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Sensitive Crystallization: Revealing the Life-Forces Behind Biodynamics

Hunter Francis Interviews Philippe Coderey

Developed by Ehrenfried Pfeiffer in the 1930s at the suggestion of Rudolf Steiner, the process of sensitive crystallization is a unique and powerful method used to illustrate and assess the life forces or energy fields behind matter. The method is simply employed with a solution of copper chloride mixed with the substance to be studied and then evaporated leaving an array of crystals characteristic of the substance. For the past six years, Philippe Coderey, a vintner and winemaker from southern France has been applying Pfeiffer's method to support his work in agriculture. By making thousands of crystallizations of wines, soils, biodynamic preparations and more, Mr. Coderey has used the crystal patterns formed to interpret the energetics, organization and complexity of a wide array of substances with stunning results. These patterns serve as a sort of energetic "fingerprint" and can be very helpful in diagnosing and remedying problems related to vitality and formative forces. Mr. Coderey is now doing consulting work using sensitive crystallization through his company Grow Biodynamic (www.growbdc.com) In September 2011, I had the pleasure of speaking with Mr. Coderey at Tablas Creek Winery in Paso Robles, California. He graciously shared his methods, insights, and many of his discoveries with me.

***Note:** Throughout our discussion, Mr. Coderey used many of his crystallizations to illustrate the principles and reactions we were discussing. We have annotated four examples in the figures shown below.*

Hunter Francis: *I'd like to start with a little history. Where are you from and what is your background in agriculture?*

Philippe Coderey: I am originally from the Toulon region of Provence in southern France. My family was involved in viticulture and enology, so it was part of my upbringing. We grew wine grapes and made wine and this led to my interest in winemaking. We also grew olives and did some farming.

HF: *Did you study it formally?*



Philippe Coderey with horns

PC: Yes, I studied viticulture and enology for five years first in Provence and then at the university in Dijon.

HF: *What did you do after school?*

PC: I got my first job in Switzerland, where I worked from 1983–1987. I worked for a small agricultural firm that

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Editor's Note

I always learn so much from each issue of *Applied Biodynamics*, and I hope you find that the same is true for you. This issue is no exception. Hunter Francis presents us with another captivating interview, this time we learn about the work of Philippe Coderey and his sensitive crystallization experiments. We are developing a different part of ourselves when we utilize a method such as this for assessing the quality of soils, wines and other living substances. We develop our capacity for observation and discernment, as well as our artistic and intuitive capabilities. Where conventional science works more with the mind and abstract thought, observational techniques such as sensitive crystallization engage the soul. Those of us working with Rudolf Steiner's agriculture have learned that it is in the meeting of these two methods that a new path to learning about the world in which we live can be forged and that a sustainable future can be built on these kinds of discoveries.

In a world that demands proof, how do qualitative methods meet with traditional scientific investigation? And furthermore, how do we quantify and evaluate biodynamics when some of the practices employed are not so easy to measure and count. This latter question is addressed in the second article in this issue. "The Scientific Basis of

Biodynamics" was written by John Bradshaw and previously appeared in the Australian magazine *Biodynamic Growing*. Bradshaw is the founding editor of the almost ten-year-old publication, which was formed, according to the magazine's website, "to disseminate information about the Australian 'Demeter-standard' Biodynamic method developed in Australia since the late 1940s by Alex Podolinsky and the farmers of the Bio-Dynamic Agricultural Association of Australia." (www.bdgrowing.com) Though we typically do not publish reprints in *Applied Biodynamics*, the editorial staff found Bradshaw's article to be of great importance and felt that it would certainly be of interest to our North American readership. We are glad to be collaborating with our Australian colleagues in this way. Look for a second article by Bradshaw in our Spring 2012 issue.

Hugh Courtney reviewed two books in this issue which have recently arrived and are for sale through JPI.

Finally, in this issue, take note of the next annual Fellowship of Preparation Makers conference, this year to be held in Colorado.

Wishing you a healthy and prosperous new year.

Christy Korrow

Applied Biodynamics

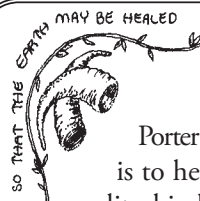
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Mission

The mission of the Josephine Porter Institute for Applied Biodynamics, Inc. is to heal the earth through production of quality biodynamic preparations based on the spiritual scientific discoveries of Rudolf Steiner and to advance education and research in biodynamic agriculture.

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Sensitive Crystallization: Revealing the Life-Forces Behind Biodynamics

sold inputs for vineyards and wineries – everything from synthetic fertilizers and pesticides to equipment. I started to have problems with my liver, however, due to the absorption of the chemicals through my skin. So, I knew I had to stop.

HF: *And how were you led to biodynamics?*

PC: My girlfriend at the time was involved with a Waldorf school, which had a biodynamic garden. I spent a lot of time in that garden, and learned about the philosophy behind biodynamics there. It grew on me, and eventually, I realized it was a direction I needed to take. At the same time, I had always wanted to live in the United States, so when I learned that the Camphill community in Kimberton, Pennsylvania, was offering a three-year training in biodynamics, I decided to do it. I moved there in 1987 and stayed for almost ten years. The program was discontinued in 1993, but I stayed until 1996.

HF: *Who taught the curriculum?*

PC: Many people were involved. The farmers working in the community taught a lot of it, but we also had many visiting professors, including Hugh Courtney, Hugh Williams, Dennis Kloczek, Alan York, Alex Podolinsky, even Herbert Koepf.

HF: *Some leading teachers! What did you do after that?*

PC: I had actually wanted to go to California when I came to the US, but I ended up in Boulder after Kimberton. The Naropa Institute was setting up a biodynamic farm there and they needed help. Jim Barausky, also from the Kimberton program, started the farm. I worked there for eight months until my visa ran out in 1997.

HF: *Did you stay in France at all before returning?*

PC: Yes, I lived in Corsica for a few years, working in

a biodynamic citrus orchard. Then, I went back to the mainland of France and worked for M. Chapoutier, which owned eight vineyards in southern France. I worked as a vineyard manager and winemaker for them for six years.

HF: *Were the vineyards biodynamic?*

PC: Yes, since the early '90s.

HF: *Would you say the French are more receptive to biodynamics?*

PC: Not necessarily. They have an affinity for the traditional aspects of biodynamics. When it comes to age-old farming techniques that their ancestors used, it's something they can identify with. My great grandmother, for instance, used to pay attention to the moon when she worked on the farm and garden. She even practiced healing by the laying on of hands, prayer and the use of medicinal plants – as did many people of her time. When it comes to the esoteric side of biodynamics, however, the French can have as much trouble as anyone else. For myself, I tend to focus on the results of biodynamics – the health of the soil, resistance to disease, the taste of the fruit, etc. The proof is there; it works. When you think about it, there are many scientific phenomena that we can't see, yet still produce results we use every day. I'm thinking here of things like microwaves, radiation and even cell phones. We readily accept the existence of those energies, even though we can't actually see them.

HF: *So, how did you finally end up in California?*

PC: I was contacted by a recruitment agency in 2004 on behalf of Randall Grahm of Bonny Doon Vineyards in Santa Cruz, California. He was looking for a French person with experience in viticulture, winemaking, and biodynamics. I seem to have fit the bill! Long story short, I was hired in 2005 and became their director of biodynamic viticulture.

HF: *How many acres do they have under their management?*

PC: It's constantly changing. In 2005, we were working with about sixty vineyards, but in 2006, Randall Grahm sold two of his brands. When that happened, we no longer worked with conventional growers and could focus exclusively on biodynamic growers. When I left last year, I think we were working with under a dozen vineyards.

HF: *How was your experience there?*

PC: It was great. It was a unique opportunity, because instead of working with just one vineyard, I got to experience many different vineyards around the state.

HF: *How does your work with sensitive crystallization fit into this whole trajectory?*

PC: Well, ever since I started to study biodynamics, I wanted to study sensitive crystallization, because that's a part of biodynamics. The method was developed by Ehrenfried Pfeiffer, who was a student of Rudolf Steiner. Steiner gave Pfeiffer indications as to how he could use crystallization as

Biodynamic Preparations Legend

BD #500 – Horn Manure

BD #501 – Horn Silica

BD #502 – Yarrow

BD #503 – Chamomile

BD #504 – Stinging Nettle

BD #505 – Oak Bark

BD #506 – Dandelion

BD #507 – Valerian

} Compost
Preparations

BD #508 – Horsetail (*Equisetum arvense*)



a means of demonstrating the superiority of biodynamics versus conventional agriculture. It took Pfeiffer about twenty years to develop the method. He tried using many salts in the process, but eventually settled on the use of copper chloride, because with copper chloride, you have the greatest diversity of expression within the crystallization. With copper chloride, you get different layers with a lot of character.

HF: *So that's the method you use?*

PC: Absolutely, it's crucial. Consistency is especially important in comparing different crystallizations. If you use a different technique, you will have a different result; so, it is important to use the same method, especially if you are comparing the work of other people. Also, to ensure the relevance of what I am looking at, I use controls and robust sampling of any given substance.

HF: *Where did you actually learn the technique?*

PC: I first heard about the process at Kimberton, but we didn't have a lab there. We talked about it, and looked at pictures of crystallizations. There were still people around at that time who had worked with Pfeiffer and who knew about his work. It was very interesting. But it wasn't until I was at Bonny Doon that I began to practice it. When I told Randall Grahm about the process, he asked me to find someone who

Figure 1: A highly mineral wine (top) vs. a fruity wine

The "mineral" wine was made from fruit from an old abandoned vineyard in southern France. The vineyard had essentially gone back to the wild. It had had no pruning or fertilizer since WWI. The vines had extremely deep roots. So, the fruit from those vines expressed qualities of a landscape undisturbed by human intervention. In the crystallization, you can see a high degree of minerality, which is evident around the edges of Petri dish. This was reflected in the mineral taste of the wine – a very powerful expression of terroir. The fruity wine, on the other hand, has long, straight needles and much weaker forces around the periphery. The lack of cross-hatching of the needles indicates the wine has very little complexity. In fact, the wine can be considered a "fruit bomb." This means the wine has a very simple expression of fruitiness, but lacks the complexity and expression of terroir.

could teach me how to do it. Well, I did some searching and finally contacted the Pfeiffer Institute in Lyon, France. They had done some crystallizations for Chapoutier, so I asked them if they could teach me. They agreed, but I would have had to move back to France to study with them. Since I was working, I couldn't do that; so, I asked if they knew of anyone else I could study with. Ironically, they referred me to a man in Provence who turned out to be an old high school classmate of mine!

HF: *Who was that?*

PC: Christian Marcel. He came to Bonny Doon in 2005 and helped me set up a lab there. He started to teach me how to do the tests and how to read them. Over the following year, I would send him my crystallizations, and we would discuss them together. He came back the next year to give me more training, and it has developed from there.

HF: *So what exactly is the process? Can you tell me how do you do a crystallization?*

PC: Of course. First, you need a dehydration chamber, which is essentially a wooden box with two glass shelves. Mine is about two feet by two feet by one and a half feet in size. It opens in the front and has a window so you can see what's happening inside. There are three sets of shock absorbers – one under the box, and a set under each shelf – as the process must occur undisturbed by any sort of movement. There are holes in the top of the box, so moisture can exit. At the bottom, there are some small lights to warm up the box. I keep the temperature at 90°F (30° C). The Petri dishes used in the



Figure 2: Poor quality BD #500 (top) vs. high quality BD #500

In the first picture, of the "poor" quality preparation, it appears the preparation has weak life forces. This was the result of a preparation made in a very dry soil, which had poor water retention in an area that received only ten inches of rain in the winter. This made for a very mineralized preparation. The "stronger" sample was from an area that received about fifty inches of rain in the winter. The topsoil was much deeper and had much greater water retention capacity. The result is a more powerful expression of forces, as evidenced by the way it filled out the Petri dish.



crystallization are made of Pyrex and must be perfectly flat. I have mine custom made. The solution used in the Petri dish is a total of 5 milliliters: 1 milliliter of wine (or other solution), 2 milliliters of purified water, and 2 milliliters of 10% copper chloride solution. I mix the solution in a beaker, and I always do a series of crystallizations. Replication of the result is important to see. Because the Petri dishes are very hard to clean afterwards, I usually do about three to four. When you are ready, you put the solution in the Petri dishes, and let them incubate about eight-ten hours. I do mine overnight. In the morning, the crystallizations are complete.

HF: *What types of crystallizations can you do besides wine? Can you do orange juice, for instance?*

PC: Yes. I can do everything except oils.

HF: *Can you test solids, such as soil?*

PC: Yes. In that case, I take 10 grams of the soil and I let it soak in 40 grams (milliliters) of HPLC (high-performance liquid chromatography) grade filtered water (a 1:4 ratio) for an hour. I stir it to make sure it is homogenous. Then, I filter the solution and use 1 milliliter of that in the crystallization recipe. (A coffee filter of appropriate porosity is used, making sure the tightness of the weave is neither too loose nor too restrictive. This can be determined through trial and error. For the sake of consistency, one should always use the same kind of filter.)

HF: *What about the 10% copper chloride solution? How do you make that?*

PC: I buy the purest copper chloride

Figure 3: Compost before BD preparations (top) vs. compost after application of BD preparations

Clearly, there is much better organization of the forces after the application of BD preparations. In the crystallization of the compost that had not received the preparations, you can make out several centers, which reflect the five different ingredients the compost had been made with. In the second picture (after the preparations) you can see that the centers seem to merge into one another. This indicates the ingredients are working together and is likely what Steiner meant by saying the preparations help "vivify and organize a compost," in his Agriculture lectures.

possible – dry, 98%. To make the solution, I take 25 grams of the dry copper chloride and dissolve it into 250 milliliters of purified water. This is according to the original Pfeiffer recipe. Everyone doing crystallizations around the world uses that recipe. You can also find it in Christian Marcel's book *Sensitive Crystallization*, which is widely available. (Please see book review, page 14.)

HF: *Have you done many crystallizations with food?*

PC: Not many. A few months ago, I started to crystallize tomatoes – biodynamic vs. conventional. I'd like to do more with food.

HF: *What can you say about the art of interpretation, after the crystallizations are complete?*

PC: Well, it depends on the substance you are studying. In wines, for instance, you have three fundamental areas to consider: the center, where the crystallization starts, the periphery around the edges of the Petri dish, and the area in between the center and periphery. The location of the center of a wine crystallization is like the fingerprint of

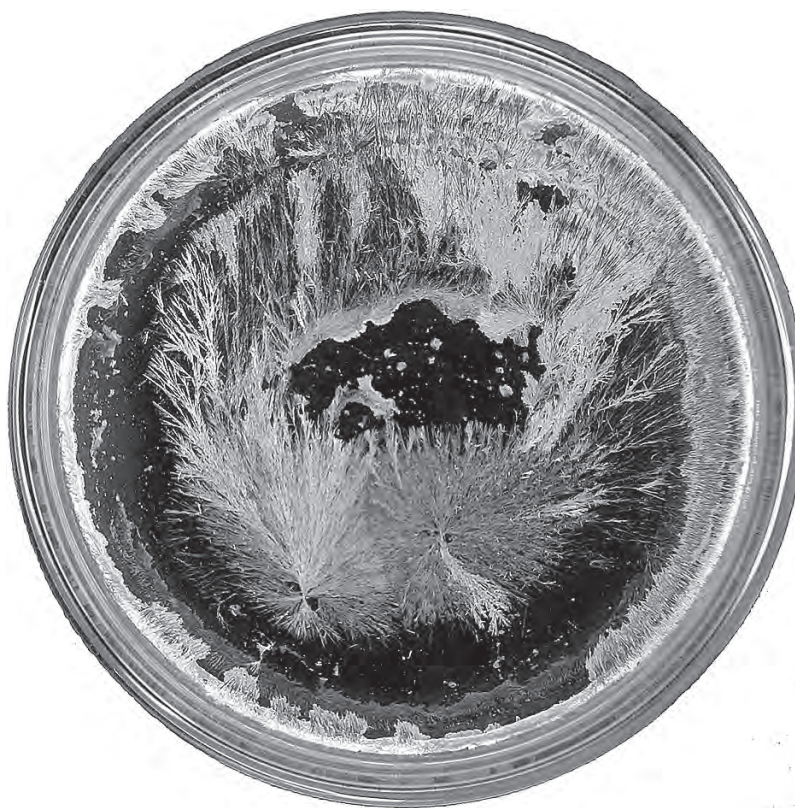


Figure 4: Soil before BD preparations (top) vs. soil after application of BD preparations

This experiment was to see if the compost preparations would have a similar effect on soils as on compost. The soil here was from a biodynamically-managed garden in California. The garden was approximately 35 feet by 35 feet. As an experiment, the compost preparations were buried in the soil as one would place them in compost. This was done in a circular arrangement of the five solid preparations, with each one placed along the periphery of a circle with a diameter of approximately 25 feet. The preparations were buried equidistant from each other. The sixth preparation (valerian) was stirred as usual and sprayed on top of the whole area. The soil treated in this manner was then compared to a sample of the same soil taken prior to the experiment. When one looks at the difference between the crystallizations, one can see how the preparations vivified and re-enlivened the soil – and only two hours after application! Note: The first picture (before addition of the preparations) was taken about three days after the first rain following the Fukushima disaster. One would expect to see much better organization of forces in a BD soil, indicating the rain affected the biodynamic soil negatively. Rainwater normally vivifies a soil, whereas in this case, it seems to have weakened it. After the new application of the preparations, however, we can see that the organization of the forces was enhanced.



the varietal. A Grenache, for example, is always off center, towards the bottom of the crystallization. A wine made with four types of grapes will exhibit four distinct centers. The center also reveals the fruit character of the wine – its fruitiness. The smaller the centers are, the less fruitiness you have in the wine. The periphery tells you about the mineral content of the wine, which relates to *terroir* since it comes from the soil. The relationship between the center and the periphery tells you something about the overall character of the wine, for example, whether the minerality (around the edges) is overpowering the wine. The middle regions tell you about the vegetal and floral character of the wine. The shape and arrangement of the radiating crystals tell you something about the wine. The primary or “pine needle” radiation from center out to the periphery refers to the life forces being expressed in the wine. The secondary branching cross-hatching the radiating needles refers to the organizational forces, or complexity. So, if you have long straight lines coming out from a strong center with little cross-hatching, you have a fruity wine with weak vegetal and floral character and not much complexity. Of course, to make these connections for myself, I continually had to taste the wines I was crystallizing. This has been essential in being able to interpret the crystallizations.

HF: *What about crystallizations of the biodynamic preparations? What have you seen in them?*

PC: Overall, you can see in the crystallizations of the preparations (and soils or compost that have had preparations applied) that the preparations do a lot to help organize the crystals in the Petri dishes. Crystallizations showing the effect of the preparations also tend to have a more distinct center. You know, when I first read Steiner’s *Agriculture*, I didn’t know what he meant when he said the preparations “organize the compost.” Now I can see what he means in the crystallizations. You can also see changes over time. Take the case of BD #500 (horn manure), for instance. The process involved in that preparation has a lot to do with digestion. We as humans say, “I am.” A cow would say, “I digest.” That is the essence. When you place a manure-filled horn in the soil, you should realize the soil also digests, thus enhancing the process begun in the rumen of the cow. The digestion continues through the wintertime, in the soil, as a soil is digesting and transforming its own organic matter. The next year, you spray the digested material on the soil, thus reinforcing the process. One thing that I’ve seen is that when you look at a soil which has had the preparations applied over a number of years, the quality of the crystallizations progressively improves.

HF: *Have you experimented at all with other preparations?*

PC: I’ve mostly done crystallizations with BD #500

and barrel compost (sold through JPI as Biodynamic Compound Preparation), but I’ve experimented with the BD #501 (horn silica). I’ve also crystallized soils and composts before receiving the preparations and after receiving the preparations to see what changes occurred in the organization of the crystallizations.

HF: *Is there anything else you should consider in looking at crystallizations done for soil or compost?*

PC: One thing that can have a marked effect is the quality of the water used in agriculture. People sometimes don’t think of this in making preparations or compost. Irrigation water, if at all contaminated, can really interfere with the quality of the crystallization, as opposed to purified water. One thing I’ve noted, however, is how big an influence passing irrigation water through a flowform can have on changing its energy field. Flowforms help organize the forces reflected in crystallizations.

HF: *Are there any other applications you’d like to mention?*

PC: The potential range of application is really astonishing, and the sensitivity of the crystallizations to energetic effects seems to be far-reaching. I’ve been inspired by the work of Masaru Emoto in Japan, who looks at crystallizations of water which has been frozen. At one point, I decided to emulate his work, but on dry soil rather than on water. In the experiment, I dried the soil and stored it for a long time. Before testing it, I divided the soil into five equal portions – the same soil, mind you – and placed each sample over pieces of paper with five different words on them ranging from vulgar insults to “gratitude.” Each one yielded a different crystallization, even though they had come from the same soil. And while they had similarities indicating that they were from a similar material, they each yielded a different qualitative result, with gratitude being the most beautiful in terms of the organization of the crystals. What this tells me, is that soils, like water, are sensitive to many stimuli – including our intentions. It’s interesting to know that apparently Steiner first came up with the idea of doing crystallizations during the time he was offering consultations to physicians. In that role, he had the opportunity to visit with many patients. As he was working, he noticed frost crystals that had formed on the windows of the rooms of the patients. What captured his interest, however, was that similarly shaped crystals appeared on the windows of patients who were afflicted with the same diseases! There is, no doubt, an artistic, qualitative aspect to interpreting sensitive crystallizations. The more you do them, however, the sharper your intuition becomes. It is fascinating work.

HF: *Indeed it is! Thank you very much for sharing your knowledge, Philippe.*

The Scientific Basis of Biodynamics

John Bradshaw

Rudolf Steiner, in giving his 1924 lecture series, *Agriculture*, which formed the foundation of biodynamics, was insistent that all his suggestions for a renewal of agriculture be thoroughly scientifically tested. A rigorous scientific approach has been the basis of biodynamic development since then.

Some scientists criticise biodynamics on the basis that it is unscientific, or that it is based on mysticism, some claiming that there is no scientific evidence to show that it is any different from organic agriculture.

An example of this is the article “The Myth of Biodynamic Agriculture: Biodynamics is a scientifically sound approach to sustainable management of plant systems” by Professor Linda Chalker-Scott.¹ In this article, Chalker-Scott states, in relation to the biodynamic preparations: “These processes were not developed through scientific methodology, but rather through Steiner’s own self-described meditation and clairvoyance.... The rejection of scientific objectivity in favor of a subjective, mystical approach means many of Steiner’s biodynamic recommendations cannot be tested and validated by traditional methods. In practical terms, this means any effect attributed to biodynamic preparations is a matter of belief, not of fact.” Further, “Given the thinness of the scientific literature and the lack of clear data supporting biodynamic preparations, it would be wise to discontinue the use of the term ‘biodynamic’ when referring to organic agriculture.” And “The onus is on academia to keep pseudoscience out of otherwise legitimate scientific practices.”

It is a sad indictment on the standards of contemporary science that such ill-informed comments can be written by a scientist of her academic standing.

Inspiration in Science

Regarding the process of scientific enquiry, Fred Hoyle² and Raymond Arthur Littleton³ wrote (1948):

“It is often held that scientific hypotheses are constructed, and are to be constructed, only after a detailed weighing of all possible evidence bearing on the matter, and that then and only then may one consider, and still only tentatively, any hypotheses. This traditional view however, is largely incorrect, for not only is it absurdly impossible of application, but it is contradicted by the history of the development of any scientific theory. What happens in practice is that by intuitive insight, or other inexplicable inspiration, the theorist decides that certain features seem to him more important than others and capable of explanation by certain hypotheses. Then basing his study on these hypotheses, the attempt is made to deduce their con-

sequences. The successful pioneer of theoretical science is he whose intuitions yield hypotheses on which satisfactory theories can be built, and conversely for the unsuccessful (as judged from a purely scientific standpoint).”⁴

It matters not the source of the inspiration, the wild leap of imagination that may lead to new theories. No rational scientist would say: “I don’t know where that promising idea came from; I’d better not investigate it.”

It is the application of the scientific method, to prove or disprove an idea or theory, that is important. Throughout history, men and women have had ideas which seemed impossible to their contemporaries. Often these ideas came as if from outside the mind, in flashes of inspiration.

Consider Friedrich August Kekulé’s⁵ inspiration which led to the discovery of the molecular structure of organic compounds:

“One fine summer evening I was returning by the last omnibus through the deserted streets of the metropolis [London], which are at other times so full of life. I fell into a reverie, and lo! the atoms were gamboling before my eyes! Whenever, hitherto, these diminutive beings had appeared to me, they had always been in motion, but up to that time, I had never been able to discover the nature of their motion. Now, however, I saw how, frequently, two smaller atoms united to form a pair; how a larger one embraced two smaller ones; how still larger ones kept hold of three or even four of the smaller, whilst the whole kept whirling in a giddy dance. I saw how the larger ones formed a chain.” ... Reaching home, Kekulé spent the night sketching the figures the atoms danced in his dream. The patterns eventually became the formulas for organic compounds. In Ghent, Kekulé dreamed again, dozing off while thinking about the formula for benzene. This time he saw chains of atoms dancing like snakes: “One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes.” The picture of the snake swallowing its own tail gave Kekulé the idea of what chemists now call the benzene ring.”⁶

Kekulé’s dictum was that inspiration is a perfectly normal part of scientific investigation, but must be followed up by careful development of a theory and experimental verification.

Compare Kekulé’s inspirational discovery with that of Alex Podolinsky, who was giving an early biodynamic introductory lecture to farmers, when: “momentarily stunning, exactly between the audience and myself, a moving, see-through picture arose: Soil; plant with biology and liquids in action and flowing up the roots and leaves; Sunlight raying down and crystallizing into leaves and downwards,

i.e. a motion picture of total earth, plant, cosmos happening; and through it, in the background, the audience still visible. I stopped, breathlessly looked, but then had to continue the lecture. I did not **seek** such motion picture... but, I was very concentrated and an inspirational overview of this important functioning Reality was received. It took a further three years... to achieve the **objectivity** portrayed in Lecture I.⁷ This was undertaken by the holistic **over-viewing** of all factors – by thinking.”⁸

Whatever the source of Rudolf Steiner’s inspiration, he appears to have had considerable insight into the inner workings of nature. The detailed suggestions he made for a renewal of agriculture, including the seemingly strange suggestions for the making of the biodynamic preparations, imply some sort of inspirational source. Whether his ideas had any basis in fact would, properly, later be tested by scientific research. Ehrenfried Pfeiffer wrote: “He never proceeded from abstract dogma, but always dealt with the concrete given facts of the situation. There was such germinal potency in his indications that a few sentences or a short paragraph often sufficed to create the foundations for a farmer’s or scientist’s whole life-work.”⁹

Scientific Validation of Biodynamics

To accuse Rudolf Steiner of rejecting scientific objectivity is simply ignorant. Steiner had the greatest respect for scientific objectivity. As a high school student he questioned Newton’s theory of color, and, while a tertiary student at the Vienna Institute of Technology, began conducting experiments on color and light, writing several papers on his conclusions. He later discovered the scientific work of Goethe, including his theory of color, and found that Goethe had conducted similar experiments to his own. Steiner repeated many of Goethe’s experiments, confirming his findings, and agreeing with Goethe’s conclusions. He eagerly studied all of Goethe’s scientific writings, and so impressed his professor that at the age of 22 (1886), he was entrusted with the job of editing Goethe’s scientific works for publication in the German National Literature series. Steiner gained his PhD in 1891 from the University of Rostock, his doctoral dissertation being published as a book under the title *Wahrheit und Wissenschaft* (*Truth and Science*).

When Steiner met the 19-year-old Ehrenfried Pfeiffer in 1918, he was a university student. Steiner encouraged him to concentrate on studying the sciences, including physics, chemistry and botany. He valued scientific qualifications and wanted scientists to thoroughly test his recommendations for agriculture. The first test of Steiner’s agricultural suggestions was made in 1923, when Dr. Pfeiffer and Dr. Wachsmuth buried cow manure in cow horns at Ar-

lesheim, Switzerland. The horns were dug up in early summer 1924, and had been converted into the moist colloidal, concentrated microbial substance we now call BD #500 (horn manure), as predicted by Steiner’s theory.

After the 1924 lecture series, Steiner entrusted Pfeiffer with refining the method of making and applying the biodynamic preparations he had described, including correct application rates, storage methods, etc. Pfeiffer carried out this research work meticulously, and provided his results to those involved in the practical implementation of the method.

Around the same time, Steiner entrusted a research worker in Stuttgart, Lilly Kolisko, with the task of testing the validity and effectiveness of the preparations. This she did together with her husband, Dr. Eugen Kolisko, a medical doctor and lecturer in medical chemistry. Steiner had earlier asked Lilly to find a method of demonstrating the activity of what he referred to as “formative forces,” and she developed the method of capillary dynamolysis for this purpose. The Koliskos also carried out much detailed research on the effects of very dilute substances, and on the influence of moon and planets on plant growth. The results of their decades of collaborative work were published in a book called *Agriculture of Tomorrow* in 1939.

They established that Steiner’s suggestions for preparation making were correct. They found that, when they compared the method suggested by Steiner for each preparation with alternative methods, Steiner’s suggestion was always correct. For instance, cow manure buried in a cow horn converted into a sweet smelling colloidal humus, and was far more effective than cow manure buried in an earthenware pot or in a wooden box (neither of which converted into humus) next to the manure-filled cow horns. And they found that the preparations did have a significant and positive effect on plant growth, despite the very small amounts used.

A rigorous scientific development at Rudolf Steiner’s request has been the basis of biodynamics since then, in those countries that followed Dr. Pfeiffer’s indications.

In Australia, Alex Podolinsky thoroughly tested every new development in biodynamics (with the assistance of Andrew Sargood in the early years) at the Bio-Dynamic Research Institute. Meticulous tests were carried out, over a *six-year period*, to evaluate the effectiveness of the stirring machines developed by Kevin Twigg for activating biodynamic preparations. BD #500 (horn manure) was sprayed so accurately that each square inch of soil in the comparative plots had to receive a drop of BD #500. Tests included comparative chromatography tests of the stirred BD #500 liquids, plant stem, leaf and whole plant, and

evaluation of the effect of the variously stirred BD #500 on soil and plants over time. Most important was the long-term monitoring of soil conversion, soil development and biodynamic upper plant expression.

The stirring machines proved more effective at activating the preparations than expert hand stirring, for any amount of water over 12 gallons (54 liters).¹⁰ Obviously, for biodynamics to spread widely, it was essential to stir larger quantities of water at a time than 12 gallons (the soil activator spray BD #500 is applied at the rate of 3 gallons per acre). The maximum amount of water which can be stirred in one vessel while maintaining the correct vortex and chaos characteristics was established as 60 gallons/270 liters (20 acres of BD #500). For broad acreages, linked series of stirring vessels were developed, so far up to 6 60-gallon vessels (120 acres per stir).

“Prepared” 500+ (developed by Alex as the only way to get the biodynamic compost preparations #502–#507 out over broad acreages) was tested in a similar methodical way, and proved considerably more effective than BD #500 sprayed by itself. Many tests were done on soils, showing humus development, deepening color and improvements in structure resulting from the application of the biodynamic preparations.

Using no inputs at all (for 40 years), Alex was able to increase the organic matter in the top 100 mm from 0.9% to 11.4% and from 0% to 2.4% at 1000 mm in just the first six years of applying the biodynamic preparations. In 1989, Alex asked a Victorian Agriculture Department senior agronomist, Peter Medling, to investigate the amount of carbon dioxide locked up in his soil over the six-year period (organic matter holds CO₂). The investigation was done by Peter Medling, together with Agriculture Department scientists John Stewart and Graeme Savage, using Professor Leper’s methodology.¹¹ The finding was that this soil had locked up a staggering 1614 tons of carbon dioxide per hectare over the six-year period.

Various researchers have compared aspects of biodynamic farms in Australia with those of conventional farms:

- J.A. Lytton-Hitchings studied the physical and chemical properties of adjacent biodynamic and conventional dairy farms in Victoria.¹² He found that the biodynamic soil had greater macro-porosity to a depth of at least 420 mm, weaker soil (*i.e.* better structured) at 60, 120 and 200 mm, smaller, dry bulk density values at 120 and 200 mm, greater air-filled porosity at 200 mm, smaller volumetric water content during summer to a depth of 1.4 m, and greater organic matter content in the upper 50 mm. He concluded: “These more favorable soil properties of the biodynamic soil have the potential to allow

faster infiltration, less surface runoff, less water logging, deeper soil exploration by plant roots and a longer interval between irrigations.” (In fact the interval between summer irrigations on the biodynamic farm was nearly twice as long as that on the conventional farm.)

- C.B. Parker and S. Cock also found better soil structure on biodynamic farms.^{13, 14}
- In 1991 the Dairy Research and Development Corporation funded a research project to assess biodynamic methods of dairy production on the basis of biological and economic data. This study compared seven (later expanded to ten) matched pairs of biodynamic and conventional dairy farms in Victoria. The project was overseen by Doug Small (senior Victorian Agriculture Department Soil Researcher) and Dr. John McDonald (Victorian Agriculture Department Veterinarian). The results, together with three undergraduate thesis papers on phosphorus balance, physical and chemical soil properties, and soil and plant root characteristics on biodynamic and conventional farms formed the basis of a paper presented by Doug Small at the Australian Institute of Agricultural Science’s Organic Agriculture Conference in 1993.

Some of the results reported were: better soil structure on biodynamic farms; similar pasture composition; soil phosphorus slightly lower on biodynamic farms (which used no fertilizers); other mineral levels similar, but nitrate nitrogen higher on conventional farms; biodynamic cows never suffered from bloat, and incidence of metabolic disorders was less; irrigation much less frequent on biodynamic farms; lower levels of selenium in conventional cows, lower levels of phosphorus in biodynamic cows; biodynamic cows were more fertile; biodynamic cows remained productive longer; grain feeding 600% higher on conventional farms; milk production was higher on conventional farms, but costs were lower on biodynamic farms; net returns somewhat higher on conventional farms, but if off-farm environmental effects were taken into account (nutrient run-off has been measured at up to thirty times higher from conventional farms, causing blue-green algae and other environmental problems) it was suggested that the total economic benefit would most likely be in favor of biodynamics.

- A study comparing biodynamic with conventional soils was carried out by Eric Frescher as part of his Bachelor’s of Civil Engineering at LaTrobe University.¹⁵ The biodynamic farm studied had demonstrated considerable reduction in salt affected areas over a five year period. During the same period, the neighboring conventional farm studied had demonstrated significant expansion of salt affected areas. The results showed that: the biodynamic soil was

less compacted and more porous than the conventional soil in both a dry and wet state; water infiltration on the biodynamic soil was four times higher for the first ten minutes, and two and a half times higher after that; the biodynamic soil was capable of holding twice the amount of soil moisture, and contained twice the amount of carbon; the biodynamic soil contained numerous aggregates and was softer; the conventional soil contained very few aggregates and was harder; the biodynamic soil was five times less acid than the conventional soil; the biodynamic soil contained six times more nitrate nitrogen in the top 50 mm and at 200 mm contained 10 ppm nitrate nitrogen compared with zero on the conventional farm; in dry conditions, the soils showed similar levels of biological activity (as measured by micro-organism respiration rates), but in wet conditions, the biodynamic soil biological activity was far higher.

Scientific Objectivity

A stumbling block for many scientists is that the biodynamic preparations are made in such a strange way, by putting manure or powdered quartz crystal in cow horns, or encasing herbs in animal organs. Scientific objectivity is replaced by disparaging emotional outbursts. Any scientist who reacts in this way, particularly without bothering to read any of the scientific studies of biodynamic methods, has left the realm of science. They are in the same position as the “scientific” contemporaries of Copernicus who ridiculed his preposterous suggestion that the Earth might move around the Sun, not vice versa. It would be a further fifty years before Johannes Kepler published his *Mysterium Cosmographicum* which supported Copernicus, and a further fifteen years before Galileo’s public support for the Copernican model, supported by telescopic observations, slowly began to sway astronomers towards accepting a heliocentric model.

Consider the following procedures: take the inner mucosa of the fourth stomach (abomasum) of a young calf. Dry and clean it. Slice finely and soak for a few days in salty water to which vinegar has been added. Filter the solution. Or this: inject virus infected material into a fertilised egg. Allow it to develop in the live chicken embryo for several days. Open the egg, harvest the virus, and purify it. Strange sounding procedures? The first is the method of isolating rennet for cheese making. The second a method of manufacturing human vaccines. The difference between these strange sounding procedures and the biodynamic preparation making methods is that we now understand the processes involved in rennet and vaccine production, but don’t yet understand the processes involved in making biodynamic preparations.

Many theories have been proposed over time, which have taken decades or centuries to be proven. Many practical discoveries have been made which have been of great benefit to mankind, and which have been used for centuries or millennia before being scientifically understood. Take the discovery of bronze, 6000 years ago. It was discovered that if copper is melted with arsenic, a very hard metal would be formed. This was the birth of the Bronze Age. Later, it was found that tin and copper, in varying proportions, sometimes with the addition of other metals, made a better combination. Many refinements were made over time. It was not until the 19th century, however, that the actual processes, chemical formulae and structures involved were finally understood.

Scientists have a long history of behaving unscientifically when their belief systems are threatened by new developments. Two recent examples: the Binnig/Rohrer/Gimzewski scanning-tunnelling microscope, invented in 1982, produced atom-scale surface resolution. Surface scientists refused to believe this was possible and heaped scorn and abuse on the developers, who, in spite of this, won the Nobel prize in 1986 for their discovery. Stanford R. Ovshinsky developed amorphous semi-conductors. Physicists vitriolically attacked him because it was “well known” that chips and transistors could only be made with single crystal silicon slices. He was almost bankrupted and his work ignored until, ten years later, Japanese developers funded his work, and a great technological leap forward was made possible (writable CD ROMs are but one result).

“Concepts which have proved useful for ordering things easily assume so great an authority over us, that we forget their terrestrial origin and accept them as unalterable facts. They then become labeled as ‘conceptual necessities,’ etc. The road of scientific progress is frequently blocked for long periods by such errors.” – Albert Einstein

Many agricultural scientists are locked into a narrow understanding of the process of plant feeding dating back to Justus von Liebig’s discovery that plant roots can only absorb nutrients in solution (1840s). They accept this limited view as an unalterable fact and refuse to even consider that the Sun-warmth-directed intake of (water soluble) nutrients from soil colloidal humus by fine feeder roots, essentially separate from the uptake of water by larger roots, as proposed by Alex Podolinsky, may present a fuller picture of the reality.¹⁶

Soil scientists have commented that the soil changes brought about within one year by the correct application of high quality biodynamic preparations would take nature thousands of years to accomplish. Many photos are available which clearly depict these astounding changes, and many professional farms and farmers can demonstrate the effectiveness of the biodynamic preparations in practice.

Farmers following the plant feeding theories of conventional soil scientists develop soils that are less well structured, less biologically active, lower in organic matter and humus, less capable of absorbing water, and less capable of *holding* water. They use large amounts of increasingly expensive (and, in the case of phosphate, finite) artificial fertilizers to support plant growth. Many nutrients from these fertilizers run off their farms into waterways, causing environmental degradation (let alone the sheer wastage). Their plants require protection from insects and diseases with toxic chemicals which put the the health of farmers, consumers, and the environment at risk. Their produce contains pesticide residues, contains more water and less nutrients, has a shorter shelf life and less flavor. Their animals are less healthy and less fertile.

Farmers (worldwide) following the "Australian Professional Bio-Dynamic method," encompassing the plant feeding theory espoused by Alex Podolinsky, together with the all-important biodynamic preparations, develop soils that are better structured, deeper, darker, more biologically active, higher in organic matter and humus, capable of absorbing more water, and *holding* more water. They use relatively small amounts of (non-water soluble) fertilizers, and have very low nutrient runoff from their farms. Their plants don't require the application of toxic chemicals to protect them from insects and diseases. Their produce is almost completely free of pesticide contamination (environmental contamination deriving from conventional farming is impossible to completely avoid). Their produce contains less water, more nutrients, has a longer shelf life, and better flavor. Their animals are healthier and more fertile.

The inescapable conclusion is that the theory of plant feeding underlying conventional farming is deeply flawed, whereas the theory of plant feeding advanced by Alex Podolinsky, which underlies biodynamic farming, *is* supported by the practical results.

Most of the above characteristics of the two farming systems have already been supported by published research, while the rest are supported by general observations and published objective blind taste tests, but await funding for properly constructed studies. Sadly, though, pure science has been largely subverted, over the last thirty years, research funding being more and more linked to the commercial sector. Research that would enable farmers to improve soils and crops without importing large amounts of fertilizers and without using chemical sprays, is unlikely to attract funding from the agro-chemical industry. Scientists who question the status quo are often harassed, lose tenure or lose funding.

The source of scientific inspiration is irrelevant: whether it be through a dream, a flash of intuition, claimed clairvoyant

ability, or even if the "fairies at the bottom of the garden" told you, the important point is the development of a theory based on the inspiration and the thorough scientific testing of it.

Scientists must remain objective and open-minded. They must be mindful that throughout history scientists have quite wrongly and unobjectively ridiculed innovations which appeared strange or didn't fit with currently accepted theories, but were later proven correct.

Alex Podolinsky adds: "Biodynamics, by result, is capable of providing sustainable food production and sustainable nature enhancement, being a method obeying the laws of the organic design of Nature and Creation, providing food of high quality and able to supply humanity in equal measure to artificial means including the danger posed by GMOs which have not been objectively examined as to their long term effect. Biodynamics provides a sane future for the Earth. GMOs and nanotechnology are two totally unexamined prospects of great danger to the future of the Earth."

Notes

- 1) Linda Chalker-Scott, PhD, Extension Horticulturist and Associate Professor, Pyallup Research and Extension Center, Washington State University, September 2004.
- 2) 1915-2001, mathematician and physicist, Professor of Astronomy at Cambridge 1948-1973.
- 3) 1911-1995, British astronomer.
- 4) "The Internal Constitution of the Stars," in *Occasional Notes of the Royal Astronomical Society*, 1948.
- 5) 1829-1896, founder of the theory of chemical structure.
- 6) Frederick Prescott, *Modern Chemistry*, Sampson Low, Marston and Co. Ltd., London, 1932.
- 7) Alex Podolinsky, *Bio-Dynamic Agriculture Introductory Lectures Vol 1*, Gavemer Publishing, Sydney, 1985.
- 8) Alex Podolinsky, *Living Knowledge*, Bio-Dynamic Agricultural Association of Australia, Powelltown, Vic, 2002, p. 33.
- 9) Rudolf Steiner, *Agriculture*, Biodynamic Agricultural Association, London, 1974, preface, p. 6.
- 10) Expert hand stirring was slightly better than machine stirring for amounts below 12 gallons. Twelve gallons proved to be the limit to which a competent hand stirrer could go while still maintaining the required energetic, deep vortex and vigorous **bubbling** chaos.
- 11) University of Melbourne.
- 12) Lytton-Hitchins JA, Koppi AJ, & McBratney AB, *The soil condition of adjacent bio-dynamic and conventionally managed dairy pastures in Victoria, Australia* in *Soil Use and Management* (1994) pp. 10, 79-87.

- 13) Parker, CB, *The Phosphorus balance of a conventional and a biodynamic dairy farm*, Undergraduate thesis LaTrobe University, School of Agriculture, 1992.
- 14) Cock, S, *A comparison of soil and plant root characteristics in irrigated summer pasture from two different farming systems*. Undergraduate thesis, LaTrobe University, School of Agriculture, 1991.
- 15) Frescher E, Russell J, "A Comparison of Biodynamic and Conventionally Managed Soils – Hyden Western Australia," *Biodynamic Growing* No. 4, June 2005, pp. 29–33

- 16) See Lecture 1 in *Bio -Dynamic Agriculture, Introductory Lectures, Vol. 1*, Alex Podolinsky, Gavemer Publishing, Sydney, 1985.

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The Fellowship of Preparation Makers 2012 Annual Conference

Focused on the theme of "Harmonizing Heaven and Earth Through the Polarities of BD #500 and BD #501," this year's conference will be held Thursday, March 1 through Sunday, March 4 in Hotchkiss, Colorado.

In his lecture entitled "The Meaning of Life" given in Copenhagen, May 24, 1912, Rudolf Steiner states: "Thus we see that it is necessary, in order that things may really come to fruition, that they differentiate into polarities, and that the polarities then reunite in order that life may progress. That is the meaning of life."

In our eleventh year of annual conferences, the Fellowship of Preparation Makers will address the "idea" of polarity as it relates to the two spray preparations BD #500 and BD #501. We will examine aspects of polarity inherent in the physical forms of the horn sheaths, manure, and quartz crystals used to formulate the preparations. Aspects of polarity within summer and winter forces of earth and cosmos provide another perspective within which to view the transformation from polarity to harmony when preparations are stirred and sprayed during the cycle of the year.

The qualitative change from manure to colloid, from crystal to silica may be examined from a feeling state attained during the grinding of quartz crystals, or the sensory experience of texture, smell or other sensitive measurements of various horn manures from around the continent. As preparation makers are gathered together, a group experience of unification and transformation of polarities is envisioned through our intensive study of these preparations. The Fellowship of Preparation Makers welcomes and encourages preparation makers at all stages of interest to join us on this path.

The conference will feature keynote speakers Mac Mead, Philippe Armenier, and Hugh Courtney, workshop presentations by Lloyd Nelson, Caroline Gordon, Jim Barausky, and Wali Via, and a pre-conference workshop on introductory biodynamics.

Hosted by the North Fork Valley Biodynamic Community and the Valley Organic Growers Association, the meeting will be held at Memorial Hall in Hotchkiss. For complete information and registration, visit the Valley Organic Growers Association website at www.vogaco.org.

Book Reviews – Newly Received Titles

Sensitive Crystallization – Visualizing the Qualities of Wines by Christian Marcel. Floris Books, Edinborough – \$29.95.

Although this book does indeed have its focus on wine quality, it can also serve as a text on the sensitive crystallization method originally developed by Ehrenfried Pfeiffer. Following indications suggested by Rudolf Steiner, Pfeiffer developed the technique as a means to make visible the formative forces within living organisms. Well-illustrated with photographs in color, Marcel's book details the origins of the method; the equipment and materials used; and the scientific basis behind the method. Unfortunately,

mainstream science still has not recognized the method, and this book may serve to overcome the reluctance that hinders the scientific community from endorsing a truly remarkable tool for reading the quality of foods, soils, and any living substance. Marcel devotes several chapters to how the sensitive crystallization pictures are interpreted using comparative photographs. The chapter making a comparison between differently managed soils is particularly dramatic and demonstrates clearly that the "formative forces" within biodynamic soil are much stronger than either organic or conventionally managed soils. Marcel's

book finishes with numerous photographs that show the usefulness of the method for the winemaker in improving the quality of wine. This is a most excellent book that should serve to bring recognition and awaken interest in the sensitive crystallization method.

Pfeiffer's Introduction to Biodynamics by Ehrenfried Pfeiffer. Floris Books, Edinborough – \$13.95.

This title is a collection of previously published articles by Ehrenfried Pfeiffer, along with a previously published biographical excerpt on Pfeiffer by Herbert Koepf. The first article, "Rudolf Steiner's Contribution to Agriculture" appears in both the Adams translation and the Creeger/Gardner translation of Steiner's *Agriculture Course*. The article "The Biodynamic Preparations" was previously included in the booklet *Biodynamics – Three Introductory Articles*. Since that title has gone out of print, it may be that this current title will be the main source for a very valuable

article covering Pfeiffer's detailed analysis of the biodynamic preparations. "Questions and Answers on Biodynamics" was for many years supplied to newcomers by the Biodynamic Farming and Gardening Association and then by Josephine Porter when the preparations distribution became her sole responsibility. After many years out-of-print it was published in Issue #46 of *Applied Biodynamics* because it was seen as a valuable statement by Pfeiffer on the subject of biodynamics. It may be worthwhile to have these articles available all in one place, and because of the out-of print status of a number of older publications, this title could serve as a basic introduction to biodynamics for the newcomer while providing some scientific underpinning for the subject, especially with the second article.

Both titles are available from JPI for cost mentioned above, plus shipping.

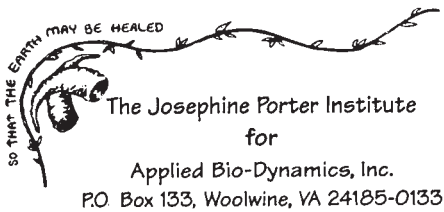


“We must recognize that fertilizing must consist of enlivening the soil, so that the plant is not in dead soil, and does not have difficulty making it through to the fruiting stage out of its own vitality. The plant does this more easily if from the very beginning it is embedded in something living.”

Rudolf Steiner
*Spiritual Foundations for the
Renewal of Agriculture*, p. 66

“A farm is always an individuality... The climate and soil conditions are the very foundation of a farm’s individuality.”

Rudolf Steiner – *Spiritual Foundations for the Renewal of Agriculture*, p. 184



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