# On the Theme of the Agriculture Course: Open Secrets in the Composition of the Fourth Lecture

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In agriculture we are indeed fortunate that we can usually let our products do our talking for us. But this works only for a while. Sooner or later we find ourselves in the position of having to explain—either to ourselves or to others—what it is that we are doing, or not doing. And what we need then is to be able to articulate the *inner logic* of our actions, which in this case means the inner logic of our biodynamic practices. If we are not able to do this, our will gradually becomes lamed, our circle of friends gets smaller and smaller, and our business inevitably suffers.

Today, therefore, I am going to try to show how the inner logic of the fourth lecture of the Agriculture Course—which is in many respects the central lecture of this Course—how this inner logic can be revealed by an active, questioning method of reading that pays special attention to the *composition* of the lecture. I am not proposing to answer every question about this challenging lecture, but I am going to share some questions that have proved fruitful for me over the last 25 years, and which I hope will also stimulate you to further discoveries of your own.

I am going to assume that most of you here have read the Agriculture Course at least once—if not many times—and hence are generally familiar with its content. But just to be sure … I am going to immediately offer you a slide with an outline of the main topics in the fourth lecture:

**Outline of the Fourth Lecture**

1) Natural vs. spiritual scientific views on human nutrition
2) Example of tree; fertilizing as an enlivening of the soil
3) A personal relationship to fertilizing; an organism's skin
4) Compost with quicklime for fertilizing pastures & meadows
5) Horns vs. antlers; preparing and using horn manure
6) Preparing and using horn silica or horn orthoclase
7) Natural vs. spiritual scientific approaches to agriculture

Certainly this is not the only way to divide up this lecture, but I have found this way to be quite useful. I will leave it on the screen to remind us of the whole as we now proceed to consider each of these main sections.

- 1 -

So, let us start by asking why in this lecture on *agriculture* does Steiner start by talking about *human nutrition*? In fact, in this first section Steiner actually talks about both nutrition and *methodology*. He emphasizes that spiritual science does not start from *details*, as natural science is inclined to do, but instead tries always to start from the most *comprehensive* phenomena. In spiritual science, the human being is the primary tool for studying the world, because the human being is a *microcosm* of the world. Thus the human being is a more comprehensive phenomenon than is the plant or even the whole earth.

To illustrate this methodological difference, Steiner then describes how natural science had recently to correct itself regarding the *amount of protein* human beings need each day. This kind of error, he says, arises because natural science often looks only at short-term effects and because it starts from "a totally false view of how living things are nourished." Specifically, the idea that the *substance* of our physical body comes from the *food* that we eat, is completely wrong! On the contrary, he emphasizes that most of what we eat is *excreted* again, while most of the substance of our body is actually absorbed from the air through our lungs, our skin, and even our senses! It is continually absorbed in "finest dosages" and is then "condensed," "hardened" and "deposited" within our body; eventually we cast it off peripherally when we shed flakes of skin, or cut our hair or our nails. Later, in Lecture Eight, Steiner calls this bodily substance "cosmic substance" (because it ultimately originates in the ethers of the cosmos).

On the other hand, Steiner asserts that what is of primary importance in our earthly food are the *forces* that it contains, the earthly forces of vitality that sustain our *will* and enables us to be *physically active*. Food is important, he says, because it "has inner energy like a fuel."

At this point it is fruitful to stop for a moment and reflect on what he has said so far. Certainly the business about "cosmic substance" is different from anything that natural science teaches. But when Steiner says that our earthly food is important because it has "*energy* like a *fuel*," how is this any different than the standard materialistic view, where the energy content of our food is measured in terms of "calories," and where food is regarded as the source of our energy, just like fuel is for a machine. Well, here too there *is* a great difference, but in the Agriculture Course itself, Steiner does not make fully explicit that he regards food not as the direct source of an organism's energy, but only as the *stimulus* for an organism's *own* vital activity.[1]

We may now also ask ourselves, what then is the *direct* source of our energy, our will-force? This again is not explicitly addressed in the Agriculture Course, but in numerous other lectures[2] Steiner indicates that every physical action of ours is accompanied by catabolic processes of combustion (oxidation or respiration) in which energy and warmth are released as our bodily substance is consumed and ultimately converted primarily into carbon dioxide and water. In this regard he is in agreement with natural science, although Steiner always bristled when these delicate, living processes were compared with outer combustion.[3] As soon as our physical action or digestive activity consumes our bodily substance, however, another process comes to the fore whereby this substance is replaced. This latter, anabolic process is what Steiner describes in Lecture Four as the condensing and depositing of the fine, cosmic substantiality that we take in through our lungs, skin and senses. The alternation of these catabolic and anabolic processes is largely regulated by the rhythms of our soul or astral body, especially by its wake-sleep rhythm.[4]

Thus, at the beginning of Lecture Four, Steiner alludes to a nutritional process where the energy released from breaking down and excreting our earthly food stimulates us to convert our body's existing cosmic substances into energy for our earthly will-forces and at the same time draw in new cosmic substances from the atmosphere. On another occasion, Steiner summarized the whole process very succinctly: "For everything that we excrete as outer, material substance, something etheric is taken into us."[5] This process, however, is only half the story, and in the Agriculture Course it is only in the eighth lecture that Steiner describes the other half of the story. The earthly forces and cosmic substances that Steiner describes in Lecture Four together constitute what he calls the "metabolic-limb system." On the other hand, the "nerve-sense system" is oppositely constituted namely, with cosmic forces and earthly substances. These earthly substances come from the small portion of our earthly food that we do not excrete but rather assimilate. In order to assimilate food and make it part of our own body, we must totally transform it.[6] We must not only break it down physically and chemically, we must also strip it of any etheric or astral qualities that it may bring from its plant or animal origins. Everything that is not already mineral—like salt—must momentarily be reduced to the mineral level, i.e., it must become dead. And then this dead substance must be re-*enlivened* by our own etheric body, re-*astralized* by our own astral body, and ultimately *individualized* by our own ego.[7] The substance of our nerve-sense system, therefore, is earthly substance that has undergone a thorough process of refinement and has then been deposited or excreted within us. Hence Steiner can characterize our brain as a "highly developed manure pile" (Lecture Eight).

With this broad perspective on human nutrition we are now in a much better position to understand the transition to *agriculture* and to the *farm organism* that Steiner makes in the following sections of this lecture and in the remainder of the Course.

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Steiner uses the example of a tree to begin to explain how substances and forces work in agriculture. It is characteristic of a tree to have bark, which is plant-matter that is on its way to becoming soil. On the other hand, soil that is alive and permeated with decomposing humus-like substances is on its way to becoming a kind of plant sheathing. With a tree it is most evident that there is no strict separation between the life of the plant and the life of the soil. The life in the soil supports the plant's life and if the soil is not alive, the plant will have greater difficulty developing itself all the way to its fruiting stage. For this reason Steiner says the goal of fertilization must be to *enliven* the soil. What ordinary mineral soil needs most of all is more *life forces*; it does not necessarily need more physical substances (although certain substances may of course be the vehicle for the life forces). In regions with black or chernozem soils, this enlivening is least needed because there nature itself sees to it that the soil is sufficiently alive.

In this context Steiner gives his first practical indication of how this soil enlivening may be achieved. Just as the trunk of a tree may be regarded as a mound of especially living soil, so we can help any soil become more enlivened by *raising it up in mounds* and by adding to it *decomposing organic matter*. In this respect, trees are natural models of humus formation and decomposition!

But here we may also pause and ask ourselves, what do trees have in common with the regions with black soil—like the Ukrainian Steppe or the North American Great Plains—in which trees are often notably sparse? Well, first of all, in some of these regions in the past, trees were in fact more common; but probably what is more important is that these regions generally have continental climates, with great *extremes* of *summer* and *winter*. If one thinks about it, a tree is itself the product of *many* summers and winters, and so we should keep in mind the possibility that the ultimate generator of humus is in fact this alternation of summer and winter ....

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Turning next to the third section, we may ask why does Steiner now start speaking about how crucial it is to acquire a *personal relationship* to everything in agriculture, and especially to the handling of manures? He himself explains this by saying that every organism needs a *skin* to separate itself from the world and so that the "stink of life" stays contained within the organism. But how exactly does having a "personal relationship" to the various smells on the farm help create such a skin?

The answer to this is not immediately apparent, but shortly afterwards Steiner makes clear that he is thinking of, among other things, nitrogen escaping as ammonia, which has a very pungent smell. This is the kind of thing a farmer needs to notice—and take steps to correct—if he wants to strengthen the life of the farm organism. By working to keep such manure smells contained, and in general by working to generate fertility within the farm and to *recycle* the substances and forces generated on the farm, the farmer is in fact creating and maintaining a skin for the farm organism. Only with such a "dynamic skin" can the farm organism develop and *accumulate* its own life forces and thus become a self-sustaining entity.

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In the fourth and central section of the fourth lecture, Steiner immediately states that fertilization must consist *not only* in bringing life into dead, mineral soils; it must *also* involve the process that he had emphasized in the previous lecture, namely, the process of "bringing enough nitrogen into the soil so that life can be carried to those structures ... to which it must be carried." This is a *task*, he goes on to say, that must be implemented in an "exact practical manner." The result will be an enlivening of the solid, "earthy" component of the soil, and not merely a stimulating of the watery component, which is what is accomplished when minerals—i.e., water-soluble salts—are used as fertilizers.[8]

So what exactly are these mysterious earthy "structures" to which life must be carried by nitrogen? Apparently they are carbon-containing structures, because back in the third lecture he said:

> Nitrogen leads life into the forms that are embodied in carbon. Wherever nitrogen appears, its role is to mediate between life and the spirit, which temporarily assumes form in carbon. Everywhere in the animal and plant kingdoms, and also in the interior of the earth, the bridge between oxygen [the carrier of life] and carbon is provided by nitrogen. The kind of spirituality active in nitrogen … is what we call astrality.

And more specifically:

> The etheric life principle [oxygen] would float around like a cloud, would not take the carbon framework into account at all, if the nitrogen did not have such a strong attraction to the carbon framework. ... [Nitrogen] brings the oxygen to the carbon so that the oxygen can grab hold of the carbon and expel it. Nitrogen is indeed the mediator for the production of carbon dioxide out of oxygen, for the exhalation of carbon dioxide.

But not just any nitrogen can do this; it has to be nitrogen that is created in a special way. And there in the third lecture Steiner pointed to the world of the *legumes*:

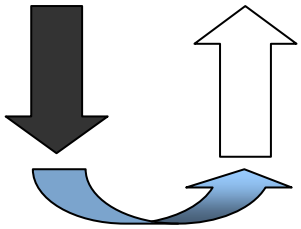
> [T]his process can be observed ... in the most wonderful way in the Papilionaceae, in the legumes, in all those plants which in agriculture can be called the nitrogen collectors. These plants do indeed have the function of drawing in nitrogen in order to convey it to what is below them. ... There below in the soil the calcareous elements in the soil are ... dependent on a kind of nitrogen-inhalation, just as the human lungs are dependent on inhaling oxygen.

With all this we now have enough background to return to the central section of Lecture Four. Here Steiner begins to extol the virtues of making a simple, plant-based compost pile, and of then adding to it some calcium in the form of quicklime (calcium oxide). He indicates that the quicklime will strengthen the compost's mild astrality relative to its rampant etheric life and thus enable the compost when applied to the soil to fully permeate and "astralize" the earthy element of the soil. As a result of this astralization, he says, the soil will become "permeated with nitrogenous substance," which will then bring about an enlivening process in the soil that is very similar to a certain "plant-like" process in the human organism, a process that does not emphasize fruiting but remains at the vegetative stage. Hence he recommends that this plant-based compost be spread on meadows and pastures, so that these will be stimulated to produce fodder that will in turn stimulate "liveliness" in the animals that eat it.

So, what is he really saying here with this complicated description of making and using a compost pile? Stated succinctly, he has described a soil fertilization method based on the *model of the legumes*. When describing the legumes' nitrogen collection process in Lecture Three, Steiner not only emphasized the role of calcium and related elements in this process, but also characterized these elements as being filled with cravings and desires, i.e., with astral (soul) forces that have a contractive or earthly quality.[9] At that time he did not explicitly mention quicklime, but quicklime is in fact an especially good example of this quality of greedy desire. Among other things, quicklime is greedy for water; when its greed—or thirst—is slaked, the quicklime changes into slaked lime (calcium hydroxide). So in Steiner's instructions for the compost pile, this greedy quality is used to break down the fresh organic matter in the pile. By sucking out the water in which the old etheric forces of life were anchored, the quicklime deadens the organic matter. (This process appears analogous to the initial deadening of food that takes place in human nutrition, as mentioned in connection with the first section.) Once the "cushion" of old etheric forces is weakened or eliminated, the astrality in the pile can then act directly on the solid or earthy element of the soil and cause it to become permeated with "nitrogenous substance." Just as the legumes are able to enrich the soil with nitrogen that is living and even sentient (astralized), so a similar enrichment seems to be the rationale behind this plant-based compost made with quicklime.[10] This special nitrogen then has the capacity to bring living oxygen to the carbonaceous, organic matter in the soil, i.e., to stimulate the *respiration* of the soil and at the same time *enliven* it. When oxygen removes the carbon in the soil as carbon dioxide, the oxygen as well as the carbon leave behind their *living ether*, which then serves to attract and condense new cosmic-etheric substance to replace the carbonaceous structures that were destroyed.[11] In this case, this cosmic-etheric substantiality comes from the "cosmic upward stream" that entered the soil via its silica and clay components, as described by Steiner in Lecture Two.[12]

Thus, even though legumes are not explicitly mentioned in the fourth lecture, the central motif of this lecture appears to be the whole "fertilization dynamic" initiated by and exemplified by the legumes. And Steiner's recommendation to fertilize with quicklime-enhanced plant compost appears to be a first step toward imitating and enhancing this natural dynamic of the legumes. What Steiner describes here as "astralization" needs to be seen in the context of his spiritual view of the whole earth as an ensouled being. This being *awakens* during the *fall and winter* when it *inhales* its soul or *astral body*.[13] This astralization is experienced by the single plants as a catabolic process, which encourages *flowering and fruiting* and then leads to dormancy or death. These astral, *earthward-directed forces*, however, are taken up especially by the *legumes*—hence Steiner's remark in Lecture Three that the legumes tend to "wait for winter." In the soil, *calcium* takes up these forces and promotes the break down of organic matter. On the other hand, the earth's falling *asleep* in the *spring and summer* is experienced by the plants as an anabolic *vegetative* process, where *cosmic-etheric substances* are taken up by *silicon* and the *clay* minerals and promote vertical growth especially of the *grasses.* The following diagram attempts to summarize this dynamic.

**The Legume Fertilization Dynamic**



| | | |
|---|---|---|
| *fall-winter* | | *spring-summer* |
| *inhalation/waking* | | *exhalation/sleeping* |
| *flowering/fruiting* | | *vegetating* |
| *legumes/calcium* | | *grasses/silicon (clay)* |
| *earthly-astral forces* | | *cosmic-etheric substances* |
| *organic matter decay* | | *soil enlivening* |
| *soil astralization (N)* | *stimulates (via O)* | *soil respiration ($CO_2$)* |

Before passing to the next section, there are a few questions here that deserve closer examination. Firstly, how are we to think of the enrichment of the soil with "nitrogenous substance," which Steiner says comes about with the quicklime-enhanced compost? How can such an enrichment occur in the absence of legumes? Is this compost perhaps meant to stimulate the free-living nitrogen-fixing bacteria that may be in the soil? This may indeed be the case, but the quicklime itself may also play an unsuspected role. Biological nitrogen fixation is well known to be impaired by low calcium levels,[14] but instead of just contributing alkalinity, quicklime may also be involved in the "hidden alchemy" that Steiner mentions in Lecture Five.[15] There, in connection with the yarrow, chamomile and nettle preparations, Steiner states that in living nature and under hydrogen's influence, potassium and calcium "are constantly being transmuted, first into something resembling nitrogen, and then into nitrogen itself."[16]

This may be a startling thesis, but Steiner actually starts hinting strongly about alchemical processes already in the third lecture when he describes carbon as the "Philosopher's Stone." In the third lecture there are also a couple of other passages that seem to allude to the transmutation of calcium into nitrogen. One of these has already been quoted, namely, the passage where Steiner says that the calcareous elements in the soil (possibly including potassium) engage in a kind of "nitrogen inhalation." The other is Steiner's description of a curious experiment to demonstrate the importance of atmospheric nitrogen for human beings. If a person is placed in a sealed chamber with a reduced level of nitrogen, Steiner says that this person will begin producing and exhaling extra nitrogen until the normal atmospheric level is restored. The significance of this experiment is not at all clear from his description in the Agriculture Course, but if one turns to a lecture he gave to the Goetheanum construction workers on October 10th, 1923, one finds there a much more complete discussion of this experiment, which is worth briefly examining here.[17]

In this lecture to the workers, Steiner explains that it is very important for us to have the right proportion of nitrogen in the atmosphere around us, and that if it is not right, we will either produce more gaseous nitrogen from our body, or hold back some of the nitrogen that we inhale. And then he goes on to say that although our lungs do not need the nitrogen we inhale, we do need it for our kidneys and metabolic-limb system, so that part of our astral body—namely, our will—can freely enter into our physical body and trigger there, for instance, a muscular movement. To make such a movement, some organic substance must first be destroyed—poisoned—and then the poison must immediately be overcome (detoxified). According to Steiner, this destructive phase is based on the presence of poisonous *cyanide* (nitrile) compounds, i.e., *carbon-nitrogen* compounds having little or no oxygen and which in their inorganic form are linked with a cation such as *hydrogen*, *potassium* or *calcium*. In this lecture Steiner speaks about the processes of cyanide production and detoxification chiefly in connection with the human being, but he does mention in passing that hydrogen cyanide occurs in certain plants[18] and that these cyanide processes are very important for plant growth in general. In fact, in all higher plants hydrogen cyanide is a metabolic co-product of the biosynthesis of ethylene ($C_2H_4$), a ubiquitous gaseous hormone that plants produce when they are astralized (especially when leaves or flowers senesce, fruits ripen or plants are stressed or wounded).[19] It seems, therefore, that for Steiner these cyanide processes are closely linked to the transmutation of calcium and potassium into nitrogen, as well as to the process of biological nitrogen fixation and to the fertilizing properties of quicklime-enhanced compost.

A second question concerns Steiner's specific recommendation to use quicklime. It is sometimes asserted that he merely wanted something with which to adjust the pH of the compost pile, or to supplement it with calcium. From the considerations discussed today, however, I think these possibilities are quite unlikely, and indeed both of them could be accomplished equally well with slaked lime or even with ordinary limestone (calcium carbonate). Quicklime, on the other hand, which is prepared by burning limestone at high temperatures, is much more active and dynamic than the other two forms of lime and hence is also much more likely to be involved in a living, alchemical process. In fact, "quick" is an archaic English term for "living"—and on one occasion Steiner himself referred to burnt lime (quicklime) as "living lime."[20] For all these reasons, quicklime could well be regarded as the *first* preparation mentioned in the Agriculture Course.[21] But unfortunately it has never been regarded as such, and indeed very few biodynamic farmers have any kind of personal relationship to it. Quicklime has not only been neglected, but—because it is prepared by intense heating—some people even regard it as a "synthetic" material. Its use, therefore, is often forbidden in organic certification guidelines and it is currently even forbidden by Demeter!

One final question about this section. Steiner ends his discussion of compost by emphasizing the importance of not allowing its astrality and nitrogen to escape, and he therefore recommends covering the pile, and even interlayering it, with "milled peat" (Torfmull) or "peaty earth" (Torferde).[22] He could have suggested to cover it with hay, or with leaves, or even to build a roof over it, but he did not. And nowadays it is commonplace even to use polypropylene compost covers. But do these materials retain the astrality and nitrogen of a compost pile as well as peat? Do any of you go to the trouble of using peat on or in your compost piles? If so, I would love to hear your experiences.

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Let us now turn to the fifth section. Here Steiner rather abruptly begins to talk about *cow horns* and *deer antlers*. Why does he do this? Of course he wants to lay the foundation for introducing the horn preparations, but what is the connection here to what he has just been discussing?

A stag begins growing a new set of antlers every year in the spring. In this sense antlers arise through an out-breathing growth process, and Steiner also describes them as vents for excess etheric-astral forces. The stag's strong metabolic forces surge toward its head and, as it were, break right through it. When the antlers reach maturity in the autumn, even the skin or "velvet" falls away and the antlers extend there into the world as naked bones. The stag thus becomes a highly sensitive, nervous and aroused animal. On the other hand, the horns of a bull, and especially those of a cow, are regions of thickened and hardened skin, which permanently enclose the horn bone and prevent any metabolic forces from escaping. Instead, these forces are reflected back into the animal where they reinforce its metabolic strength. In this sense horns represent an in-breathing, fall or winter process.

These considerations, says Steiner, can suggest to us how we can enhance the effectiveness of ordinary farmyard manure. Manure is simply whatever the animal ate, digested and then excreted. Because it is manure from an animal, which does not have an individual ego and does not form its brain as highly as does the human being, this manure is not as deadened as manure from a human being. By going through the animal's digestive tract, Steiner says that the manure is imbued with astral and etheric forces, which give it the power to enliven and astralize even the inorganic, earthy component of the soil. (The power of the manure, he emphasizes, has nothing to do with the bacteria that live in it; they are only symptoms of its condition.) And so, to further enhance this manure, Steiner suggests stuffing it into a cow horn and burying it in good soil over the winter.

It is not too difficult here to see the metamorphosis and enhancement that the plant-based compost plus quicklime method of fertilization has undergone. Cattle manure is basically grass and other plant matter that has been composted by the animal! The quicklime is here replaced by the animal itself, in which the astralizing forces are already strongly present. And where Steiner recommended covering the compost pile with peat, this covering is here replaced by the horn. Thus each manure-filled horn is like a little, plant-based compost pile! And by being buried during the wintertime when the macrocosmic astralizing forces are strongest, the whole process, originally modelled on the legumes, is here even further enhanced.

As already mentioned, Steiner suggested that the quicklime compost with its mild but stable astrality is most suitable for spreading on pastures and meadows. He now suggests that the horn manure with its powerful astrality be highly diluted with water and then sprayed on the soil where vegetable or grain crops will be grown. In other words, the *plant*-based compost is to be used to produce *animal* fodder, while the *animal* manure is to be used to produce *human* food. Thus the diluted horn manure was evidently intended to supplement, not replace, the quicklime compost, which of course is spread in bulk and thus furnishes the pastures and meadows with substances as well as with forces.

One further aspect of this fifth section is also noteworthy. Besides the exact logical progression that we have seen in this lecture, we can now also begin to recognize another compositional principle. When Steiner describes how to dig up and then stir the horn manure, he draws particular attention to its smell at these times and again mentions the importance of acquiring a personal relationship to these things. In this respect there is a clear echo of the theme of the third section of this lecture. And just as a farmer strives to create an enclosing "skin" for the farm organism, so too is the cow's horn a supreme example of an enclosing skin.

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In the sixth section of this lecture we come to the horn-silica preparation. Steiner explicitly suggests—and to a certain extent we can readily see—that this is a further development of the principle of the horn-manure preparation. The horn manure brings an astralizing winter impulse that should stimulate a spring-like response in the soil, an enlivening process which, as Steiner says, "pushes" the plants upwards. Conversely, we can see without too much difficulty that the horn silica, by having been buried in the summer, might acquire a summer impulse, so that when finely sprayed in the air above the growing plants, it could then stimulate an "autumn-like" response, namely, a ripening and a devitalization. This response can be envisioned as a process whereby the cosmic forces of life are pulled up and out of the plant body, leaving behind in the ever more delicate and devitalized forms of the leaves and flowers, a crystalline precipitate of earthly substance. Indeed, the only thing that Steiner says about horn silica's influence is that it "pulls from above."

Let us now take this polarity a little further and ask ourselves, if the horn-manure spray is meant to enliven the dead *earthy* element in the *soil*, what might the corresponding goal be for the horn silica spray? Could it be to enliven the *air* and especially the *warmth* above the ground, both of which are dead (according to what Steiner has said in the second lecture)? This is an open question, but it is certainly noteworthy that at the beginning of the fifth lecture Steiner remarks that it is not only the *soil* that can become depleted of its life forces—the *air* can become depleted as well!

Because Steiner says so very little about the horn silica and how it works, people often assume that it is a very simple preparation and sometimes even regard it less highly than they do the horn manure preparation. But why should the "stimulation dynamics" of the horn silica be any less complex and subtle than those of the horn manure?!

Remember what Manfred Klett mentioned in his lecture this morning in connection with Lecture Three. Steiner says there that *carbon* and *hydrogen* are not as "well behaved" as *nitrogen* and *oxygen*. Specifically he speaks about the "odd" behavior of carbon, the Philosopher's Stone, in relation to its underlying calcium "trellis" and to the legumes. But he does not detail carbon's relation to its underlying *silicon* "trellis" and he never gets around to speaking about the "odd" behavior of *hydrogen*, the carrier of *warmth*. So I suspect that there are many more secrets about the horn silica preparation still to be discovered ... including the real difference between making it with quartz or with orthoclase!

At present this sixth section of the fourth lecture seems to contain more open questions than open secrets. But we can at least notice that *if* the horn silica preparation is indeed regarded as a means of enlivening the dead aboveground *warmth,* then this sixth section mirrors the theme of the second section, in which Steiner spoke of enlivening the dead *earth* element.

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Steiner began this fourth lecture by using human nutrition to illustrate the difference in the methodologies of natural science and spiritual science. Now at the end, in the seventh section, he contrasts the materialistic goals inculcated into agriculture by natural science with the holistic goals that spiritual science can inspire in us. The goal of providing a "healthful" nutrition for the human being can have particularly far-reaching consequences for the world. How we feed the *microcosm* has implications for the *macrocosm*.

In closing I will leave you with a metamorphosis of the first slide that I showed. Here I have tried to express in brief the compositional structure of the whole lecture. In a certain way, the form of this lecture seems to match its content. In any case, I am convinced that grasping the compositional form of this lecture is the key to understanding its content and to unlocking its open secrets.

## Composition of the Fourth Lecture

*Fundamental Methodology*

1) man as microcosm

7) macrocosmic consequences

*General Principles*

2) enliven earth below

6) enliven warmth above

*Specific Conditions*

3) personal relationship creates "dynamic skin"

5) cow creates horns (thickened skin)

*Individual Task*

4) comprehension stimulates action

## Notes

NB: All unreferenced quotations are from Rudolf Steiner, *Spiritual Foundations for the Renewal of Agriculture* (1993 [CW 327]), translation sometimes slightly revised. (CW = Complete Works of Rudolf Steiner)

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[1] See, for example, Steiner's lecture of Sept. 3, 1923 (*The Healing Process*, 2000 [CW 319]): "The essential thing for the digestive system is the bodily activity that is called forth by the presence of the outer foodstuffs. What the human organism needs to do because it has taken in a foreign body that must be transformed and metamorphosed, what the human being must do as a result—that is what is important."

[2] See, for example, his lecture of Oct. 26, 1922 (*Fundamentals of Anthroposophical Medicine*, 1986 [CW 314]).

[3] "Just as a living organism is something quite different from a quartz crystal, so too is what is designated as combustion within the organism something quite different from the dead process of combustion that takes place outside; in the organism it is something alive and even sentient" (beginning of the Eighth Lecture of the Agriculture Course).

[4] Compare Steiner's lecture of Mar. 17, 1923 (*From Limestone to Lucifer: Answers to Questions,* 1999 [CW 349]).

[5] From Steiner's lecture of April 20, 1923 (not yet published in English [CW 84]). Compare his lecture of July 18, 1923 (*From Mammoths to Medium: Answers to Questions*, 2001 [CW 350]): "When we eat a potato, for example, it is not a matter of absorbing something from the potato; rather, the potato merely stimulates us ... There then arises in us the force to again expel the potato, and while we are expelling it, there comes to us from the ether ... that which builds up our body in the course of seven years. We do not actually build up our body from the substances of the earth. What we eat is merely there so that we can be stimulated. In reality we build up our body from what is above. ... You have compressed your heart [for example] from the sunlight, and the food you have eaten has only stimulated you to compress the sunlight to this extent." Compare also his lecture of Oct. 15, 1922 (*The Younger Generation*, 1967 [CW 217]): "[I]n the human organic process, permeated as it is with soul and spirit, matter is completely destroyed and then created anew."

[6] Compare Steiner's lecture of March 22, 1920 (*Introducing Anthroposophical Medicine*, 1999 [CW 312]): "In a healthy organism, all of these forces that are active and inherent in the food itself ... have to be overcome ... to such an extent that they become irrelevant to any internal activity of the organism."

[7] See Steiner's lecture of Oct. 22, 1922 (*Spiritual Relations in the Human Organism*, 1984 [CW 218]) and his first lecture on Oct. 27, 1922 (*Fundamentals of Anthroposophical Medicine*, 1986 [CW 314]).

[8] In a conversation with Johann Streicher in 1920, Steiner specifically mentions the harm of fertilizing with *nitrogen* salts (*Spiritual Foundations for the Renewal of Agriculture*, 1993 [CW 327], Appendix B, Part 1A).

[9] In the first and second lectures, calcium is specifically associated with the (earthly-astral) forces of the moon, Mercury and Venus.

[10] Compare Steiner's remark in his lecture report on the Agriculture Course, June 20, 1924 (*Spiritual Foundations for the Renewal of Agriculture*, 1993 [CW 327]): "There is a big difference between nitrogen and nitrogen, between the dead nitrogen that is found in the air along with oxygen, and another kind of nitrogen. ... [T]he nitrogen in the soil, the nitrogen that must enter the soil with the manure, this nitrogen must be formed under the influence of the entire heavens; this nitrogen must be alive."

[11] In regard especially to carbon, compare Steiner's lecture of Nov. 9, 1923 (*Man as Symphony of the Creative Word*, 1991 [CW 230]). Compare also his lecture of Mar. 31, 1920 (*Introducing Anthroposophical Medicine*, 1999 [CW 312]).

[12] This would correspond, in the "upside-down" farm individuality described in Lecture Two, to an absorption via "lungs, senses and skin."

[13] The earth is simultaneously asleep in the other hemisphere where there is spring and summer. See Steiner's lecture of March 31, 1923 (*The Cycle of the Year*, 1984 [GA 223]).

[14] See, for instance, Banath et al., "Effects of Calcium Deficiency on Symbiotic Nitrogen Fixation," *Plant Physiol.* (1966) 41:760-763 (http://www.plantphysiol.org/cgi/reprint/41/5/760.pdf).

[15] Although "alchemy" nowadays is widely regarded as a pre-scientific concept, even by many biodynamic practitioners, this skepticism also existed in Steiner's day. But Steiner reminded his listeners that "today the transmutation of elements is spoken about quite openly," alluding to the fact that since Rutherford won the Nobel Prize in 1908 for discovering the transmutation of radioactive elements, scientists have revised their former opinions and now accept the possibility of transmutation at least in some cases.

[16] In the fifth lecture he also mentions a specific "qualitative relationship" between calcium and hydrogen, which in his handwritten notes is specified as a 1:3 ratio between quicklime (Kalkerde) and hydrogen (*Spiritual Foundations for the Renewal of Agriculture*, Appendix A, p. 208). Interestingly, the first product of nitrogen fixation is always ammonia, which consists of nitrogen and hydrogen in a ratio of 1:3 ($NH_3$).

[17] Not yet published in English (CW 351).

[18] Organically bound forms of cyanide (e.g., cyanogenic glycosides) are very common in the plant world, especially in the rose and legume families. Steiner specifically mentioned the poisonous nature of bitter almonds a few weeks later in his lecture of Nov. 3, 1923 (*Man as Symphony of the Creative Word*, 1991 [CW 230]).

[19] See D.A. Dzombak et al., *Cyanide in Water and Soil: Chemistry, Risk, and Management* (CRC 2005); and Wang et al., "Ethylene Biosynthesis and Signaling Networks," *The Plant Cell* (Supplement 2002): S131-S151 (www.pubmedcentral.nih.gov/picrender.fcgi?artid=151252&blobtype=pdf).

[20] In unpublished notes (Notebook 78) to his lecture of Oct. 7, 1923 (*The Four Seasons and the Archangels*, 1984 [CW 229]), Steiner wrote: "Kalkstein – durch starkes Brennen zum lebenden Kalk – begehrt Krystallisations-wasser und $CO_2$ – : Lösch-Mortel hört auf lebendig zu sein." [Limestone – through being strongly burned becomes living lime – desires water of crystallization and $CO_2$ – : slaked lime ceases to be living.]

[21] Prior to the Agriculture Course, Steiner also suggested that a preparation from a poisonous plant, *Digitalis purpurea*, could be used to help an inorganic potash fertilizer be assimilated by plants (see *Spiritual Foundations for the Renewal of Agriculture*, Appendix B, Part 1A-C). Since poisonous plants have particularly strong astrality (see, for example, Steiner's lecture of Mar. 22, 1923, *The Driving Force of Spiritual Powers in World History*, 1972 [CW 222]), the logic of this preparation may also be based on the model of the legumes, which though not generally poisonous, are nonetheless strongly astralized.

[22] See the answer to the second to last question in the first discussion period.