive for the well-being of everything we are connected with. This is a huge challenge in a materialistic and individualistic culture. Nature's intelligence is willing to share its wisdom – based on its being permanently connected with everything around. Here only one condition holds: open yourself to this wisdom, through open hearted awareness. It invites us to engage in a wider consciousness than our human intellect.

What next?

Both the science of palaeology and the evolution process suggest the need for a teleologic perspective as argued by, amongst others, Teilhard de Chardin and Alfred North Whitehead. The key point is evolution of consciousness that will continue to evolve[9]. The most relevant style in farming and gardening (as an agri-culture) and nature management, is a style that is inspired by this teleological perspective of evolution. Such style sees the inherent connection between old gnosis, modern (quantum) science and consciousness[10]. These are heavy words. But it would mean that an agriculture of the future demands a cultural evolution as well.

Fortunately, this question is not new. Several people have reflected and published their thoughts. Not only Laszlo, palaeontologue and priest de Chardin[11] or process-theologist Whitehead. Also more recent work of for example Klaas van Egmond in 'Sustainable civilisation' or Marja de Vries in 'The whole elephant' or Hans van Asseldonk in his 'Tao of Agriculture'[12] or Peter Merry's 'Volution'. In this respect I also feel inspired by scientists like quantum-physicist Hans-Peter Dürr, biologist Mae-Wan Ho, cell biologist Roeland van Wijk, mystics like Michael Roads, artists like Mondriaan and certainly farmers experimenting with E, I or even with spiritual techniques.

Agriculture is to be more than only sustainable. The better farming style contributes to the evolution into the next sphere, following the noosphere we are currently in. And nature management requires more than only maintaining biodiversity or guaranteeing climate mitigation. Just imagining that I am able to contribute to this evolutionary perspective, gives me great joy.

8.4. Fast learning opportunities, sources of inspiration

In fact, important agricultural learning has already happened in the last century. Our famous soil-expert dr. Mulder, who in the later decades of the 19th century fought with the young Liebig about his approach of soil fertility as basically a mineral issue. Mulder saw organic matter as the key, and in his later years Liebig agreed with him (and

almost apologized for his limited mineral perspective on soil fertility). In 1924 Steiner presented his fundamental vision on food production, already then thinking in the largest possible informational ecosystem, including cosmic frequencies and spiritual powers. This farming model remained a tiny brook in the farming watershed, but it has been crucial for the quick start of organic farming in the 1970's. Soon after that Farming Systems approaches, Permaculture and Agro-Ecology enlivened the living-systems-track that was left dormant around the 1930's. And now we are invited to enlarge our views again, with two additional aspects of nature, its waves and its fractals. And some farmers and gardeners even embraced the subtleties of a spiritual dimension in dealing with nature and food production, like in Perelandra Gardening, Tree-whispering in the USA, co-creation with Water Beings in the Netherlands, work by students of Dounov in Bulgaria, readers of Anastasia books in Russia or the Damanhur eco community in Italy, etcetera. Subtleties that ancient agricultures have bravely conserved.

All these new developments together make one thing clear: it is not nature that needs help, it is men. This[13] indeed is the fundamental challenge. It moves our focus from 'external' challenges alone to the 'internal' challenge as well. Developing our psyche and our mind-set. Becoming aware of our connections with nature and becoming conscious of the impact of our mind-set on nature. If our connection with nature is not getting more intimate, if we cannot overcome our ego with its separating and divorcing tendencies, then we will not arrive where we could. Working on improving our economic system and our ecologic systems also requires work on our ego-system.

To facilitate internalizing this view on the world and on ourselves, we might be interested in 'fast learning paths'. There are several opportunities for fast learning. I'll hint at a few.

With integrative medicine …

What if we would correlate this MEI-trend in farming with a comparable trend in the integrative medical sector? Isn't the link between healthy soil, healthy plants and animals, a vivid environment, healthy food and healthy people, a crucial one? Not only nutrient cycles, but also quantum theories and biophoton science so evidently show how

mass, energy and information connect all stages and forms of life.

The other way around, this connection would also benefit agriculture, as the medical sector has developed electromagnetic techniques much earlier than the farming sector did. And they thoroughly studied their impact. Complementary Medicine is a vast growing field of exploration and experiment. Already in the 1990's Richard Gerber published his books about Vibrational Medicine. The first Dutch book [14]"Bio-energie" was published in 2006. The integrative medical sector is at least a decade ahead of the agriculture sector in seriously developing wave-based techniques.

With ancient agri-cultures …

What if we would esteem *ancient agrarian techniques?* Not only their attitude towards nature is inspiring, also their farming techniques are nature-inclusive and some are highly productive as well. Various modern techniques presented in this book, have much in common with ancient techniques. Those ancient people were highly intelligent. They offer to teach us their energetic language and their way of perceiving the causality relations between human health, social harmony and a respectful style of dealing with the earth and with nature with all its active forces and unseen beings.

The United Nations organisation for food and farming, the FAO, has been proactive when it included these cultures-in-extinction in their policy, be it in the margins. With their GIAHS program – *Globally Important Agricultural Heritage Systems*[15] – the FAO recognizes the importance of supporting about two hundred ancient cultures with the aim to keep their techniques and their environments alive. FAO shows the remarkable productivity of some of these old techniques, many of them yield quantities that do not differ much from current modern farming. FAO advises not to study their techniques as such without also looking at their environment and their culture. This coexistence shaped their specific view on nature and their technologies. It is evident that an energetic and spiritual world view generates energetic and spiritual tools.

It is inspiring indeed, to explore their techniques as well as their world views and their values. During my international work, I gradually understood that they are really rich in knowledge and in knowing. They offer us a learning path for understanding nature as M+E+I combined. If we learn to listen. De Vries[16] has made an excellent synthesis of the views of these wisdom keepers. Some insights, taken from appendix 18, show the astonishing relevance of this learning opportunity for modern society.

"Everything is energy. This energy is consciousness and therefore possesses intelligence. Energy never rests. Everything moves and vibrates. Everything has a unique pattern of vibration and everything is recognizable by this specific rate of vibration. Physical objects vibrate slowest. Our thoughts, feelings and desires each have their own rate of vibration, which we send out into the universe[17]" These sentences sound quite quantum physics. Ancient people already perceived consciousness as a kind of energy, with its own vibrations.

One example how relevant ancient knowing may be for modern farming is the drawing of a shaman after his dream about the building blocks of life. This knowledge was analysed by the Canadian/Swiss anthropologist Jeremy Narby in his book 'The Cosmic Serpent'. The shaman reported that the building blocks of material nature are like two intertwined serpents, connected with light beings. The modern cell-biologist tells us that these buildings blocks are the strings of DNA. And recently bio-photon science discovered these DNA emits a weak light.

With artists …

Artists can become partners of nature, of science and of farming. Several artists have tried, already from the 1920 onwards, to visualize the unthinkable aspects of quantum theory[18]. Artists imagination can help comprehending them, precisely because key concepts in quantum theory often are so strongly counter-intuitive. Other artists have tried to picture subtle energies that are difficult to describe in scientific language or even in plain language. All his life, Dutch painter Piet Mondriaan tried to discover – and show in his paintings – the invisible forces that shape our material reality. In his later paintings

the line represents the energetic male force and the square the formative female one. This lifelong search culminated in his final work Victory Boogie Woogie (1944) that he considered to be his best. He succeeded in making the 'invisible' lines visible, by only suggesting them between the square blocks[19].

A renewed cooperation between 'arts and sciences' could be very helpful in our exploration of a new comprehension of reality. The British conductor Sir John Eliot Gardiner reflected on the link between his musical world and the agricultural sector. The universe is a broad orchestra of frequencies and modern agriculture only has a few instruments left. Gardiner presented his thoughts at the conference 'Harmony in Food and Farming' in the UK in 2017. He wondered: can we build a bridge between the mathematical laws which inform the musical scale, the movement of celestial bodies and the principles and practices of harmonious agriculture?

Just imagine yourself as part of the universe, as one cell in your body as part of the entire body - with billions of cells working effectively together. Or as one player in the universal orchestra.

Modern mystics ...

One important lesson of the mystics is that they will not talk about this connection and experience of one-ness until you have experienced it yourself. It simply cannot be understood by intellect alone. But fortunately, these teachers agree to guide us along the path of personal discovery[20].

With world religions …

Could global religions contribute to the inner development? Van Asseldonk[21] invites old wisdom traditions - and hopefully the great world religions – to meet again for a healthy transformation of mankind. The Ecologist agreed with him in their millennium issue "The Cosmic Covenant, re-embedding Religion in Society, Nature and the Cosmos" (2000). The Ecologist documents the key messages for man and nature and creation, preached by all major religions. They strongly converge! Let's not focus on the fact that in history the majority of believers have astounded and raped their messages. That is wasting

energy. Once again, we must confirm that a great effort and belief is required to grow towards the wisdom of the human spirit in the direction of its soul and that of nature. Views to be further explored, I hope.

This book is a beginning of my answer to the beings of nature who, during my vision quest in 2010, invited me 'to be their voice'. I hope it will be inspiring for others as well.

Footnotes:

[1] Several persons have reflected on the need for cultural transformation. Klaas van Egmond analyses the trends in society in his book 'Sustainable Civilization' . Mainstream civilization is dominated by materialism and individualism. That's also why ecological and financial crises emerge. He argues that a stable and sustainable society can be reached by a better balance between (spiritual) belief systems and materialism and between the collective and the individual focus.
Dutch researcher and philosopher Marja de Vries studied the conditions and limitations of such a cultural transition. De Vries also distinguishes between societies in balance and out of balance. She documented how wisdom keepers in various cultures keep their society in balance. Interestingly, comparable insights can be found among contemporary scientists.

[2] The economic term for extra costs arising from a production process but often 'externalized', neglected and not included in the selling price. It means that not the producer but the labourers or the natural resources carry the burden of these costs without compensation.

[3] An early report, already in the 1990's, assessed the cost-benefit ratio of the Dutch farming sector. It was written by consultancy group Berenschot. Their study concluded that the added value of the sector is almost the same as it actually costs. And in their study not all costs had been included. More recent calculations only confirmed that statement of over 20 years ago.

[4] www.Soyana.ch

[5] As also suggested by Roeland van Wijk, in the interview in the Dutch magazine Vruchtbare Aarde, winter 2018.

[6] Eijk, van T., 1998. Farming Systems Research and Spirituality, an analysis of the foundations of professionalism in developing sustainable farming systems. PhD dissertation, Wageningen University.

[7] Diest, S. von., J. Wright, M.J. Samways and H. Kieft, 2019. Intuitive farming: finding the missing link toward regenerative agricultural knowledge and practices. In prep for Agricultural Systems Journal.

[8] Ulrich Berk, pers.comm. 2019.

[9] See also Birch 1990, Fukuoka 1981 and Marjanovic Goran 2019.

[10] Currivan, 2005.

[11] In 'The phenomenon of man'

[12] www.taovandelandbouw.nl

[13] Statement of modern mystic Michael Roads in Int.michaelroads.org

[14] Nico Westerman. 2006. "Bio-energie. De potentie van niet-reguliere geneeskun-

de", Rathega. Nederland. ISBN 90-810881-1-4.

[15] www.fao.org "Globally important Agricultural Heritage Systems are outstanding landscapes of aesthetic beauty that combine agricultural biodiversity, resilient ecosystems and a valuable cultural heritage. … These ancestral agricultural systems constitute the foundation for contemporary and future agricultural innovations and technologies…."

[16] www.marjadevries.nl

[17] De Vries in 'The Whole Elephant.'

[18] Mondriaan, Buys, Duchamp, Malevitsj e.a.

[19] As suggested by Marty Bax in 'Het web der schepping'. 2006. SUN, The Netherlands.

[20] For example Willis Jager from Germany and Michael Roads from Australia.

[21] In his 'Tao of Agriculture' www.taovandelandbouw.nl In Dutch language only.

Appendices

Appendix 1: Personal Thanks

This book is the work of an explorer. I do not consider myself to be a scientist or an inventor. I am an international agronomist, interested in science. For this book, my role was mainly to make an inventory of emerging techniques and suggesting hypotheses as potential explanation for the observed phenomena that still are insufficiently understood. It became a dream to share what I found.

I am deeply indebted to those people who shared, inspired, corrected, criticised and encouraged me on this journey.

Chadian and Indian project colleagues compared fundamental ideas in their culture with the western culture I represented. They tried to show me that their reality was more complex and richer than my academic one. Mrs. Penka Kostadinova and mrs. Tanja Kutzarova in Bulgaria tried to teach me to feel energies before I was open for it. Around 1990, Tompkins and Bird kept me reading their Secret Life of Plants during a bike holiday. Michael Roads inspired hundreds of farmers in the Netherlands already in the 1990's, while I listened without understanding everything he told. In 2016 I joined his inspiring 5-day intensive course that went much deeper into the metaphysical reality of nature.

Maja Kooistra and Hans Andeweg taught me how to sense and strengthen the energies of trees, plants and fields. ACRES USA organized the world's first pre-conference on farming with subtle energy techniques in 2004 in Minnesota USA. I was very inspired by Phil Wheeler who, in his 'Farming the Universe', introduced the basic energy systems relevant in farming. And by Hugh Lovel with his, probably first, lecture on 'Quantum Agriculture'. And Jim Conroy and Basil Alexander presenting themselves as Tree Whisperers.

Hans-Peter Dürr (+) corrected my thinking about matter and energy and insisted on something non-material, 'the quantum information field' to which human beings can connect. Vladislav Popov provided

me with a thorough inventory of relevant articles in Russian. Saskia von Diest read my first article about intuition and travelled from South Africa to the Netherlands to visit several farmers who had taught me. She also organized two intensive weekends in South Africa, an impressive experience where 60 people came to my course. Professors Michael Samways, Eugene Cloethe and Mohammed Karaan from Stellenbosch University showed clear interest and encouraged me.

Melissa Roussopoulos introduced me into her powerful Nature Constellations. Julia Wright and Michel Pimbert of Coventry University were the first to give strong backing to my unconventional agricultural ideas and invited me as a research associate of their Centre for Agroecology, Resilience and Water. Together with Marijke Kuipers I organised the 3-year course on quantum-informed agriculture in the Netherlands. We received interesting and sometimes confidential information from lecturers we invited: Walter Thut, Michel Duhamel and Frank Silvis, and so many others. My daughter Eline, who has read almost everything I wrote on the subject. She also introduced me into the shamanic world of Jonathan Horwitz, who made me experience an unknown metaphysical world, full of accessible information. Roel van Wijk invited me in his circle of the International Institute of Life Energy and the world of bio-photons. Jan Pieter Kaptein built my website gaiacampus.com and Jan Buter forced me to tell this complex story in a 4 minutes film. Friends and family encouraged me to write the story down, and at the same time insisted I should be much shorter, make it more personal and 'kill my darlings'. Thank you Marga for your rigorous editing suggestions and support. Thank you Jet Sennema for the language corrections.

Last but certainly not least. Without the open minds of the dairy farmers in the Network Energetic Farming this book would not have been written. And without them I would not have seen other innovations that encouraged me in turn. The university in Los Banjos in the Philippines started a Quantum Food Systems course several years ago, initiated by dr. Pamela Fernandez. The University of Coventry in the United Kingdom will set up a Quantum-based-Agriculture course. Researchers at the Stellenbosch University in South Africa are investigating how farmers can develop their intuitive capacities. Over a dozen universities in the world (Brazil, Greece, the Netherlands, Poland,

Portugal, Russian Federation, Ukraine, United Kingdom, South Africa) have expressed interest to explore what quantum theory might mean for agriculture and horticulture education.

And I feel gratitude towards many other beings for their efforts to contact me and for their inspiration.

Appendix 2: Genodics: its quantum physical background.

In high school you have learned that every chemical element has its own specific mass. You remember the Periodic Table of the Elements. Sternheimer has calculated the corresponding wavelength of each particle with its mass m, using this formula:

$$\lambda = \frac{h}{p} = \frac{h}{mv}\sqrt{1 - \frac{v^2}{c^2}}$$

In this formula, h is Planck's constant, p is the momentum of the particle, m is the mass of the particle, v its velocity and c is the speed of light. And from wavelength he calculated the frequency f.

The shorter the wavelength, the higher the frequency, the higher the energy. Very high levels of energy generally are expressed, not in frequencies anymore but in Mega electronVolt (MeV).

When Sternheimer put the calculated frequencies and the energy of all particles of the Periodic System in one graph, he recognized a certain pattern, as it were clusters of energy (MeV) in which the frequencies of a number of elements apparently concentrate. As a musician, he recognised a certain resemblance with the frequencies of harmonic music (see figure 3 below). From this finding he deduced that in nature something like 'scale resonance' might exist.

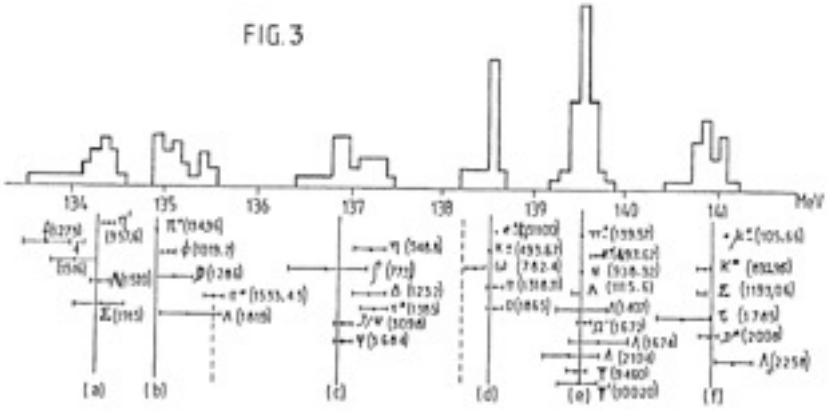
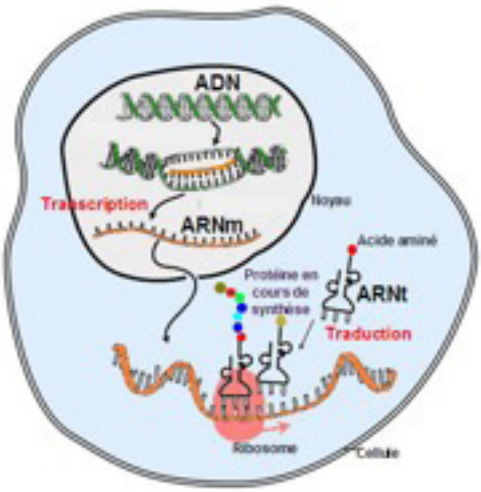


fig. 3. The principal insight of Sternheimer was that the energy inherent in the frequencies of all physical elements are not evenly distributed along the horizontal energy axis (MeV), but apparently concentrated in specific energy domains. These are the vertical peaks along the horizontal line. Source: Duhamel, pers.comm. (2016)

The specific interval of a specific protein

Duhamel delved into the process of protein synthesis. He talks about transcription or copying DNA. He talks about messenger RNA and about translation of the 'architecture' of the protein. He goes technical. At the moment of fixation on a ribosome, the attached amino-acid emits a wave signal that 'invites' the next amino-acid to attach. Each amino acid that links to the transfer-RNA emits a specific tone, each subsequent amino-acid giving a different tone.

Cell biologists have detected 22 amino-acids that shape all proteins. Sternheimer found 10 frequencies that play most roles. Which means that some amino-acids react on the same pitch or in harmony with it. The frequencies that mobilize the amino acids, are higher than those of visible light.



The reproduction of DNA in a cell. The different amino-acids assemble along the ribosome, in their very specific order that fits that protein. Source: Genodics

Appendix 3: Most advanced knowledge on prevention and cure from Johne's Disease with SMET

One herd was subject to individual faecal culturing for MAP before installing the SMET-box and after ten years of constant exposure to frequencies from the SMET-box. In 1997, before a SMET-box was installed, 10 out of 51 individuals were infected (20%), while in 2008 - after 10 years of constant exposure to frequencies from a SMET-box - 2 out of 66 samples (3%) tested positive for MAP. One of the cows that tested positive for MAP in 1997 was still in the herd in 2008 and tested negative for MAP at that time. No preventive measures regarding herd management or hygiene were taken during this period e.g. infected individuals were not culled, calves received cow's milk and were kept mixed with cows, boots were not disinfected between barns[1].

As dairy practice has shown that the technique is effective, further research is very relevant. A new proposal is in the make. This is the most advanced – and supportive - knowledge available in 2018. Based on their scientific work, Van der Linden and Bosman suggest that potentially, Low Frequency Electromagnetic Fields (LF EMF) can be used to complement herd management in the control of Johne's Disease. A lot of work on the effects of frequencies on living tissue

has already been done. Many experiments suggest the efficacy of LF EMF against a wide range of pathogenic bacteria[2.] Next to directly affecting the growth of bacteria, experiments on in vitro macrophages (human, murine and fish) show that these macrophages can be stimulated to higher activity through LF EMF[3,] suggesting a possible direct stimulating effect on the immune systems of man, mice and fish. The same system that induced highly increased immune stimulation in isolated phagocyte cells, also proved to decrease mortality by 60% in infected fish; decreased feed consumption for equal growth in chicken by 8% (comparable to the use of preventive antibiotics) and 40% decreased intestinal lesions in chicken due to *Coccidiosis* infections[4]. In other studies (although not specifically targeting the immune defence), rats were orally infected with *Salmonella typhi*[5] and *Staphylococcus aureus*[6] and after 5 days exposed to weak LF EMF. Ten days later the rats were sacrificed and livers were examined. Infected rats that received no LF EMF treatment exhibited numerous abnormalities in the liver tissue typical for respectively *S. typhi and S. aureus*, while infected rats treated with LF EMF had healthy livers not different from livers of the control group of rats. This is the end of the data shower.

Already years ago, farmers were discussing the possible impact of the SMET-box. Would it weaken the bacteria or would it strengthen the cow's immune system? Van der Linden and Bosman tend to confirm this farmer wisdom. Both a direct effect of LF EMF on bacteria as well as an effect on the immune defence of hosts of pathogens seems to be substantial for a wide variety of different bacteria and host species. Also, exposure of infected 'in vivo' animal models (fish, bird, mammal) to weak LF EMF shows that clinical symptoms of bacterial infections get reduced and survival rates get increased. It appears that the magnitude of the effect and also the direction of the effect (inhibiting or stimulating) depend on the frequency and also the strength of the LF electromagnetic field. Furthermore, the optimal frequency and optimal strength of a field for inhibition of bacterial growth seems different for each species of bacteria. Overall, the influence of the frequency is dominant over the influence of the strength of a field[7].

So, altogether there is sound argument to investigate whether the SMET-box can significantly contribute to the control of Johne's Di-

sease or not. With this background information, Friesland Campina - the biggest dairy cooperative in the Netherlands - was approached and was willing to cooperate at two conditions: 1) to identify at least 10 farmers interested in the research and 2) to get cooperation of the formal Veterinary Health Service (GD). NGO Gaia Sira then conducted a survey among all 150 SMET farmers and received 29 reactions, the great majority of whom wanted such a study. Staff of the GD are also willing to cooperate. For the moment this is the end of the story. The follow-up of this story will be shared at my website: www.gaia-campus.com

Maintaining animal health in dairy farming costed almost € 80 per animal in 1999[8]; for fattening pigs this was around €6, and per hundred laying hens €9. In 2009 Bondt[9] calculated that the health costs of all farm animals would amount to nearly € 400 million annually. A reduction in use of only 25% would already result in savings in the sector of almost € 100 million.

Appendix 4: Lovels explanations of patterns and (neg)entropy in nature

Coming from the bio-dynamic background, Lovel learned a lot from Johann W. von Goethe[10]. In identifying the fundamental forces of nature, von Goethe suggested that "in the inorganic, mineral realm the driving force is polarity. In the inorganic realm things run down or explode. In the organic (living) realm, however, the driving force is enhancement. Living organisms become more concentrated and enrich themselves. They tend toward ever-greater complexity, sophistication and refinement, or in other words they implode [the word implode is used by Lovel as the contrary of explode].

One pattern, easy to recognise in nature, is the self-organizing and self-similar Phi growth curve that living organisms express in fractal forms such as sea shells, cow horns, fern leaves, tree branches, blood vessels and the like[11]. "

Negentropy, order, attractors and patterns of information

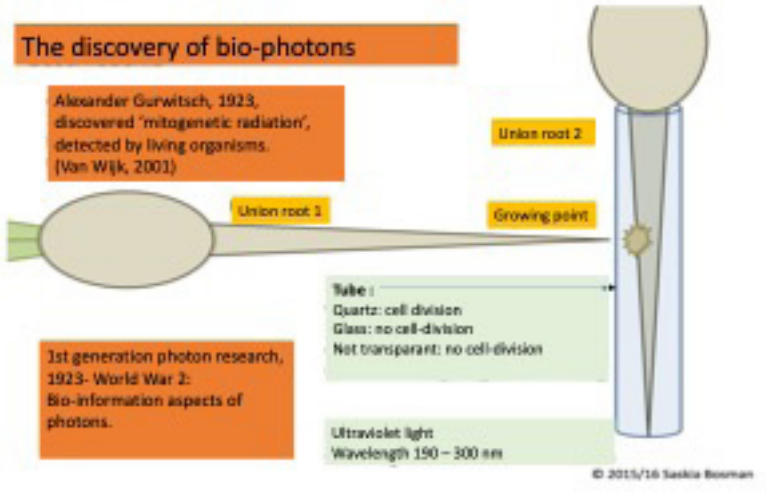
Lovel's distinction between energy in machines and energy in living systems is a fundamental one. "A nuclear power plant, a wind generator or a water turbine 'produces' the energy we obtain from an electrical outlet. These machines transform mechanical energy into electrical current. It is transferred, and once we plug into this system its electrical energy is turned back into mechanical power. Note that in the process there is always some loss, either in the electrical wire, in wasting heat by friction or just dispersion of energy. He says this kind of energy 'explodes, it wears out or is used up'. This mechanical type of energy in fact disperses from higher concentration to lower concentration. It increases entropy.

Organizational energy in living systems however, instead of dispersing it accumulates. It 'implodes', going from lower concentration to higher concentration. That is the contrary to entropy, it is called syntropy or negentropy.

As the verb 'imploding' is often associated with 'collapsing', which is contrary to life processes, we could introduce new words for the same comparison. We could activate the nouns entropy and syntropy into verbs 'to entropize and 'to syntropize'. Or again use them as adjectives 'entropic' and 'syntropic' processes.

Appendix 5: Bio-photons discovery and technical developments

The Russian researcher Alexander Gurwitsch[12] discovered, that an onion root-point appeared to stimulate the cell division of another onion root at a distance of 2 mm. The drawing below gives an impression of the experiment where his discovery originated. 'Something' was transferred between these roots. He called it 'mitogenetic radiation'.



The famous experiment in which Alexander Gurwitsch discovered the bio-photons (explanation in the text below). At that time, he spoke of mitogenetic radiation. Source: Bosman based on Van Wijk (2014).

After the Second World War, this kind of research stopped. By then, molecular research appeared more promising. In recent years however, bio-photon research brought it back. Very sensitive measurement devices have been developed, both for a particle perspective and for a wave perspective. Photomultipliers count light-*particles*. Highly light-sensitive CCD cameras serve the wave-approach.

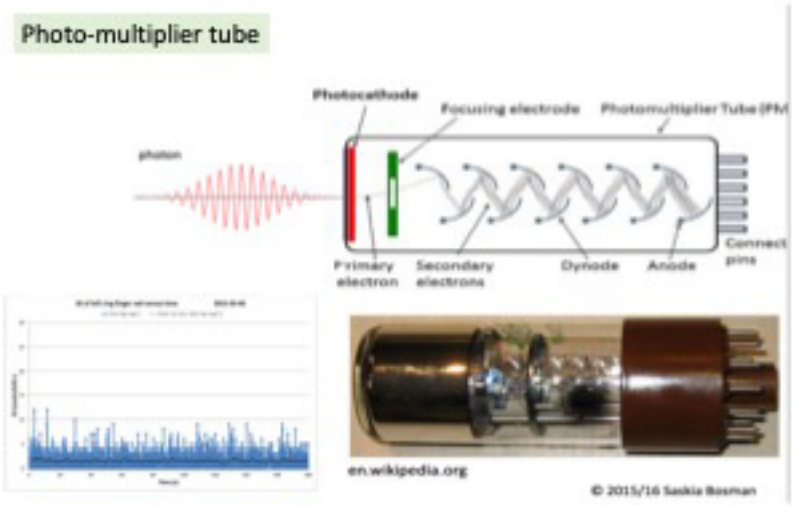
Bio-luminescence

Ultra-weak light is also found in soil life. In bioluminescence, ultraweak light is emitted from metabolic reactions involving oxygen radicals. The production of light probably follows these chemical reactions:
The reduction process : $NADH + H^+ + Luciferine \rightarrow NAD^+ + LH_2$
The oxidation process : $LH_2 + O_2 \rightarrow LO + H_2O + light$

Particle or wave: what do we measure?

With a photomultiplier you measure particles, with a CCD-camera you measure waves. So, your choice of the instrument determines how you measure light.

Because the molecular approach in biology (particle-based) started to dominate after 1950, it became interesting for frequency researchers (wave-based) to look at the effects of bio-photonics at the molecular level. After all, money was available for that molecular research.

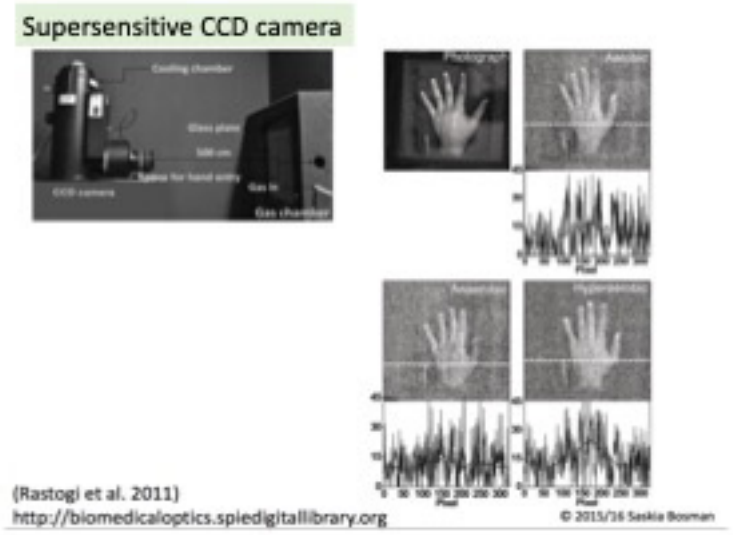


The photo-multiplier, an instrument that amplifies the extremely weak light signals in such a way that they can be observed on a photosensitive plate. Source: inspiradiance.nl

The photomultiplier was developed from the 1970s onwards for photon research from a particles perspective. It is called a multiplier, which means that more and more photons are released every next step. The most sensitive tubes release 1 electron per 4 photons. And so on, until enough electrons are released to be able to measure an electric signal: these signals together shape the image of light that we can see with our eyes on photosensitive paper or on a computer screen.

Other instruments, highly light-sensitive CCD cameras, are used when you study light from a wave perspective. The measurement must be made in pitch darkness because the photon radiation is very weak. CCD cameras are capable now of counting individual photons. So, you can count the number of photons on each pixel of the photo. Emission peaks can be recognized in the images: these are differen-

ces in the intensity of the photon emissions. For example, the skin underneath the nail stimulates the nail's horn to emit more light. See the picture below. Something similar happens with a piece of white silk on the hand: the hand also stimulates the silk to emit photons. It may take hours before the total light pulse is processed into a still picture.



A very sensitive camera (above left) can register the very weak light impulses so they become visible to the eye. If you want to picture a bio-photonic image of your hand, you have to work in absolute darkness, put your hand under the camera and sit still during the shutter opening time of 30 minutes. Source: inspiradiance.nl

Two types of light emission

Studying the behaviour of photons, we should distinguish two types of emissions: Ultraweak Photon Emission (UPE), and Delayed Luminescence (DL). Both types of emissions are useful as they give us specific information about the metabolism and vitality of the tissue emitting the light.

1. UPE *(Ultraweak Photon Emission)*

This is about excitation: electrons in an atom may jump into a wider orbit in which they can hold more energy. The molecule containing that atom absorbs that extra energy. Further on in the metabolic processes, the excited electron falls back into its smaller orbit and emits this

small excess in energy in the form of a photon. The more the colour shifts from visible light towards UV, the shorter the wavelength and the higher the frequency, so the higher the energy. The further away the electron orbits from the nucleus of the atom, the more energy is released when the electron falls back into a smaller orbit. You can measure the released energy with the CCD-camera which, however, takes minutes, sometimes hours.

Photons emitted from a living system are photons that leak out of that system. The system cannot hold them, which provides information about the vitality of the system. This involves very little energy, varying between 10^{-18} and 10^{-16} Watts per square centimetre of tissue. Which is at least a thousand times lower intensity than the human eye can see.

2. DL *(Delayed Luminescence)*

Delayed Luminescence - delayed release of light – happens in response to an external impulse of light, sound or heat. An organism stores light energy by means of excitation of electrons in biomolecules. This happens, for example, during photosynthesis in the chlorophyll of plants. Measuring DL is done with the photomultiplier tube. Leave the shutter open and measure the loss of photons during 10 seconds. In healthy living material or in crystals, this results in graphs with a typical hyperbolic decay curve. This curve from living material is clearly distinct from curves of non-living material or from diseased biological systems, which produce exponential decay curves. The exponential curve quickly falls to unmeasurable light intensity. Such a system does not have much internal coherence, it is sick, non-organic or non-crystal. The hyperbolic curve, on the other hand, is decreasing slowly, which means that the photons are held longer, indicating a stronger internal order.

How do biophotons occur?

The impulse from an energy source (in this case called 'pump source') gives more energy to an electron, when the energy source vibrates faster. When the electron gets enough energy, it jumps to an orbit further from the nucleus. Sunlight - the most important pump source - excites electrons in chlorophyll in the leaves of plants. There are

several other pump sources. Both in plants, animals and in humans biomolecules can react with radicals of oxygen or nitrogen. In animals - that do not have photosynthesis - their food is a pump source. The most efficient light-producers are molecules with a ring shape including carbon and nitrogen, such as tryptophan.

Photons from a red lamp have a lower frequency with lower energy, so you can't excite the electrons as much as with a blue lamp (that emits a higher frequency of light, so gives more energy). When the electron falls back into the orbit closer to the nucleus, it emits exactly this 'excess' energy again in the form of a photon. This energy can then be used, for example, for the metabolic process in the cell. Of course there is a seasonal effect: in summer we get more sunlight with more intense blue, while in wintertime the light it is more reddish, with less energy. And there is a daily rhythm as well: at midday the light is more blueish than at the end of the day.

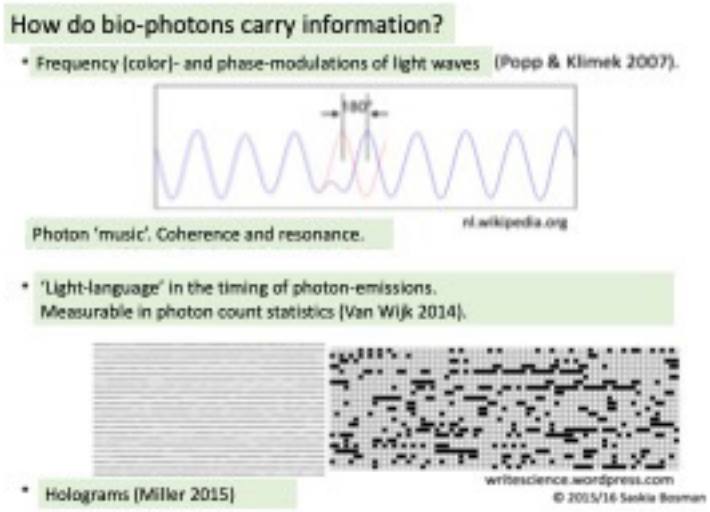
The lower frequencies of audible sound can also act as a pump source and generate photon emissions. Red light can be compared to low tones and blue light to high tones. Loud sound can lead to light emission from an organism. You can see from its colour whether the photons come from oxygen or from another pump source.

The measurement of spontaneous photon emission is mainly used to get an impression of the plants' immune system. Delayed luminescence provides information about the vitality of an organic product. It is also used to predict seed germination, estimate growth and ripening stages, and predict vitality under different storage conditions.

How biophotons transmit information

Bio-photons play a role in cell-to-cell communication with the emission of ultraweak photons. A biological system - such as a cell - affects a neighbouring system with its photons. Although this fact has been known for almost a century, it is only in the last decades that this subject has regained the attention of scientists, as these phenomena can now be observed with modern sensitive devices.

How do these photons carry information? *The hypothesis is that vibrations can carry specific deformations – called 'modulations'* – that are specific for each content of information. Patterns in light waves can be recognised in the modulation of their waves.



The picture shows phase-modulation (Popp&Klimek 2007). The lower picture shows how 'light-language' looks like: one counts emitted photons in time-lines. Source: inspiradiance.nl

This information is probably transmitted in collagen tissue[13]. Proteins are deposited in collagen fibres, to which water molecules adhere. Water causes collagen fibres to swell. Water conducts light very well, so in this way light can spread through the organism.

Appendix 6: Ecotherapie evaluation by dr. Lamers

In the philosophy of ECOintention, every organism, organisation, ecosystem or farm is perceived as a wheel, steered by its owner or its manager. In healthy and vital systems, the manager is intimately focussed on and connected with this wheel. Once the manager is positioned in the hub of the wheel, the system can become self-organizing. Being in this hub, a farmer is in a relaxed concentration, which enables him to use his intuition and to connect with his land by visualization. Next, he gives life energy with positive attention from his heart. He directs this energy towards a goal *(for instance healthy*

crops) with his intention from the mind. Life energy and information / intention generate a formative force, which can become an 'attractor'[14]. The ECOintention process is essentially creating this non-physical attractor that increases the probability of a project to achieve its goals.

Dr. Jan Lamers investigated the effects of Ecotherapie treatments[15]. Lamers is an agricultural researcher and certified Ecotherapist. Some quotes from his report: "Out of 57 projects there are 56 whose targets have been achieved fully or to some degree. These objectives included increasing production, improving the health of crops and animals, increasing sales or financial results. The farmers were requested to indicate on a scale of 1 to 7 to what extent they agreed with the question or the statement. 14 farmers have completed every question, which was sufficient for statistical processing. The statement 'I am satisfied with the financial result of my farm' received an average of 3.4 in March 2005 and a 5.0 in October and a 5.4 in January 2006. That is an increase of 2 points, which is statistically very reliable and is no coincidence. Communication 'within the company' and 'with the outside world' had improved reliably. Moreover, at the end of the balancing period, managers had more time for themselves and were more relaxed. They could better realize their objectives. This boosted their self-confidence, as well as their health." They found themselves in the 'hub of the wheel'.

Appendix 7: Water and consciousness according to Voikov

A system demonstrating consciousness must have three specific traits. First, the system must be able to store and process large amounts of information, as consciousness essentially is a phenomenon of information. Second, this information must be integrated in a unified whole so that it is impossible to divide it into independent parts. Third, the brain is the most intensely energy processing living matter. Already in 1937 Alexander Gurwitsch stated that the 'brain in situ is the most intense and continuous source of coherent UV-photon emission among all other tissues.'

Appendix 8. Aquaphotomics

Dr. Roumiana Tsenkova from the Graduate School of Agricultural Science, Kobe University, Japan, presents a very good overview of the current state of development in her article 'Aquaphotomics: dynamic spectroscopy of aqueous and biological systems describes peculiarities of water'[16].

Why *near* infrared spectroscopy?

The water/light interaction at each frequency of the entire electromagnetic spectrum, measured for a whole biological or aqueous system, is a potential source of a better understanding of water and of the biological world.

Because biological samples thicker than about half a millimetre cannot be monitored with InfraRed (IR) spectroscopy, as water absorbs too much light, IR spectroscopy becomes useless when the task is to assess a complex biological system. Fortunately, this is precisely where the strength of vis-NIR (Near InfraRed) spectroscopy lies. The spectrum of water in the vis-NIR range includes wavelengths of 680–2500nm. Water absorption in the vis-NIR range is several times weaker, meaning that this spectral range can be used to analyse thicker samples. This feature provides the opportunity to scan whole biological objects non-destructively, very fast, using long path lengths and without sample preparation. Using the vis-NIR region, it is very easy to acquire, in real time, spectral data for monitoring and measuring biological and aqueous systems. Thus, water molecular vibrations can be observed and analysed in relation to other molecular vibrations and functions of the whole system.

History

The first NIR spectrum measurement of water was already reported in 1925. Absorption peaks were found at approximately 775nm, 980nm, 1222nm, 1450nm and 1997nm in cold water (0°C). Other studies showed that the actual positions of specific water absorbance peaks in a NIR spectrum are also influenced by other constituents in the sample, for example, salts. These early studies indicated that a sound under-

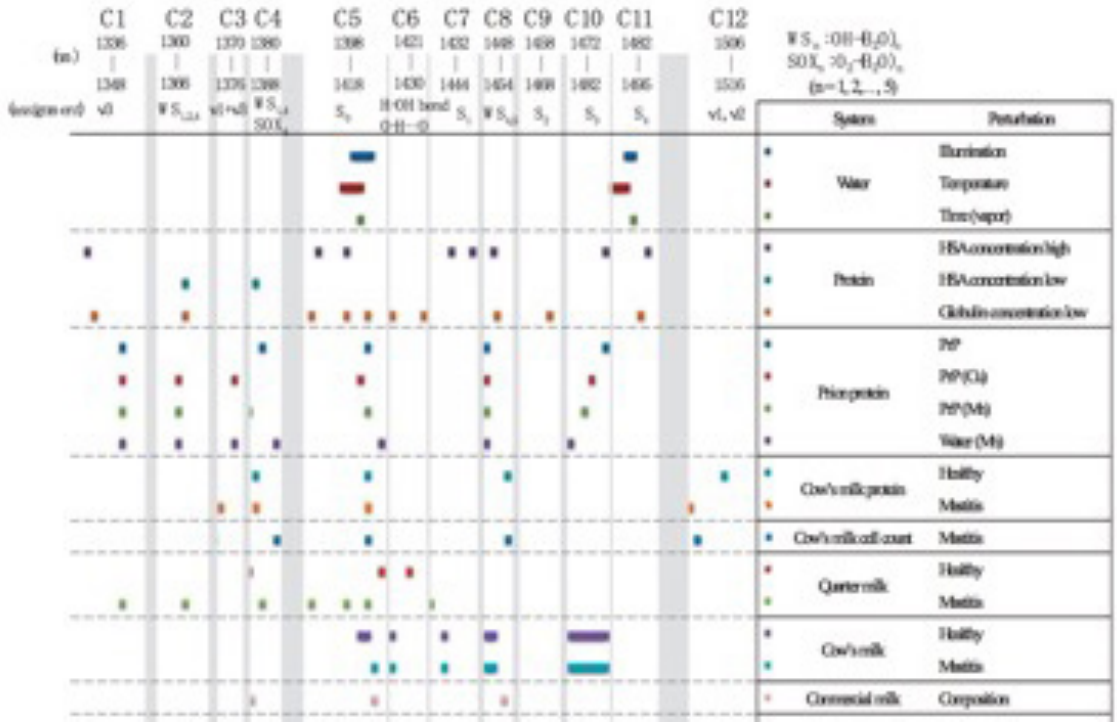
standing of the interactions between NIR energy and water in its various molecular conformations is fundamental to the understanding of an aqueous system. Furthermore, other areas of science such as astronomy, food and medical sciences etc. reported water absorbance bands in the vis-NIR range of the electromagnetic spectrum.

For the past 30 years, scientists have made steady progress increasing the efficiency and sensitivity of visible and ultra-violet photon detectors, while methods for detecting elusive single photons in the NIR range have faltered. Recently, researchers at the USA National Institute of Standards and Technology have developed a new, highly-sensitive, low- cost technique for measuring electromagnetic radiation in the NIR range, too[17]. The technique can measure the spectrum of the specific wavelengths of NIR light used widely in tele-communications as well as the very weak IR light at single-photon levels given off by fragile biomaterials, biosystems and nanomaterials. This discovery will open doors for researchers studying diseases, pharmaceuticals, secure communications, remote sensing etc., but the highest expectations are towards understanding water and its role in biological and aqueous systems. The new technology enables the measurement of spectra with sensitivity of more than 1000 times that of common commercial optical spectral instruments.

Aquaphotome of a dairy cow

The water absorbance bands of a system under perturbations define the respective Aquaphotome, a database of characteristic water absorbance bands specific for each particular system. The entire Aquaphotome is a cumulative database of all the Aquaphotomes that are unique for each system.

Table 1. Water matrix co-ordinates [WAMACS]: characteristic water absorbance bands with a high contribution in respective spectral models developed under various perturbations: concentrations, temperature, illumination, disease, damage, host molecules in the structure or in solution, particles size.[65,63,50,64,68,72–74]



Part of the Water Matrix Coordinates Table related to milk. The table also includes spectra of cow's blood and urine, as well as spectra of wheat, sugar, maize, flour and mushrooms. Source: Tsenkova, Japan.

The Aquaphotomes of milk, blood, urine, tissue etc. of a dairy cow will, when combined, present the Aquaphotome of a dairy cow. The Aquaphotome is the entire complement of water molecules' absorbance bands of aqueous and biological systems, i.e. comprehensive spectral assignment of all existing water absorbance bands. It was found (see the last-but-one row in the table) that in the spectra of milk from a healthy or a mastitic cow, the free water molecules (in C5 frequency range, wavelengths between 1398 and 1418 nm) had different impacts on the overall Water Absorbance Patterns.

Aquaphotome of plants

Water spectra depict slow changes as a response to environmental or other perturbations. Water becomes a mirror of biological changes on a molecular level when using invisible NIR light. An investigation of the spectra of plants inoculated with mosaic virus, presented distinct

spectral variations between infected and healthy plants. Noteworthy, this study also showed high variations at Water Matrix Coordinates in the area of water solvation shell for all healthy plants, but not in infected plants. This might be an interesting insight into the role of water in plant cells, to be further investigated.

These and other similar studies would lead to better understanding of disease and its relationship to water structure. Future work should answer the questions on what is the importance of "free" water molecules, for example, for the health of calves and humans who are the consumers of the milk. One day, we might be able to answer the question "what is the water structure, i.e. Water Absorbance Pattern, which is most desirable or harmful for humans or particular living systems".

Appendix 9: Grander water vitalisation

Some Austrian university laboratories proved that the use of Grander Technology resulted in lower need of chemicals, improved bacteriological quality of water and much longer shelf life of drinking water. From 1997 to 2000, the Grander Technology was examined by Russian professors Yuri Rachmanin and Kondratov. They confirmed that the structure of water undergoes a lasting change during Grander revitalisation. They showed a so-called cluster structure in which groups of water molecules tangle together. Thus, they suggest, Grander-vitalized water has similar qualities to oscillating quartz: the structures function as antennas that collect special frequencies of energy and transfer them to the water to be vitalized. Also, the improved bacteriological quality of Grander Technology vitalized drinking water has been shown to last for years without any chemical addition, even at room temperature.

Appendix 10: Nature beings advise on water purification

There are as many different forms of water clusters as there are energy patterns. Water filtered from its chemical pollution, still contained the information structure of the harmful substances. The electromagnetic frequencies of those substances could be precisely traced back to the chemical polluters. These tests show that water that is mechanically cleaned from unhealthy substances, still causes our bodies to vibrate according to the frequencies of the removed particles that continue to vibrate in the physically 'cleaned' water. As this phenomenon of 'informed water' is not yet widely accepted among most water engineers, they are not aware of solutions either. Let alone would they accept working with a solution advised by nature beings.

On this point, water engineer Silvis comes with revealing experiences acquired over the period 2015-2017. The newly established FishFlow-Form Foundation in the Netherlands had taken the initiative to develop a new type of fish stairs combined with the so-called flow-form principle. Fish stairs are designed to allow fish to swim up-stream while avoiding a sluice or a weir over which they cannot jump. The Foundation searched for the right shape and dimensions to promote the rhythm of flowing water to enable purifying effects.

Two fish passage inlets at the left bank of the stream; the weir with bridge is visible at the right side of the picture. The fish are guided through the M-shaped ditch (visible in the left part of the picture) and swim from below the weir (at the top-right end of the picture) through the M-shaped ditch towards the water inlet at the left bank (in the middle of the picture). Then they can continue upward in the stream itself. Source: Vortex Vitalis.

The FFF-initiators not only wanted to focus on the usual scientific research issues such as fish passability, physical and chemical water quality and hydrodynamics, but also wanted to analyse the variations in energetic quality of the water and its influence on the wider landscape.

Vortex Vitalis was invited to carry out the radiesthetic measurements and to document contacts with nature beings as well. Silvis invited clairvoyant artist Lydia van Oort to picture the nature beings. They both recorded their observations independently.

Example of another Flow-form nearby the waste water purification plant in Dinxperloo (NL). Source: Vortex Vitalis.

They reported interesting information from their contacts with water beings. Reading their report, I gradually got convinced that something real is happening here, as the information received is so original and practical at the same time. The information is directly related to the very situation of this purification plant. I just mention some of the key messages they have got.

Information from Nature beings

"Hendrik, the lord of the brook, appeared immediately. He would love to work on the quality of his living environment. But it feels as if he has lost hope for improvement. He says that the cleaning of his environment, especially the water, will take place gradually and at a slow pace. He shows this with the reed pipe from which droplets of water fall in his hand, see the picture of Lydia van Oort. The number 4 is

important. The water flows in 4 little streams through his fingers. The straw tube represents the cleaning effect of reed. There are many nature beings that have come to the stream. Out of curiosity, but certainly also to explore us and to seek rapprochement. Every one of these beings wants to use their own talent in order to make the plan a success. Without the help of nature beings, trees and plants, it is almost impossible to realize vitalization of the water."

The beings themselves explained Silvis what happens and who is involved for what functions. "The Landscape Deva is responsible for the coordination between the different nature beings. She in fact is the patroness of the area. Various nature beings take care of the banks and roots and leaves of the trees around the stream or of the water plants. Yet another being sends healing and strengthening energy from the cosmos to other beings, symbolized in a clear rock crystal. It is full of nature beings in this area. The different creatures are connected with different densities of energy. They experience other beings just as we often experience nature beings, through feeling, aware of their presence, but not tangible. Nature beings experience the world in moving colours rather than the solid densified fabric as we humans know it. They do know form as well, but it is not as fixed in structure as we know it. All creatures are ready to share their knowledge and insight in order to make the project a success."

"Nature beings always like it when people are aware of them and make contact. This gives them strength. They appreciate the fact that the Water Board wants to improve the water quality. It will attract many elemental beings and fairies and therefore also children. By playing and working on the spot, they simultaneously increase water quality. The more variety of plants, the more dynamic life in and around the stream. The more fish in the brook, the more energetic nature beings become and the more elemental beings take on their task in and around the brook."

"They like it very much that Frank and Lydia capture the energetic situation at the start, to know later on by comparison, what has been the effect. They also like the measurements of the Hartmann and Curry networks to see how the energy extends from the stream into the landscape. The more research of this kind is carried out, the easier these ideas will find their way into society. Please stick to your

measuring and observations, they say, and let the people do with it what they want, but don't try to convince them of anything."

Two years later in 2017, Van Oort and Silvis connected again with nature beings at the same spot. When they entered the area, they noticed a big difference in energy. "It is a sparkling, happy energy and above all, there is more peace and unity in the area. It generally feels much lighter than 2 years ago. Now, all kinds of different nature beings are working together. The nature beings are enthusiastically and peacefully present. They stated, however, "that the result would have been even better if four flow platforms had been set up." The nature beings continued sharing their stories. They showed that water lilies bring oxygen into the water. That the damselflies are back in large numbers, which means that the natural state of the water and the environment is completely in order again, they said. That the water nymphs provide the water with oxygen from the air and with life energy from cosmic consciousness. Without this life energy, life on earth is impossible, they insist. Everything is animated by this life energy or life consciousness. The water creatures now can more easily address the self-cleansing capacity of the brook. The water is purified by flowing and swirling through the Flow-Forms. The nymphs love the flow platforms, they help them to provide each drop of water with light, air, information and awareness." Silvis asked "Could we in fact consider Flow-forms as cosmic antennas?" "Indeed," they said, "we are very happy with it and hope that this FFF phenomenon will be applied in many more places in the Netherlands."

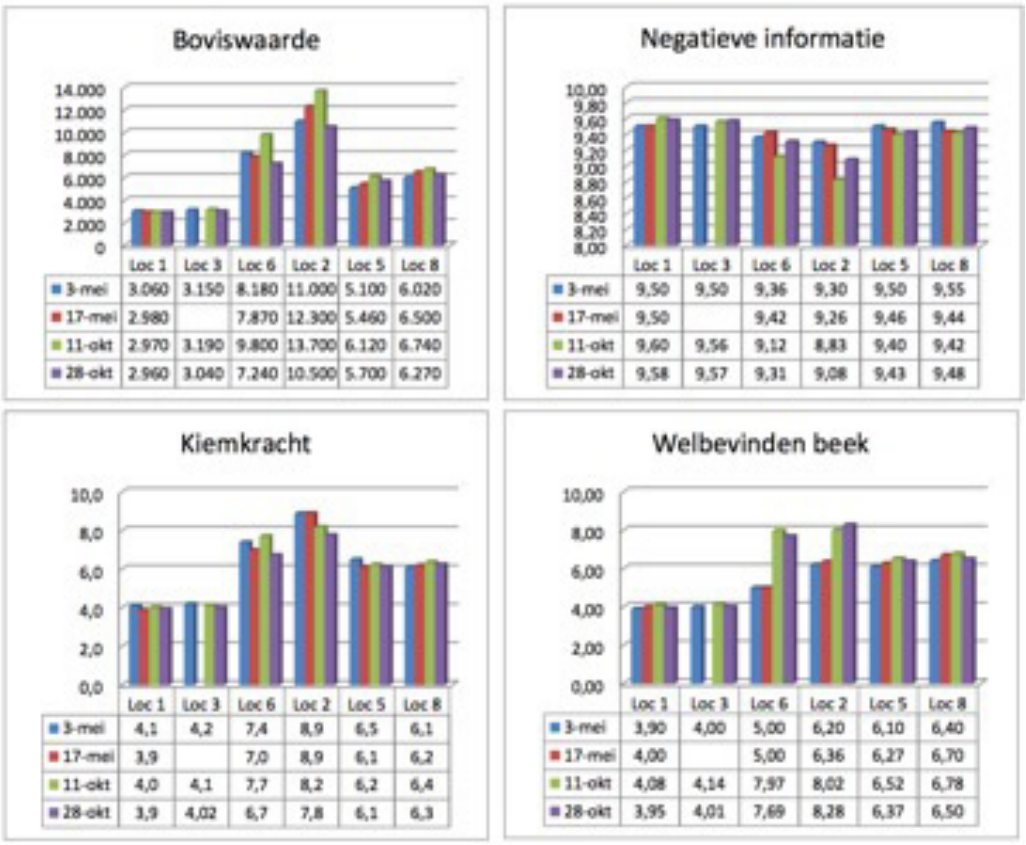
Flow-form with fish trap during the fish feasibility tests. The water flows to the right. The fish swim against the waterflow, so towards the left, they 'jump' through the stairs. Source: Vortex Vitalis.

Here are Silvis' energy-measurements, based on dowsing

Four different parameters have been measured at six different locations:

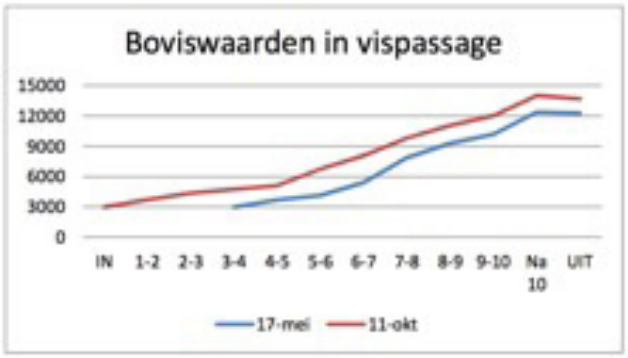
1. *The Bovis value.* This parameter measures life energy, or vitality. The higher the Bovis value, the better the energetic quality. Physically speaking, the Bovis value represents the biophysical energy content. The unit of this scale is Bovis, after the French researcher who supervised the quality of food for soldiers. A value around 6500 suggests an average food vitality. Below 3000 the food is sickening. Above 7000 is healthy food. Values measured on very healthy food go up to 40.000 Bovis. The meaning of these numbers is explained in Appendix 15.
2. *The germinating power.* This parameter tells how well plant seeds can germinate under the influence of this water. The closer the value is to 10, the more vitalizing the water will be.
3. *The negative information.* Water stores information. Even in case a chemical substance is completely removed from the water, its vibrational frequencies may still be present in the water. The closer the value of the 'negative information' is to 0, the healthier the water is.
4. *The wellbeing of the brook.* The stream itself is a living entity. Popularly speaking, this parameter indicates "how good the stream feels". The closer the value is to 10, the better.

These four values measured have been presented in the four graphs below. Measurements took place at six locations and were repeated four times at different dates.



Graphs of the four parameters at six locations and four measurement dates: Location 1: upstream lower inlet (3rd and 17th of May); higher inlet (11th October). Location 3: immediately behind the weir (no measurement on the 17th of May). Location 6: in the bending between flow-form 7 and 8. Location 2: exit fish passage into the stream. Location 5: 50 m downstream the outlet. Location 8: 800 m downstream the outlet. After the water had passed the entire flow passage (at location 2) the water had received its highest Bovis values, germination power and wellbeing. And the negative information was lowest at the same location.

In addition, Silvis measured the Bovis values in the passage itself at 12 different locations. IN is the entry (at the left) and UIT is the exit (at the right).



-Bovis values of the water at twelve locations. On May 17 the lower inlet was open: water flew through flow-forms 4 till 10 (the blue line). On October 11 the higher inlet was open: so water flew through flow-forms 1 till 10 (the red line).

Conclusions from these measurements:

A. The fish passage has a strong positive effect on the Bovis value, the germination capacity of the water and the wellbeing of the stream. The continuous improvement of these values is striking. At 50 m (location 5) after the exit of the fish passage, these values turn out to be considerably higher than before the fish passage: the average of the Bovis value increases from 3,000 to 5,595 (increase of 86%); the average of the germination capacity increases from 4.0 to 6.23 (increase of 56%); the average of the wellbeing of the stream increases from 4.0 to 6.3 (increase of 58%).

B. The negative information decreased a little bit in the fish passage itself, but in the brook the old higher value is reached again quickly. This high value is probably a consequence of leaching artificial fertiliser and slurry and leaching of crop protection chemicals.

Appendix 11: Radionics history

This radionics principle was discovered by the medical dr. Albert Abrams in the beginning of the twentieth century and he coined the term 'radionics' as everything he experimented with, radiated a frequency. Its working principle has been technically developed by T. Galen Hieronymus, who demonstrated pattern transfer, using conductive metals such as copper, along with various resistance com-

ponents. He got his radionics analyser patented and it became the foundation for his Cosmic Pipe design. Around 1950 mr. Charles Upton applied this technique in agriculture in the USA, was successful in potatoes and corn and was consequently forbidden further work by the US Department of Agriculture. Farmers applying this technique were warned that they would no longer get support from the formal agricultural extension staff. Abrams nor Hieronymus nor Upton could explain this working principle in terms of electromagnetics. At that time, they were not yet familiar with quantum physics.

Appendix 12: Negentropy, order, attractors and patterns of information

Order emerging out of chaos, that's fully against the flow towards entropy as formulated in the second law of thermodynamics. Many people conclude that there must be something 'attracting' this self-organisation of life. It is rather impossible to explain evolution from lightning that randomly connected atoms into amino-acids. Cambridge professor of evolutionary paleobiology, Simon Conway Morris, one of the leading paleo-biologists, in his 2003 book 'Life's Solutions', derives that 'the number of potential 'blind alleys' is so enormous that in principle all the time since the beginning of the Universe would be insufficient to find the one in a trillion trillion solutions that work.' Morris suggests the 'existence of something analogous to 'attractors', by which evolutionary trajectories are guided toward stable nodes of functionality'.

It could be that such 'attractors', that 'initiate' or 'instruct' a certain order and a specific shape, are 'the non-material patterns' that 'suck order from the environment' and shape reality. And it could be that farmers and gardeners, with informational techniques, can support or even enhance metabolism in life, by offering 'attractors'.

Appendix 13: Types of radiation

Geo-biologists distinguish different types of radiation:

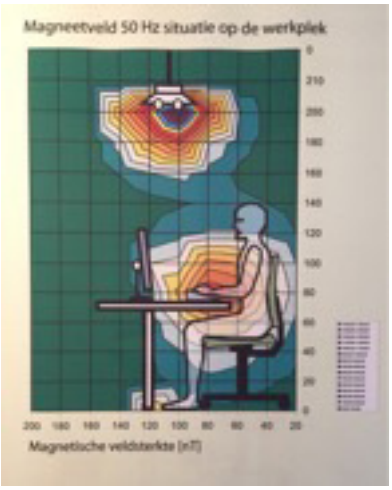
High-frequency	radio broadcasters, telephone, wifi, e.o.
Low-frequency 50-60	Hz electric installations in houses, grounding.
Subtle	faults, water veins, energy nets.

Underground high-voltage cables also affect living conditions.

Uncertainties about health effects

In the Netherlands, there is a building ban for new houses within 50-60 metres of high-voltage lines. In 2009, 95% of the members of the European Parliament supported a motion inviting governments to no longer neglect the risks involved in modern communication technology like UMTS, WiMax, C2000 etc. Fifty medical doctors requested the Dutch government to take measures to decrease the negative influences of technical radiation. Independent research is piling up and the logic is strong. Such radiation disturbs the natural vibrations of water molecules in our bodies, as well as in the bodies of animals and plants. Also, the functions of heart and brains are regulated by electrical signals, influenced by technical frequencies. Certain radiation frequencies block communication between and within the cells, the effects can be measured as blood values change. This effect is probably related to the magnetic effect of the 'spin' of electrons, which is changed by specific radiation. This is called spin-inversion, it affects the processes in the blood.

The high frequencies of geopathic and technical radiation can be detected and measures with so-called digital High Frequency meters. The strength is measured in microWatt/m^2. Below 0,5 microWatt/m^2 will do no harm to people. In most villages in the Netherlands values measured vary between 0,5 and 5,0 microWatt/m^2. In many cities it is substantially higher: above 200 microWatt/m^2.



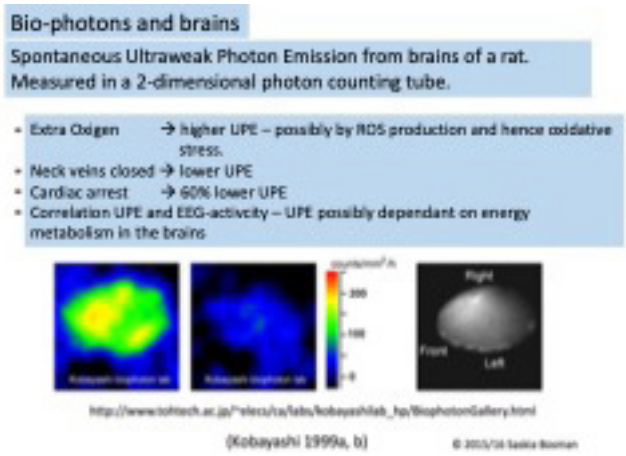
Magnetic field at 50 Hz measured at an office desk. Near the lamp and close to the computer, the magnetic field is unhealthily strong (the reddish and orange parts in the picture). Source: picture taken from lost brochure.

In an average room in the Netherlands you will come across 4 UMTS/4G lines, 2 GSM lines of 1800 Hz and 1 Radar line and 1 C2000 line. And in geopathy you'll find an average resonance with 1 fault line, 1 water vein and 4 geomagnetic nets. Be careful with *dect*-technology in mobile phones as it is based on pulsed radiation. Your laptop heats your body in the long run. Be selective with baby-phones and be careful with mobile phones for young children. The picture below shows how deep radiation heat infiltrates the skull of babies (left picture) as compared to adults.

Radiation from mobile phones penetrates further into soft tissues of a child's head (left) than into an adult head (right). Source: ehtrust.org 'Cell Phone Radiation Lecture by Joel Moskowitz, Ph.D. University of California, Berkeley, based on studies by Gandi et al. University of Utah, 1996 and 2012

Appendix 14: Sensitivity of rat brains to extra oxygen

As soon as you give extra oxygen to the brain, you count a lot more bio-photons. This is measured in brains of a rat. See the left-hand picture below. The yellowish green spot - with a dot of orange - indicates a stronger emission of photons. When you stop the blood flow into the brains, it gets less oxygen; then you count less bio-photons. If you bring the rat into cardiac arrest, then the UPE (spontaneous Ultraweak Photon Emission) decreases by 60% (middle picture). Dying rats emit many photons for a short time only. These measurements indicate that higher energy metabolism in the cells correlates with higher emissions of photons.



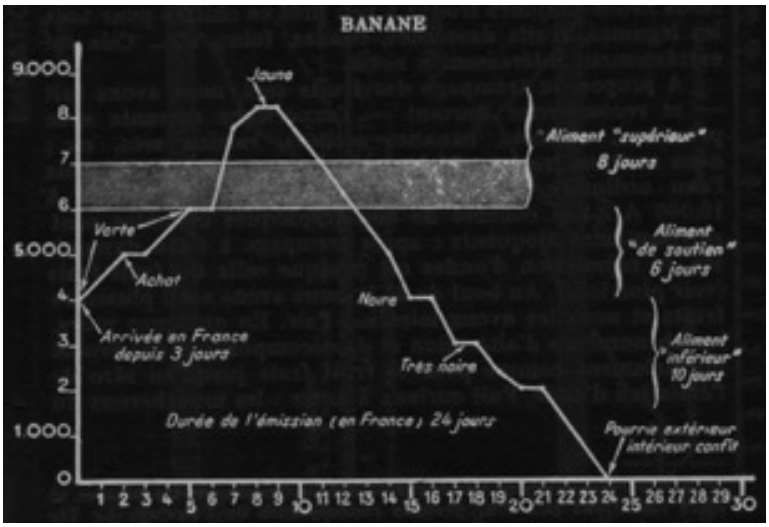
Measurements of a rat's brain show that extra oxygen leads to extra UPE (left hand picture), and vice versa. In the event of cardiac arrest (middle picture in blueish black), this emission quickly decreases by 60%. Source: Kaboyashi (1999), shared by S. Bosman.

Appendix 15: Bovis values as indicator of life energy

Only a few readers will be familiar with Bovis, so it requires some explanation. The French doctor André Bovis and his successor Simoneton, among others, have applied radiesthesia extensively. They have developed a measuring system with reference values that is still widely used today by farmers and farm advisers, in spite of not yet being recognized by conventional science. On behalf of the French government, Bovis was responsible for the quality of the food of

French soldiers between the First and Second World Wars. He noted that the mass of all foodstuffs has a certain energetic aspect. He had the - actually very modern - idea that this energy should be measurable as frequency and therefore he thought in terms of the very short wavelengths expressed in Ångström (= 10 nm). He dowsed the energetic quality of all fruit and vegetables, expressing his measurements in a scale of wavelengths in Ångström units. Based on his numerous measurements, Bovis was able to classify fruit and vegetables as superior food, food as stuffing, food that causes illness and, finally, dead food. His successor Simoneton thought it needed a different unit – as he concluded it was not wavelengths that were measured. He named these subtle energy measurements after his teacher Bovis. And this scale is in wide use till today. For many fruit and vegetables, Bovis had developed graphs representing the radiation over time. Every package of food bought had to be checked.

The graph below shows the example of the energy development of a banana, measured by Bovis himself. So immediately after a measurement Bovis could predict fairly well how many days this food would still be nutritious. This classification provides an indication for the gradual loss of vitality of the food, a very useful indication in addition to the measured levels of nutrients.



Trends in the Bovis value of a banana (vertical axis) over 24 days (horizontal axis), as measured by mr. Bovis. In the first week, the green banana turns yellow, while its energy increases from 4000 to 8000 Bovis. Then, in a week's time, the energy declines from superior quality to maintenance quality ('de soutien'). In the following week, the quality of the skin will be inferior and the skin will rot ('pourrie exterieur'). Source: vortexvitalis.nl

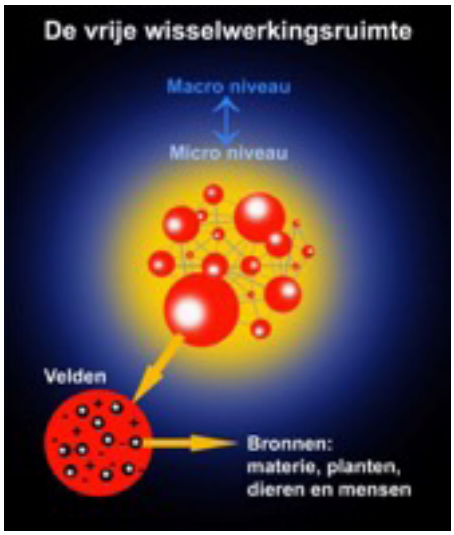
The agricultural sector can make good use of this indicator for the vitality of food. It is suitable for the soil, the water, the plant, the cow, the manure, the milk, i.e. all elements in the cycle of dairy farming.
The most common interpretation of Bovis values of food for human consumption are widely accepted among dowsers. Values below 3000 are sickening, between 6.500 and 7000 are neutral and above 7000 are contributing to health. The higher the Bovis value of a product, the better its energy quality and the healthier it is for humans, as well as for animals, plants and soil organisms.

Negative information

Measuring this vitality of food is one thing, but it is also important to understand aspects of energies that disturb metabolic processes. I tend to call it 'disturbed order'. Silvis[18] calls it 'negative information'. Many researchers have shown that water can store information. Not only Emoto from Japan with his pictures of ice crystals[19]. Researchers like Lauterwasser, Schauberger, Grander, Benveniste, Montagnier, Pollack, Voikov, Mae-Wan Ho and many others have also shown that water is an extraordinary substance and that it carries information. This applies to all parts of nature that contain water, so also the soil, the grass, the cowpat, the milk, the cheese etc. In fact, this applies to all matter. All matter radiates, and radiation contains information. This information can be positive, when it strengthens life processes, for example increasing Bovis values, but can also be negative when it inhibits life processes. Silvis added "negative information" as an indicator, which he expresses on a scale of 0 - 10. The lower the negative information in a product, the less pollution it contains and the better that element can perform its function in the metabolism. So, the closer the value of the negative information is to 0, the fewer disturbances there are and the healthier it is for the cycle. Silvis uses 2.5 out of 10 as the threshold value for cows, as shown in table 2. Like the measurement of the Bovis value, the negative information of a product is measured by means of a pendulum and a biometer.

Appendix 16: Dijkstra's thought field

Dijkstra argues that 1) communication between atoms, organs and bodies is possible and 2) photons and gravitons take care of this communication, as they form and influence quantum fields. According to another Dutchman, physicist Eric Verlinde, the foundation of gravity is in 'information' about the location of articles, something that is not matter itself[20]. Such information can probably be perceived as patterns in a field of vibration. Dijkstra calls it the free space of interaction in which thinking processes take place (see the figure below).



The Free Space of Interaction (the yellow + the blue circles), in which the thinking process takes place physically. This micro-level space is linked to the various macro-level fields from matter, plants, animals or men. Source: Dijkstra and Hooijmans, in 'The Thought Process'[21]

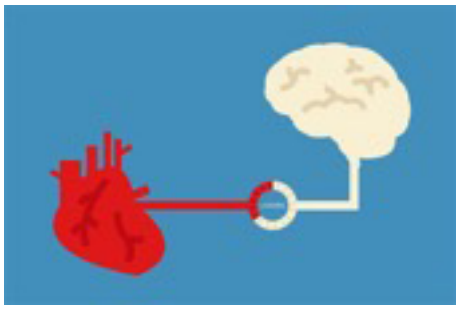
Communication between brain cells and organs in the body - in his vision - occurs by means of electrical pulses, also called varying action potentials (in the order of millivolts) or nerve impulses. This principle was reported as well in bio-electronics for communication in plants (6.1). In animals and humans, such chemical-electrical process causes brain cells to broadcast signals, to 'fire', which in turn causes brain waves to develop and spread. These brain waves differ in wavelength and in energy, depending on many factors. For example, feelings aroused by memories give rise to emotions. Neurotransmitters or hormones are then immediately produced in the body, which in

turn affect the brain. The brain reacts to this again, causing neurons to fire at the thought-field in a different way.

Input and output of the thought-field

Dijkstra distinguishes between what gets in and what goes out the brain. The *input* of a field of thought consists of combinations of brain-waves of the owner / thinker, and/or brainwaves of other beings and/or all kinds of boson radiation from the surrounding environment. Such boson radiation includes electromagnetic, magnetic, cosmic and non-natural radiation from technical devices. We receive much more information as input than we can process with the brain. And we only become aware of a small part of that info. When you focus, you often see much more than you initially became aware of. Focusing means ignoring all information you are not asking for or you have not learned to see.

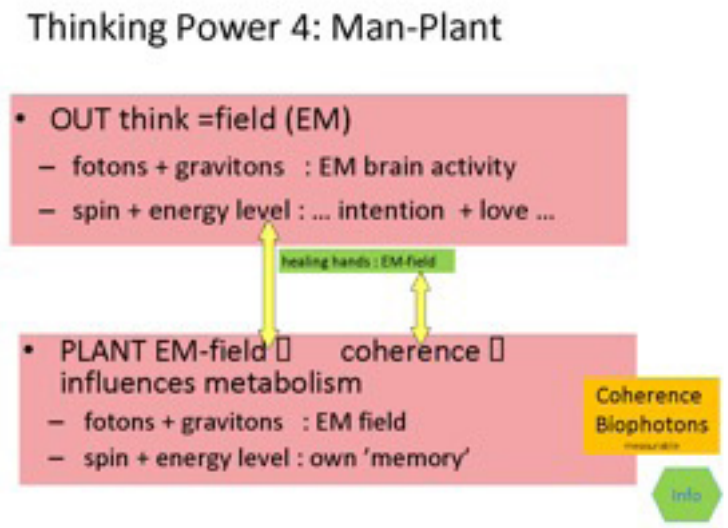
However, the output of the brain consists not only of photonic or boson radiation, but also of gravitons. The more brain activity, the more gravitons and the more powerful the field of thought. Whether or not this output has an effect on other biological processes depends both on the power of the mind and on its resonance and coherence with the frequency patterns of these biological processes. Meditating, for example, strengthens the power of the mind, it synchronizes electrical signals and makes them coherent with the other rhythms of breathing and heartbeat.



The brain waves influence the heart frequencies and vice versa.
Source: health.spectator.co.uk

The picture below summarizes the story. It shows how the human OUT and the IN field of the plant are intertwined. The effect of meditation and intention is OUT-ward oriented. The IN-ward flow of a quiet fo-

rest, of a busy city, or the earth's magnetic fields impacts your heart rhythm and breathing[22] or your awareness of nature's information.



The concluding picture – the last in a series of four - of the mutual influence of the human mind power + heart vibrations and the plant's electromagnetic and energy and information fields.

Appendix 17: Global promises failed

The Green Revolution started in the 70's of the last century. It was the first global effort that got heavily subsidized. Although there were already several cracks in that painting for those who were willing to see, this technological approach was reconfirmed by the United Nations Millennium Development Goals. Around the nineties of the last century, Henry Kissinger, the former State Secretary of the USA, called upon the farm sector and its business and researchers to do what they could. But instead, somehow agriculture has disappeared from the international agenda. That was not wise, as the international community in 2015 once again had to call for a massive effort in stimulating food production.

Appendix 18: Ancient wisdom meets modern world view

It is inspiring to explore the techniques developed by ancient agri-cultures as well as their world-view and values. During my international work, I gradually understood that they are really rich, they offer the

world a fast learning path for understanding nature as M+E+I combined, if the world chooses to listen.

De Vries[23] *has made an excellent synthesis of the views of wisdom keepers. I have selected, from her books and website, some insights that offer a relevant learning opportunity. And I comment on it. Not only for a more integrated and cyclical farming but also for a healthy relation of a society with its environment and for the learning processes of transition and personal development.*

"A unified field of intelligence is underlying all physical manifestations. It permeates and connects all visible and invisible aspects of creation. This field of intelligence can be considered as a living consciousness from which everything originates. This pure, living consciousness is pure potentiality, the field of all possibilities and endless creativity." Sounds quite like quantum physics.

"There are different planes of existence in the Universe: the physical (including energy), mental (thoughts and emotions) and spiritual planes. All changes in one layer influence all the other layers. This is also true for thoughts, words, emotions and actions." This fits the M+E+I and invites to add an S.

"Everything is energy. This energy is consciousness and therefore possesses intelligence. Energy never rests. Everything moves and vibrates. Everything has a unique pattern of vibration and everything is recognizable by this specific rate of vibration. Physical objects vibrate slowest. Our thoughts, feelings and desires each have their own rate of vibration, which we send out into the universe." It's interesting that ancient wisdom already perceived consciousness as a kind of energy, with its own vibrations. Something we only have started to formulate in terms of physics, but it is confirmed by our intuitive understanding, by metaphysics and by many practices earlier described.

"Everything flows and has its tides and cyclic movement of rise and fall. This is true for the seasons of the year, as it is for cycles of permanent renewal, like birth and death. It warns us about chaotic periods that must exist so as to create a new order. The unfolding of the evolutionary process is permeated with non-linear dynamics resulting in a spiral-like movement of growth." Ancient wisdom offers an important

advice for many activists. And it puts our intentions for agriculture in an evolutionary perspective.

"There are only two fundamental forces in the universe, the masculine and feminine principle. Everything that exists has its masculine and feminine aspect. This is true for the physical, the mental and the spiritual. These two dynamic aspects work in partnership and create, when left undisturbed, a state of balance. The masculine energy concerns the definition, the direction and the purpose and initiates the creation process. This direction-indicating aspect is also called 'positive' or yang. It is the foundation of ideas and actions. The feminine energy concerns the form, the means and the action and in fact does the active, creative work. This receptive aspect is also called 'negative' or yin. This is the dynamic that creates, that forms images out of ideas and that weaves the threads into a work of art. The masculine energy will be attracted to the feminine energy and when they unite, their connection ensures the process of creation. This attraction exists on all planes of existence and is the greatest mystery of the universe." It suggests the link between E and I, creating M. This is one reason why some artists, like Piet Mondriaan, are so inspiring. Although it still remains a mystery indeed how to express these invisible forces that shape nature in material art.

"In order to be able to restore balance on Earth, we first have to restore the balance of the masculine and feminine dynamics in ourselves. Energy follows the path of our thoughts. So, our reality is the outward manifestation of our conscious and unconscious inner beliefs." This is where I have arrived after many years of professional activism. Policy and technology are not going to heal the earth, without us, human beings and citizens, educating ourselves into a more integrated world view and acting accordingly. This statement is intimately related to the next one.

"Whenever we focus on things we criticise, we put a lot of attention into the things we don't want, so these will grow. But it is also true for our positive thoughts. When we focus all our attention on these things we really desire, we will draw energies with high frequencies toward ourselves and we will feel supported by the cosmos around us."

I also like the next statement: a change from focussing on scarcity to focussing on abundance. *"We receive blessings as material and spiritual fruits (presents, money, inheritance, friendships and blessings). These blessings are a result of our conscious and unconscious beliefs. We can release our scarcity-belief patterns and instead see the world as a place of abundance."*

"When left undisturbed, the Universal Laws result in a non-linear evolutionary process. The direction of this process is determined by the tendency of nature to move in the direction of the positive (higher frequency) pole. Higher vibrations will consume and transform lower vibrations. By consciously choosing positive thoughts, our experiences of Love, Joy and Peace will bring us automatically to a higher vibration."

This is an encouraging wisdom and it strongly supports the suggestion to start changes within and with our consciousness. The next statement indeed elaborates on it. Intention and intuition are real powers. But it also warns us not to limit ourselves to intent and attention alone: action is needed on the material reality as well.

*"We have the power to influence everything around us. We can use our **intent** (the masculine energy) to determine definition, direction and purpose and next our **attention** (the feminine aspect) to focus and receive information about form, means and action necessary to achieve our purpose. Every thought needs to be accompanied by a physical action in order to reach manifestation. Without physical activity directed toward manifesting the goal, there is no physical movement of energy which is needed as 'attractor' of compatible desires. Mental doubt is like a poison to us, so in order for us to be able to create what we really want, our thought forms must be clear and concise. The physical action in line with the desired goal can be anything, from speaking out loud what we want, drawing it, dancing it or just taking the first steps without doubt that our desired goal will be reached."*

In his recent book 'Les émotions cachées des plantes', Didier van Cauwelaert[24] quotes many scientific facts to confirm the suggestion, I should say 'the fact', that plants show a certain consciousness:

they register their environment, take decisions, react and signal other plants around them. He brings this idea of Jean-Marie Pelt[25] one challenging step further by suggesting that, if plants are capable of poisoning animals and informing or warning other plants or animals including apes (which is sufficiently proven), why not would they also be able to communicate or deal with human beings? Van Cauwelaert concludes by saying that 'nature never stops talking to us. It is us to stop being deaf.'[26]

I am fascinated by these stories of ancient cultures and of the fact that these stories seem coherent with some modern sciences on the conditions they formulate for sustainable development. Professor Jean-Marie Pelt[27] reflected about the evolution of the Western industrial societies, notably European ones and searched for new balances in society based on the respect of justice, an economy moving towards ecology, a new culture and education. Dr. E.A. Goewie[28] elaborated in various lectures on the foundations and values of different food production systems. He sees an interesting consensus between a biological or biodynamic approach and the principles of a new order as formulated by de Vries. Both van Egmond and de Vries argued for a new balance in society. This all together demands a cultural transformation indeed. Professor van Asseldonk[29] suggests that old wisdom traditions - and hopefully the great world religions – should meet again for a healthy transformation of mankind. Views to be further explored, I would say.

Appendix 19: Biological significance of photon condensation

Herbert Frohlich was the first to point out the importance of Bose-Einstein condensation for the description of biological systems. In particular, long-range signal transmission plays an important role, which obviously cannot be explained exhaustively on an exclusively biochemical basis. How do biological systems realize the coherent arrangement of their elementary components?

In 'Elemente des Lebens' researchers propose the Bose-Einstein condensation of photons[30] to explain coherence and order[31]. Fundamental to "living systems" are self-organisation and reproduction, access to a suitable energy and material flow, complexity as well as coope-

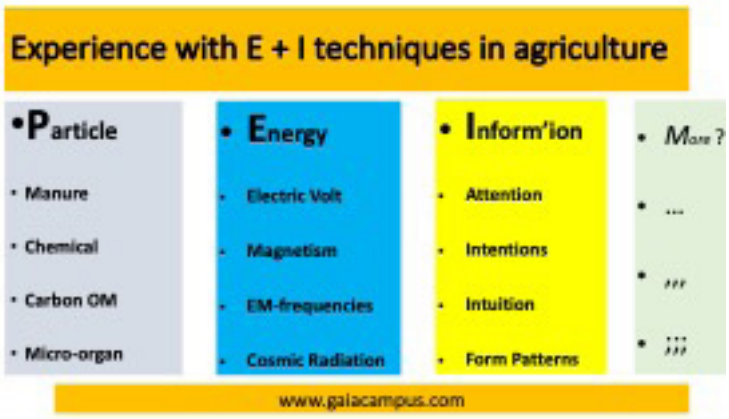
ration between cells, organs and organisms. An essential feature of cooperation in complex biological systems is coherence, the creation of a sustainable, intelligent interplay.

The Bose-Einstein condensation of photons is a phase transition that can be used to explain coherence and also to assess the level of local order. This is especially true for coherent light occurring in biological systems. Can we consider DNA as an electromagnetic resonator? Can the quality factor of a DNA be determined? Which electromagnetic functions do the microtubules of the cells have?

This view of living systems makes fluid the boundary between biology and electrical nanotechnology. Biological structures show electromagnetic properties that have so far been sought only in electrical engineering. Photon condensation seems to be an essential key for access to these two areas, as well as a link between them.

Appendix 20. MEI + S

At the end of this book, I refer to one of the first schemes I have presented, the M+E+I view on natural and human reality. In the introductory video on my website www.gaiacampus.com/about I have already suggested a fourth 'octave', without elaborating on this addition. In the picture you see what a fourth column 'More?' would look like:



Enriching the particle/mass approach in agriculture with Wave and Information approaches. This view on farming may be seen as a three-dimensional view M+E+I, leaving open the question: "Is there More?"

Another picture, from Gitt[32], also suggests such fourth octave or dimension. He complemented the three aspects of Mass (particles), Energy and Information by Will. The picture suggests that non-material I(nformation) and W(ill) can influence all material aspects and processes. So, a worldview with 4 pillars has already been devised by more people. Maybe it is not a bad idea to extend MEI to MEIW, or if you want to see it as a spiritual dimension, to MEIS.

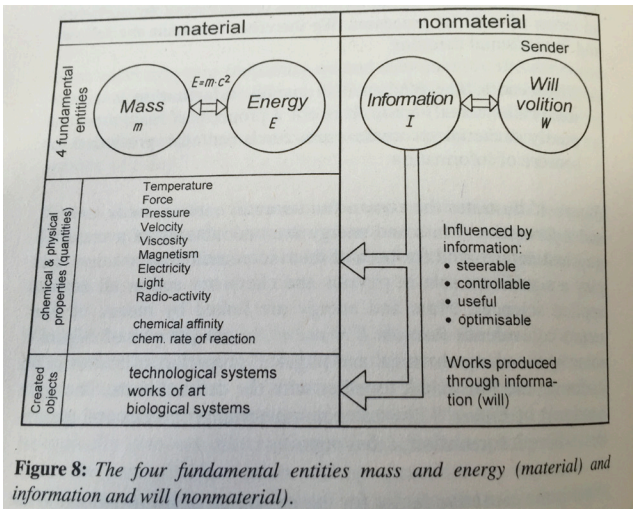


Figure 8: *The four fundamental entities mass and energy (material) and information and will (nonmaterial).*

Photo by the author, one page in a booklet I was shown in South Africa at Stellenbosch University. Source: p. 53 in Chapter 3 (Information is a fundamental entity) of the book "In the beginning was information" 2006. Werner Gitt.

In the light of the conclusions above, I may have to enlarge my original model once more. Enlarge it with a dimension of consciousness, maybe a spiritual dimension, as proposed by Silvis in the next picture.

Methods to renew farming and gardening:
Enrich M- with E + I + S techniques

M(ass)	E(nergy)	I(nformation)	S(piritual)
Mass	Electric tension	Attention	Co-Creation
Chemics	Magnetism	Intention	Consciousness
Carbon	EM-frequencies	Intuition	Unity
Micro-organisms	Form-information	Cosmic information	Nature Beings

The four columns can be compared to the four octaves in the human being:

Physical	Emotional	Mental	Spiritual

Source: Quantum inspired Agriculture 2016/2017, based on Henk Kieft (MEI) and Frank Silvis (S)

Four dimensions of working with nature in farming. Source: Quantum inspired Agriculture course 2016-2017, based on Kieft (MEI) and Silvis (S).

By including this fourth dimension we in fact open ourselves up to learning from ancient wisdom and from modern mystics and from shamans. Here is also the justification why world religions, if knowing about spirituality and creation, should join the farming game.

Footnotes

[1] Hiemstra (2010)
[2] Escherichia coli, Aarholt et al., 1981; E. coli, Leclercia adecarboxylata, Staphylococcus aureus, Fojt et al., 2004; Staphylococcus epidermis, S. aureus, Enterococcus faecalis, E. coli, Pseudomonas aeruginosa, Klebsiella pneumonia, Inhan-Garip et al., 2011; S. aureus, Ahmed et al., 2013; Salmonella typhi, Fadel et al., 2014.
[3] Simkó et al., 2001; Lupke et al., 2004; Cuppen et al., 2007.
[4] Cuppen et al., 2007.
[5] Ali et al., 2012.
[6] Hassan et al., 2014.
[7] Ahmed et al., 2013.
[8] LEI, (2009-015).
[9] Bondt et al., LEI 1.01.02 (2001)
[10] Von Goethe lived from 1749 to 1832.
[11] Phi [Greek letter Phi], which is also known as the Golden Mean, is an irrational number approximately equal to 1.61803 . . . . Like Pi [Greek letter π, the relationship of a circle's diameter to its circumference], Phi is an irrational number, and usually is written as a non-repeating decimal. It can be derived from the Fibonacci sequence in which the next number is the sum of the previous two, i.e. 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, etc. Values for Phi are obtained by dividing the last number in the sequence by the previous one, as for example, 4181 divided by 2584 is 1.61803 . . Interestingly, the reciprocal [2584 divided by 4181] is 0.61803 . . . which is why Phi is called the Golden Mean.
[12] Van Wijk, (2014)
[13] Van Wijk, 2014.
[14] As explained by dr. Peter Merry www.volutiontheory.net
[15] Published in Dynamisch Perspectief, winter 2006, pp24-27.
[16] R. Tsenkova, J. Near Infrared Spectrosc. 17, 303–314 (2009).
[17] http://physics.nist.gov/Divisions/Div844/facilities/ qom/index.html
[18] vortexvitalis.nl
[19] Emoto is criticized for choosing the most beautiful photographs, but he is not the only one who observed water.
[20] See https://arxiv.org/abs/1001.0785 Eric Verlinde's recent theory also points in this direction.
[21] The English version of the book has no picture of this Free Space of Interaction.

Resources list partly annotated
Quantum Leaps in Agriculture

ENGLISH

- Al-Khalili J. & McFadden, J., 2014. Life on the Edge: The Coming of Age of Quantum Biology. Bantam Press. Transworld Digital. London, UK.
    - The first book ever that describes how quantum physics can be applied in biology. It discusses physiological processes that are also relevant for farming and gardening. The 'communication' between proteins of our DNA, the geographical orientation of birds, bees and reptiles and the efficiency of photosynthesis in plant leaves. Quite accessible for interested readers.
- Amyan A, Ayrapetyan S., 2004. "The biological effect of extremely low frequency electromagnetic fields and vibrations on barley seed hydration and germination." Scientific World Journal; 2004, 4(Suppl 2): 55-69.
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    - The energies in fertilizers and in the cosmos preside over crop production. What makes each thing different is the energy pattern and frequency at which it resonates. The book is a manual on how to tap and use "life-force energy" to develop food production practices that are both high quality and non-destructive.
- Andeweg, Hans, 2001. In Resonance with Nature. Kosmos-Z&K Uitgevers, Utrecht, Netherlands.
    - The book contains 2 parts: Diagnosis and Therapy. In Diagnosis the reader learns to sense and judge the radiation of soils, plants and trees. This diagnosis of life force energy of living beings is the starting point for treatment. The treatments are based on orgone energy, radionics, geometrical forms and symbols and they combine the human intention with the use of electronic devices. A basic learning book.
- Andeweg, Hans, 2016. The Universe loves a happy ending. Becoming energy healers for the planet, organizations and ourselves.

Hunter House Publishers. New York.
    - About the interface between spirituality and ecology and about practical examples of remote healing of the environment. The book shows how the emerging connections between (quantum) science and universal spiritual laws give us new tools for working with life energy and consciousness as well as influencing events. The book summarizes the practical applications in 10 Principles of Energetic Guardianship.
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- Berendt, Joachim-Ernst, 1987. Nada Brahma, The World is Sound, Music and the Landscape of Consciousness. Destiny Books / East-West Publishers.
    - Berendt brings all reality back to its tonal structure. The world is sound, rhythm and vibration. It shows how modern knowledge confirms old wisdom. He connects musicians with zen masters and modern physicists. The book offers an inspiring music-based worldview.
- Berk, Ulrich & Shailendra Sharma. 2019. Effect of Agnihotra energy field on water purification. Academia.edu. Berk is chairman of the German Association of Homa Therapy, Sharma is Principal of AIMS College, Dhamnod, MP, India.
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    - Birch merges the ecological crisis with process philosophy (based on A.N. Whitehead) and quantum physics into an evolutionary challenge for humanity.
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    - Thorough study into various methods to assess apple quality and vitality. Methods compared include chemical and physical parameters, self-disintegration, sensory properties, Copper Chloride crystallisation, capillary rising picture method, Delayed Luminescence (bio-photons), electro-chemical parameters, Bovis-values. The study tried to identify correlations between various methods. Includes summaries in Dutch and German.
- Bosma et al, 2012. Animals, meridians and acupuncture points and their electro-physical function Soh, J Acupunct Meridian Stud, 2 (2), 93-106. Also in: Bosma et al., Livestock Science 99, 285-290.
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- Callahan, Philip S., 2001. Tuning In To Nature. Infrared radiation and the insect communication system. Second edition revised. Acres USA. Austin Texas.
    - One of the very first authors that suggested the wave-structure of nature. He started his discoveries during world war 2, being a radio-communicator with English aircraft above the continent. He studied the behaviour of night moths in light with various frequencies. Callahan also elaborates his finding for practical applications in food production.
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- Examining the role of religion in society, at a symbolically important date in history. 'We must revive the theological underpinnings of our original Religions in which the individual related to society, the natural world and the cosmos.' The issue emphasizes the importance of our world view and the spiritual and religious backgrounds of the environmental crisis. And it refers to inspiration from archaic societies, Tao, Egyptian cosmography, Vedic India, the book of Enoch in the Judeo-Christian tradition, the Christian tradition and African Churches.
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- Ho, M-W., 2008. The Rainbow and the Worm, The physics of Organisms. 3rd ed. World Scientific.
    - A serious inquiry into Schrödinger's question, "What is life?". It takes the reader through many areas of contemporary physics, from non-equilibrium thermodynamics and quantum optics to liquid crystals and fractals. In the process, the

reader is gaining novel insights not only into the physics, but also into "the poetry and meaning of being alive". This third edition includes new findings on the central role of biological water in organizing living processes; it also completes the author's novel theory of the organism and its applications in ecology, physiology and brain science. Titles of some chapters include: 'Life is a Little Electric Current'; How Coherent Is the Organism? The Heartbeat of Health and Sensitivity to Weak Electromagnetic Fields; Crystal Consciousness; Quantum Entanglement and Coherence; Ignorance of the External Observer. The book also shows the scientific logic behind closing energy and nutrient cycles in farming.

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    - This book addresses the issue of the quality of food we eat, and what steps can be taken to regain a personal and spiritual connection to the food we consume, and the nature elements that help us to produce our food. The book contains "easy to do" techniques –including subtle energetic techniques - of creating sustainable food from city to country dwellers and resources for returning stewardship and partnership to our lives.
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    - The book discusses different ways of seeing and doing, related to resilience of natural systems. It compares linear and circular systems. Why linear thinking creates Vicious Circles and how joining the dots creates Virtuous Circles. At the end, it summarizes the relevant concepts, values and principles and argues in favor of food sovereignty.
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- Katsenios N., V. Kavvadias, S. Theocharopoulos, D. Bilalis, Z. Ionnnou, A. Papadopoulos, N. Liakopoulou, 2015. Influence of Pulsed Electromagnetic Field on Plant Growth, Nutrient Absorption and Yield of Durum Wheat. Notulae Scientia Biologicae 7(4):505-509.
    - Researchers have adopted the use of magnetic field as a new pre-sowing, environmentally friendly technique. Enhancements on plant characteristics with economic impact on producer's income could be the future of a modern, organic and sustainable agriculture. A field experiment with durum wheat was established at Soil Science Institute of Athens, Greece, in the winter of 2014. Seeds were treated using a PAPIMI electromagnetic field generator for 0, 30 and 45 minutes one day before planting. The results indicate that this innovative technique can increase the yield of durum wheat, through enhanced absorption of nutrients. Pre-sowing treatment of the seeds leads to vigorous plant growth that are more productive.
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    - Illustrates the use of electro-magnetic waves in both modern and traditional agriculture. Some contributed to enhanc-

ing animal and plant production and food quality. Others enabled early detection and effective control of diseases and pests. Our world should not be seen as being made of matter and energy only, but also of quantum information carried by energy and circulating in the vacuum among particles and holding matter together. This new understanding of the soil-plant-animal-man relationships should make agriculture more efficient and less harmful to our environment and health. It should enlarge our concept of modern agriculture to a "quantum agriculture" considering the role of electro-magnetic radiations in life processes. Ultimately an even broader concept should encompass the "intuitive agriculture" practiced since millennia by the traditional farmers and their shamans, that is now being investigated by young research workers.

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    - The paper explores new technologies in farming, based on electromagnetic theories and techniques based on intuitive understanding of plants and animals. It also explores the question how to understand and further develop these techniques in order to contribute to sustainable agriculture.
- Kieft H., 2015. Intuitive Farming: Towards a New Vision on Nature. In Park S.A, and C. Shoemaker (eds.), Proceedings of the XI International People-Plant Symposium on Diversity: Towards a New Vision on Nature. Acta Hort. 1093, ISHS. Pp 179-194.
    - The author has studied innovative farming techniques, like electromagnetics and intuitive knowing. He furthers his conclusions of electromagnetic treatments in animal husbandry to the impact of nature environments on human health. He suggests Nature/Health research to complement their vision – based on indirect effects of nature on human health - with direct effects of electromagnetic vibrations occurring in nature.
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    - The report from an American agronomist, who travelled to the East and was so amazed about their mature farming systems approach, that he wanted to preach it in the USA as well. But the message was completely ignored. Picked up in the Netherlands in 2010 by Eburon, Delft and the Stichting12Ambachten and translated into 'Vierduizend jaar Kringlooplandbouw' by Sietz Leeflang.
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    - Horse trainer Linda Kohanov had already written THE TAO OF EQUUS, a multidisciplinary exploration of the powerful spiritual, emotional, and psychological connections between people and horses. Its provocative narrative, blending her story of prescient dreams and ancestral communication with a wide-ranging exploration of equine-facilitated therapy practices, created a worldwide demand for her workshops and lectures. Building on this theoretical groundwork in her bestselling debut, RIDING BETWEEN THE WORLDS concentrates on sharing many extraordinary, life-changing accounts. She delves more deeply into the equine mind and spirit to discover what they have to teach us about the untapped potential of our own species.
- Kreisl P., 1998. Test on the transduction of acetic acid information via an electronic amplifier. Acta Medica Empirica, 47(3): 17-24.
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    - Order the book at www.RingingCedars.com which is also the site to order the books of Vladimir Megre about Anastasia. Very practical, humoristic but deep book about fruit gardening, with a feeling of connection. Like the algebra of harmony for your datsja. Specially for Siberia and other colder areas.
- Laszlo, Ervin with Anthony Peake, 2014. The Immortal Mind. Science and the continuity of Consciousness beyond the Brain. Inner Traditions, Rochester Vermont, Toronto Canada.

    - Based on a new scientific paradigm in sync with experience-based spirituality, Ervin Laszlo and Anthony Peake explore how consciousness is continually present in the cosmos and can exist without connection to a living organism. They examine the rapidly growing body of scientific evidence supporting the continuity of consciousness. With proof that consciousness is basic to the cosmos and immortal in its deeper, nonmanifest realm, Laszlo and Peake reveal the purpose of consciousness is to manifest in living beings in order to continuously evolve.
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- Lauterwasser, Alexander, 2006. Water Sound Images, The Creative Music of the Universe. Macromedia Publishing. USA.
- LeShan L., 1974. The Medium, the Mystic and the Physicist. Skyhorse Publishing.
- Lipton, Bruce H., 2010. The biology of belief: unleashing the power of consciousness, matter and miracles. Hay House. USA.
- Lovel, Hugh, 2014. Quantum Agriculture: Biodynamics and Beyond. Quantum Agriculture Publishers, Blairsville, Georgia, USA.
    - Quantum physics grew out of the realization that matter arises due to wave functions which perfectly meet themselves. These vortices recur, concentrating charge in self-organizing, self-reinforcing resonance and thus are stable. Basically, this means that everything in the universe is vibration, either free and experienced in waves such as light, or bound in vortices in self-reinforcing, self-similar spirals. Both are influenced by quantum non-local pattern energy, which can be broadcast using a stationary, self-driven equivalent of a crystal radio set, called Field Broadcaster. He aims to raise the level of understanding in biology and agriculture where the intriguing rules of quantum physics are by far the best explanation of how living organisms interact with the soil as well as the wider universe.
- Marchettini N., E. Del Giudice, V. Voeikov, E. Tiezzi, 2010. Water: a medium in where dissipative structures are produced by a coherent dynamics. J. Theor. Biol., 265(4): 511-516.
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- McCraty, Rollin, Raymond Trevor Bradley and Dana Tomasino, 2005. The Resonant Heart, Shift: At the Frontiers of Consciousness. December 2004-February 2005, p15.
- McTaggart, Lynne, 2002. The Field. The quest for the secret force of the universe. Harper Collins Publ. New York USA.
    - The author –as a science journalist- interviews many scientists to answer her main quest about the secret of the universe. Very accessible and instructive.
- McTaggart, Lynne, 2007. The Intention Experiment – Use Your Thought to Change the World. Baror International Inc. Armonk, New York USA.
    - The author expands her earlier book into a worldwide experiment about the impact of organised intention.
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    - The first in a series of 9 books, gradually developing the ancient knowing of a young lady, living alone in the wild, educated in ancient Russian Vedic knowing. It is the starter of an 'eco-village revolution' taking place in Russia and abroad.
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- Montagnier L., J. Aissa, E. Del Giudice, C. Lavallée, A. Tedeschi, G. Vitello, 2011. DNA waves and water. J. Physics: Conf Ser., 306: 012007.
    - See also the Documentary of 2014 about Nobel Prize laureate Luc Montagnier: https://www.youtube.com/watch?v=R-8VyUsVOic0

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    - Anthropologist Narby explores the sources of knowing of Native American shamans. He concludes that the scientific knowledge of a cell-biologist might tell the same story about the foundations of life, as the dreamed answers of a shaman.
- Norman R.L., J. Dunning-Davies, J.A. Heredia-Rojas, A. Foletti, 2016. Quantum Information Medicine: Bit as It - the future direction of medical science: antimicrobial and other potential nontoxic treatments. World Journal of Neuroscience.,6: 193-207.
- Nuthall, P.L., 2012. The Intuitive World of Farmers - The case of grazing management systems and experts. In Agricultural Systems 107 (2012) 65-73.
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    - Intuition is a critical component of farmers' decision making and underlies human capital. A model of decision making, including intuition, was developed. The components included management style, experience, intelligence, decision reflection, self-critiquing, and similar. Intuitive ability proved to be critically important in achieving objectives. The pre-requisites of good intuition were: experience, technical and decision theory knowledge, and, in part, anticipa-

tion skills. Developing successful intuition requires consulting widely, personal reflection and critiquing in a constantly evolving decision skill. The model was original and the first to integrate the factors giving rise to business decision making intuition. The results make it clear how to improve intuition and underpin understanding farmers and their way of working.

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etc. The key term is coherence of bio-photon behaviour, it is suggested as a new indicator for health quality of food.
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    - Explaining the phenomena of photons in life processes, relating it to living cell chemistry and quantum theory. In chapter 16 the authors introduce the MEI-concept and elaborate on it in the perspective of living matter. The diagnostics are focussed on the human body and the levels of stress-factors that influence human health.
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    - Martha Williams once facilitated a training in animal communication in which I participated. It was a great learning opportunity. Her key message is also not easy for many intellectual people: 'Trust your intuition!'
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    - Looking for explanations of her observations, Martha arrives at the conclusion that quantum physics helped her the most.
- Wilkes J., 2003. Flowforms, The Rhythmic Power of Water, Floris Books.
- Wohlleben, P., 2016. The Hidden Life of Trees. Greystone, Vancouver, Canada.
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- Zyl van, Pieter Johannes Jacobus, 2012. Radio Frequency Energy for Bioelectric Stimulation of Plants. Dissertation M-TECH in Faculty of Engineering and the Built Environment, University of Johannesburg, South Africa.
    - This dissertation is explaining at a detailed electro-technical level, what frequencies are broadcasted on tomatoes in his experiment. He tested the reaction of tomatoes on electricity leaking from electrical wires. Compared to the non-treated tomatoes, the treated tomatoes had a 56% higher mass production and no disease problems. His explanation evolves around the frequencies of Potash K and Magnesium

Mg, resonating respectively at 16 Hz and at 32 Hz. Both elements play a crucial role in the exchange of particles and molecules in and out cells.

FRENCH, FRANCAIS

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  - The titel indeed says what the book is about. Very instructive chapters exploring and explaining human health from a quantum physics perspective.
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  - Yanninck van Doorne is the first agronomist, who did his PhD on sound and plants. His conclusions were so convincing that he developed a full set of agricultural advisory services including music and magnetic devices. His team is basically working in Belgium and France. He shares many experiences on his websites.
- Ivaldi, Marion, 2003. Les ondes au service des plantes. Journal Ouest France. 03/06/2003.
  - About waves serving plants.
- Julien, Eric avec Gentil Cruz, 2004. Kogis, le message des derniers hommes. Editions Albin Michel/ C.L.E.S.
  - Julien, after a plane crash, was unexpectedly cured by a tra-

ditional shaman. He went back to understand how this could happen. Julien understood the energetic aspects of the shamanic healing as well as the importance of energetic and spiritual healing for harmony in society. He documents the main messages of these Native Americans for modern Western cultures. This work by Eric Julien has led to the movie Aluna.

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  – Introduces the food quality measurements designed by dr. Bovis.
– Wohlleben, P., 2017. La vie sécrète des arbres. Editions des Arènes. Paris.
– Zurcher, Ernst, 2016. Les arbres entre visible et invisible. Acte Sud, France.

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GERMAN

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  – Farmers and gardeners can serve plants with non-material information. It adds a relevant tool to their farm management kit.
– Bechmann, Arnim, 2004. Transmaterialen Katalysatoren – Funktionsmodell, Anwendungsbereiche und experimentelle Erfahrungen. Zukunftszentrum Baringshausen, Deutschland.
  – This work is introducing the concept of transmaterial catalizers. It is theoretically well documented.

– Berendt, Joachim-Ernst, 1983. Nada Brahma. Die Welt ist Klang. Insel Verlag. Also in English 1987 Destiny Books / East-West Publ 1988.
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    – Bischof has explored all corners of subtle energies and potential scientific explanations. A great resource.
– Bischof, Marco, 2002. Tachyonen, Orgonenergie, Skalarwellen, feinstofflichte Felder zwischen Mythos und Wissenschaft. AT Verlag.
    – A strong document about rather unknown aspects of reality and the fundamental theories that support these phenomena.
– Danzer, A.W., 2014. Die unsichtbare Kraft in Lebensmitteln. Kristallationsbilder aus der Forschung vom LifevisionLab von Soyana. Bio und nicht-bio im Vergleich. Verlag Bewustess Dasein, Schweiz.
    – This firm Soyana explains for its clients how they approach their quest for quality and vital food. In many pictures of crystallization patterns, it shows the visible difference between bio and non-bio food. It also explains their 12 criteria to achieve the most healthy food they sell. Even their staff holds regular meditation to spiritually upgrade the food quality.
– Duerr H.-P., F.-A.Popp and W.Schommers, 2000. Eds 'Elemente des Lebens. Naturwissenschaftliche Zugange – philosophische Positionen'. Die Graue Edition, prof. dr. Alfred Schmid-Stiftung, Zug/Schweiz.
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- Hartmann, Ernst, 1954. Krankheit als Standortproblem. Band 1, Haug Verlag, Heidelberg, Band 2, Haug Verlag, Heidelberg, 1986.
    – In his publication 'Illness as a Location Problem', Hartmann reports his measurements of structural deviations from the earth magnetic field. This brought him to the idea of the so-called Hartmann-net of magnetic lines around the globe. He

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  - A modern mystic that open you for a spiritual attitude towards yourself and nature. He also reflects on the practical consequences of a spiritual attitude for the environment.
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  - Solid introduction in the qualities and energies of trees. And how to develop your personal sensing quality.
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- Pfannenschmidt F., V. Staël von Holstein und W. Weirauch. 2004, 2007. Was die Naturgeister uns sagen, Heft 1 und 2. Im Interview direkt befragt. Flensburger Hefte 79 en 80.
  - On the permanence and communication of nature spirits.
- Rajda, Vladimir, 2004. Metabolische Energie und Elektrodiagnostik der Pflanzenvitalitat. Kurzbericht fur die 10. Internationale Tagung Elektrochemischer Qualitatstest BTQ 2004, Teil 1.
  - Accessible article about the electrical volt measurements in many trees.
- Vitra Design und Autoren, 2011. Rudolf Steiner, Die Alchemie des Alltags: pp23-106 Kontext.
  - A book published at the occasion of an art exposition of Steiners work. It includes his thinking about the relevance of imagination, inspiration and intuition as ways to explore the invisible information available around and within us. This knowing is complementary to our 'normal' cognition.

DUTCH

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  - Translation from Life on the Edge, of the same authors.
- Alexandersson, Olof, 2013. Levend Water. Viktor Schauberger en het geheim van natuurlijke energie. Vertaling van de duitse versie 2008.
  - See comments under the original version in German.
- Andeweg, Hans, 2001. In resonantie met de Natuur. Kosmos-Z&K Uitgevers, Utrecht.
  - See comments in English list.
- Andeweg, Hans, 2011. Scheppend leven. Over de grondbeginselen van energetisch beheer. Juwelenschip.
  - See comments in English list.
- Arntz, William, Betsy Chasse and Mark Vicente, 2006. What the Bleep do we know!? Ontdek de werkelijkheid achter de werkelijkheid. Servire, Kosmos-Z&K uitgevers, Utrecht Antwerpen.
  - The book about the adventure of preparing the well known film with the same title.
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  - Explores the origin of ideas and their development of several Dutch artists, like a.o. Mondriaan. He considered his famous work Victory Boogie-Woogie as his most successful effort to visualize the invisible structure behind reality.
- Bodanis, David, 2005. Het elektrisch universum. Een geschiedenis van de elektriciteit. Ambo Amsterdam.
  - Translated of Electric Universe, The Shocking True Story of Electricity. Crown.
- Booij, Alice, 2006. Energetische Landbouw: Een kansrijke nieuwe ontwikkeling. In V-focus Rundvee, oktober 2006: 18-19. Vakblad voor adviseurs in de dierlijke sector.
  - The agricultural journalist interviewed Henk Kieft for a Dutch dairy magazin.
- Bouchardon, Patrice, De helende kracht van bomen, wat we van bomen kunnen leren en hoe we ermee in contact kunnen treden. Deltas Belgie-Nederland.

  - Translated from French. See comments there.
- Buhner, Stephen Harrod, 2004. Het hart als zintuig. Hoe planten hun geheimen onthullen. Ankh-Hermes, Deventer NL.
- See comments in English list.
- Bruijn, Yvonne de, 2013. De Levende Klank. Stem en Lichaam in Resonantie.
  - Also available in English and Chinese. The author guides you through her fascinating discoveries of the healing power of the voice. She relies on her body as sound resonator to sense the disharmonies in the client's body and also to sens the impact of her singing on the internal coherence in the body.
- Capra F., 1994. De Tao van de Fysica. Een onderzoek naar de parallellen tussen de moderne fysica en oosterse mystiek. Kosmos-Z&K Utrecht.
  - Compares the foundations of Western and Eastern knowledge.
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  - Explores what juridical initiatives can support sustainability in ecology and society.
  - Translation of The Ecology of Law. Berret-Koehler Publishers Inc. San francisco 2015.
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  - Describes the thinking of Victor Schauberger is inspired by careful observation of nature (in forest and in water).
- Commissie Onderzoek Biologische Landbouwmethoden, 1977. Alternatieve landbouwmethoden, inventarisatie, evaluatie en aanbevelingen voor onderzoek. Eindrapport/oktober 1976. Pudoc Wageningen.
  - Report of the Dutch national commission for alternative agriculture. It mentions some energetic backgrounds of various techniques, without further analysis.
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  - Dutch author exploring sound as basic foundation for everything.

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  - Illustrated book with very clear descriptions of 77 games in and with nature.
- Cuppen J. et.al., 2006. Immuun stimulering in vee en vis door zwakke laag-frequente elektromagnetische velden. Wageningen UR, Univ Utrecht, Immunent and FIS bv.
  - One of the first articles in the Netherlands about the impact of low frequency electromagnetic fields on fis hand on dairy cows.
- Doorne van, Yannick, 2000. Invloed van variabele geluidsfrequenties op de groei en ontwikkeling van planten. Thesis Hogeschool Gent, Belgie. Landbouw Hogeschool in samenwerking met de Rijksuniversiteit Gent.
  - PhD about sound and plants. It developed into an agricultural advisory group, as described in the French list.
- Dijkstra, Fred en Nicoline Hooijmans, 2010. Het Gedachteproces. Over de evolutie van het denken. Free Musketeers, Zoetermeer, NL.
  - An original exploration of the power of thought. Based on quantum physics theory and brain research. Translated in English.
- Phoenix Dubro, Peggy and David P. Lapierre, 2006. Het kosmische energieveld. Bewustzijnsgroei door afstemming op kosmische energieen. Ankh-Hermes Deventer.
  - See English list.
- Eden, Donna and David Feinstein, 2012. Werken met energetische geneeskunde. Voor een uitgebalanceerd, gezond, vitaal en vreugdevol leven.' Altimira, Haarlem NL.
  - Accessible description of the human energy body. Inspired by ancient cultures, specifically Chinese acupuncture. Many praktical exercises and clear drawings.
- Essink, Petra, en Paul Doesburg. 2016. Barstens vol leven. Een pleidooi voor vitale voeding. Christofoor, Zeist NL.
  - Examples of gardeners and farmers producing excellent food. And how to maintain that quality in the kitchen. It gives a clear overview of various techniques to assess the food quality and vitality. Content matter, crystallisation images, chromatografy, bio-photon measurement, fatty acid profiles, and taste panels.

– Gordon, Richard, 2006. Quantum Touch. Een doorbraak in het genezen met je handen. Ankh-Hermes, Deventer.
    – Translated from: Quantum Touch – The power to heal. 2002. North Atlantic Books, Berkeley California, USA.
– Hale, Gill, 1999. De Feng-Shui tuin. Een bron van gezondheid, rijkdom en geluk. Becht, Bloemendaal NL.
    – The principles in the design of feng-shui gardens. Explains basic concepts like Yin and Jang, various energies, I Tjing, Lo shu and Bagua, the vife elements, qi energy, vibrational energy that is connected with the Hartmnn and Curry rasters.
- Havinga, Roelf, 2001. Voorkomen, gebruik en effecten van subtiele energieen, een eerste verkenning. TEAM Ecosys, Postbus 147, 7391 AA Twello. www.team-ecosys.nl
    – One of the first articles in Dutch, introducing the use of subtle energies in farming.
– Hawken, Paul, 1975. De magische wereld van Findhorn. Brecht, Amsterdam
    – See English list.
– Hellinger, Bert, Gunthard Weber en Hunter Beaumont, 2001. De verborgen dynamiek van familieverbanden. Altimira-Becht Haarlem.
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RUSSIAN

Institutes in Russia and Ukraine, working on distant human influence on plants

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- A.S. Popov Scientific and Technological Society of Radio Engineering, Electronics and Communications. Moskow.
- Association for Applied Parapsychology. Center for Information on Science and Technology. Leningrad, Russia.
- Scientific and Technological Mining Society. Moscow, Russia.
- Moscow State University, Biology and Psychology Departments, Dept. of Biophysics (Dr Yuri Dolin).
- St. Petersburg State University, Biology Department.
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