Lilly Kolisko – Her Life and Work
1889-1976

Gisbert Husemann[1]

Lilly Kolisko was born in Vienna on 1st September 1889 and died on 20th November 1976 in Gloucester, England. Her father was a typesetter. She had three step siblings. Apart from poverty, her home life was marked by her father's tendency to drown his troubles in drink. When he came home in the evening Lilly's mother would send her to him to calm him down. Her only reading material in these gloomy circumstances was provided by the texts on the calendar pages which gave scant indication of a brighter existence.

A union of opposites

By comparison, the sophisticated surroundings and well cultivated family in which Eugen Kolisko grew up were a seemingly unbridgeable gulf[2]. But destiny closed that gulf. Eugen's father, already fatally ill, ultimately reconciled himself to it, though his mother never did.

How was the web spun?

In 1914 Lilly was a volunteer assistant in a field hospital where Eugen Kolisko was working as a medical student. He had a passionate interest in medicine and science. She learnt medical laboratory techniques: culturing bacteria, staining blood smears and identifying the cells by microscopy. The first encounter, so we are told, was as she helped carry a wounded soldier to the operating table at which Eugen was working as theatre assistant.

During this time Lilly received two invitations to a lecture at the Society of Monists and she offered one to Eugen. Together they attended a lecture by Prof. Hatschek but were both disappointed with it. Afterwards Eugen said to her: 'May I give you a book to read?'. He gave her Knowledge of the Higher Worlds and its Attainment by Rudolf Steiner.

Mrs Kolisko, who told me all this, said she gobbled up the book in a night. It was her first contact with Steiner. Light shone in the darkness of her life and Lilly Kolisko received it and deepened her understanding of it. When she returned the book to Eugen she asked him: 'Have you any more books by Rudolf Steiner?' He affirmed that he had. 'May I read them?' And thus she came to read several books on anthroposophy which were in Eugen Kolisko's library at that time.

First encounters with Rudolf Steiner

Lilly Kolisko's independence of mind, so necessary to her in life, showed in the following initial encounters with Rudolf Steiner. Her will went totally into her work, she sacrificed herself to it. She was amongst the most selfless female researchers that the epoch has seen. Her will, from its working-class origins, led to a work output that is matched a few.

Outwardly she appeared modest, speaking thoughtfully yet very resolutely. In her matriculation exam she chose Hebbel as her set author. The examiner, noting this, pointed out that he was not prepared for it, to which the examinee responded: 'It is sufficient if I am prepared'.

She was introduced to Steiner when he gave a lecture in May 1915 to the Vienna branch. 'Ah yes,' he said, 'we've met before.' 'No,' she answered and stuck to her word even though Steiner repeated twice more that they knew each other until he finally helped her by saying: 'Yes, yes, from

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[1] Reproduced from 'Archetype No 7 2001 - Journal of the Science Group of the Anthroposophical Society in Great Britain

[2] See Der Lehrerkreis um Rudolf Steiner, Stuttgart, 1977

previously!'. We can imagine the effect of this on Eugen Kolisko who was standing next to them. He said to her, 'Don't you want to speak to Dr Steiner?' 'No,' she said again.

He advised her to write to Dr Steiner. This she did. 'But,' she said to me, laughing, 'I never got an answer'. She was 70 years old then. All this lay in the distant past yet she recalled her memories as if from a numbered ledger. Mrs Kolisko had an exceptional memory. Perhaps the general tenor of her life would have been more tolerable if she had been able to forget sometimes. Being at Eugen Kolisko's side, she had suffered the tragedy of his life with him and she had to endure everything that happened at that time as a participant in the events.[3] As a result of this there remained several bitter residues which could not be dissolved away and which left their mark on her in her final years.

At the next lecture Dr Steiner came up to her out of the crowd. 'You would like to speak to me.' – 'Yes, I should like a reply to my letter.' Steiner responded: 'You have lived through a lot of difficulties and you do not get much sleep'. To help her he advised her to imagine herself being at an abyss, allowing rose petals to fall into it and gathering them together again. Regarding the letter he continued, 'And you are asking about occult chemistry; you should first fill in the gaps and only then get involved with that!' And then he said to her aside: 'You can see the etheric'. This echoed in her ears like the words of a riddle.

Eugen and Lilly Kolisko got married. In the meantime Eugen Kolisko was called to the Waldorf school at Stuttgart. (Their only child, Eugenie, became Mrs Clunies-Ross on her marriage in England.)

Pathological anatomy and the cow shed

In 1920-21 there was an outbreak of foot and mouth disease in the Neresheim region. Rudolf Steiner when asked for advice suggested treating it with a coffee preparation. He and Kolisko went into the cow shed. Kolisko had a syringe full of coffee extract and inserted it in a neck vein. Steiner stood in front of the animal. Kolisko continued the infusion until 'the astral body of the animal came out of its eyes'. Then Steiner signalled him to stop. In this way the two 'vets' administered their treatment to a cow. The animal suddenly fell down and then got up again. It was healed. In Kolisko's 1935 report, he said 'that is what Steiner called the collapse'. Not all animals got up again, some died. Incidentally it is worth noting here that the animal disease was the trigger for all the research that followed.

From animal pathology the first steps were taken via spleen function studies to the ground-breaking experiments with plant germination and metals. From this came the new knowledge of substances and on the basis of this the way was open for an anthroposophical approach to medicines!

All this was squeezed into four years. Kolisko had a sabbatical for one year and with helpers he carried out the animal treatment, himself stationed at the animal's head. He speaks of how he learnt to spot a certain change in the eyes as an indication for the duration of the infusion. By using sectioning methods Eugen Kolisko demonstrated that in the dead animals there was damage to the heart muscle. When told about this Steiner said: 'When you take this illness…and infuse the medication.. then the illness is transferred to the head.' (Where it is normal and harmless.) 'Animals that are treated in this way should in fact have no damage to the heart.' But in the brain it will occur momentarily.

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[3] Note added by the translator: after Rudolf Steiner's death in 1925 the Anthroposophical Society experienced a number of internal difficulties which eventually led to the break up of its Vorstand (Executive Committee) originally chosen by Steiner and even to the splitting up of the Society, including the expulsion *en bloc* of the membership in Great Britain. Eugen Kolisko was caught up in these difficult times and in 1935 he was eventually expelled from the Society, an act which is now generally acknowledged to have been illegitimate (Podak, C. Towards a history and a sociology of anthroposophical research institutes in the 1920s. Archetype 5, 48-60, 1999).

One should be able to demonstrate centres of inflammation in the brain which later disappear again. It was an enviable and rare opportunity for Kolisko, who had worked at the Vienna Institute of Pathology, to work with Steiner and discuss pathology with him. Kolisko, together with the vet Dr J. Werr also very successfully treated dogs with distemper using the same medicament[4].

It was also necessary to find the optimal roasting temperature for the coffee beans. Lilly Kolisko had to look for a particular structural change in histological sections in the protoplasm of the roasted beans as an indicator of the optimal roasting temperature. This was not described more precisely by Steiner. This task was the first undertaken by the Goetheanum Biological Institute, initially just a small room which E. A. K. Stockmeyer provided in the administration building of the Waldorf school. In it was a stool and a table on which stood a microscope and a microtome built by Dr Rudolf Maier.

At the turning point in the sciences

Lilly Kolisko prepared vital and stained preparations of the beans at different roasting temperatures. Members of the Anthroposophical Society thought it presumptuous to let an initiate look down a microscope. But they were wrong. Steiner examined numerous preparations and indicated in an unstained section the expected structure. Mrs Kolisko and others present could not see it. Steiner said: 'Yes, don't you see that some cells are completely clear but others have little star forms!' Then she thought she could see them too. He advised her to visit Prof. Römer in Leipzig to have them photographed and enlarged, then 'perhaps the camera will be able to see them better than your eyes'. With Römer she studied photomicrography and eventually saw the aforementioned structures in her own lab. These things are not yet published. Just before Mrs Kolisko went to Leipzig someone with her at her microscope asked in what strength (or dose) the preparation should be injected. (I suspect that it was Eugen Kolisko who put the question, because he was clearly the closest participant.) Of course, a lot depends on this and, turning to Lilly Kolisko, Steiner said: 'Do some germination experiments with the substance and show the results in graphical form; then you will get the picture of the vitalisation process which the medicament brings about in the animal.' (Gaia Sophia 1926, p.116)

Those words sum up what became her life's task. It was the pointer that brought a new property of matter to light, opening the gateway to a new era of medicine and science. Anthroposophical doctors and scientists should familiarise themselves with this. It still contains a lot more than has yet been developed from it. Here too is the justification for calling Mrs Kolisko's institute in 1923 'The Biological Institute of the Goetheanum'.

Rudolf Steiner had advised as a practical scientist and just as he objectively observed the supersensible in a new way, so too he sought in the realm of the senses a way to new experimental facts which would confirm the supersensible results. Both Steiner and Lilly Kolisko were at a turning point in the sciences. Experiments were called for to answer the question of dosage!

As she presented the first plants in the dishes and the curves derived from them, the initial indication was substantially augmented: 'That's what I mean, only you will probably have to dilute them a lot more'. The potentisation experiments were born.

The potentisation curves

Diluting 1 g common salt in 10 cm3 water gives a dilution of 1:10. This corresponds to the 1st decimal potentisation. 1:100 = 2nd and 1:1000 = 3rd. Spectral analysis will detect small amounts of a substance to the 15th potency, i.e. 1 g in a billion litres of water. This volume corresponds to a cube with 1 km edges.

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[4] Dr E. Kolisko: Ein neuer Weg zur Heilung der Hunde-Staupe, Stuttgart (1923). The injections were subcutaneous; also supplemented per os.

Lilly Kolisko: ‘Picture it vividly’ – that cube with 1 g salt dissolved in it – ‘and you might think detecting it is totally impossible.’ But the essential difference is that Mrs Kolisko did not simply dilute; she shook each stage of dilution. This enhanced the dispersal of the substance in the medium.

‘It is a sudden hastening on and a being pushed back’ … ‘The potentisation thus arises through a gradual rhythmic (periodic) approach to a particular point whereas mere dilution happens abruptly (aperiodically).’ Thus besides quantity arises a new quality of substance.

These substance qualities were used to treat the nutrient medium in which beans, peas and lentils were germinated. Up to 50 seeds for each potency with water controls of 300 - 500 seeds. Later only 30 seeds were used. Dinkel and wheat were tested and seed selection was used; for instance out of every 1000, only 20 were selected. This process alone took a week for each experiment. Lengths of roots and two leaves were measured and the values were plotted for each plant. The lines connecting the points gave the curves that Steiner referred to; the potentisation curves. The experiments were extended to the 30th, 60th, 400th, 600th and higher potencies. Variations were apparent but the curve types remained the same. The dishes containing the plants were photographed. For each of 30 plants in a dish, four measurements were needed, making 120 in all. In a 60-potency series this required 7200 measurements for one experiment. The list of experimental replicates alone makes it clear straight away what an immense amount of work was put into the potentisation curve experiments. Without colleagues this would have been unachievable. Lilly Kolisko used to take two to three hours sleep. Even Steiner himself would come to the laboratory at 7 am. after he had been up until 2 am. with the college of teachers.

The Arbeitsgemeinschaft anthroposopischer Ärzte (Anthroposophical Medical Association) published a volume on the work which took place between 1923 and 1959 under the title Physiologischer und physicalischer Nachweis der Wirksamkeit kleinster Entitäten von L. Kolisko (Physiological and physical demonstration of the effects of the smallest entities of L. Kolisko). ‘Entities’ was Steiner’s expression for what is more generally referred to as high dilutions or potencies.

‘From becoming to being,’ said Plato. But here, being, matter, was now made to become, or, was translated into an existence whence the becoming of matter originates, namely the etheric.

In the curves were various maxima and minima. On page 204 of the book mentioned above is a photograph vividly portraying the results (see figure below). It is taken in the institute garden at right angles to a long row of sunflowers. Just a glance from a distance shows that the stems are shorter in four places. These correspond to the minima in the curves. In front of them is a row of much smaller and younger sunflowers already showing the signs of the result to come. The upper limits of the larger and smaller sunflowers show a clear wavy line corresponding to maxima and minima on the curves. (On this piece of land in 1977 the new building for the hall of the Waldorf school was opened.)

Sunflowers grown under the influence of tin chloride potentised in the range D1 to D60

The smaller plants in the foreground are a repetition of the experiment 4 weeks later. This experiment was published in 1933. The sunflower seeds were first germinated in the various potentisations and then planted with a five-fold replication out in the open.

'After a few weeks you can see the potentisation curve of the sunflowers in the open air. The row starts on the right and runs along the fence. You can see clearly how the growth first increases, then decreases, reaches a minimum, then increases once again, reaching a third minimum, then increases before coming to a fourth minimum. The replicates in each position are one behind the other so that we can say that there is sufficient replication present. The variation between the plants was not great. In front of the obviously well advanced row of experimental plants is a second row, also potentised with zinc chloride, which was set up four weeks later. The course of the curves remains the same. (L. Kolisko, 1959)'

The work on the metal-planet relationships can only be mentioned briefly here. They produced characteristic curves. Many hundreds of substances from the mineral, plant and animal realms were investigated. Apart from decimal potencies, those following the centesimal rhythm were produced. Instead of 1:10, the dilution was 1:100. Others were done with the ratio of only 1:2. The curve types were the same. Mrs Kolisko was sceptical. Initially she thought that the maxima and minima should always be in the same place. 'Your wife is so sceptical,' said Steiner to Eugen Kolisko, 'but even so she has very nice curves.'

It is easy to see the significance of the demonstration of the effect of potentised substances, especially for anthroposophical medicine and homeopathy. It is well known that Hahnemann worked with potentised medicines. He spoke of 'power developments' and 'potencies'. Other doctors can now stand behind their colleagues who adopt this new concept of matter as becoming rather than being. In discussions or through occasional failures, it cannot be snatched from their hands again. It can now withstand the dogma of science. Belief in the effect of potentisation, which accords with clinical experience, is now also verifiable by precise scientific experimentation. And research in this direction fulfils a historical need, more so today that at that time.

Mrs Kolisko discovered that plant substances were most effective if each stage of dilution was shaken for 2-2.5 minutes. Mineral substances needed 4 minutes. These indications were instructive for the pharmacists.

Spleen function and the platelet issue – an open challenge

In parallel with the aforementioned researches, Mrs Kolisko conducted studies on blood. She had worked as a bacteriologist with Bauer in Vienna. She had hoped to find in the blood of diseased cows

a causative agent. She managed to get Steiner to examine these preparations too. After he had said 'nothing' in relation to several preparations, he stopped short and described certain pictures which were linked to spleen function during which the expression 'spleen hormone' cropped up. It should be observable in healthy people when food consumption occurs arhythmically. The experiments resulting from this which were carried out mainly on Waldorf teachers comprised the first work published by Mrs Kolisko (1921) under the title Milzfunktion und Plättchenfrage (Splenic function and the platelet question).

Intellect, the matchmaker, immediately made its appearance, thinking itself superior. Amongst the doctors of the Klinisch-therapeutischen Institut in Stuttgart (1921) there was criticism, even resistance. Whether Steiner himself was affected by this is unclear. He intervened, he sharply criticised, he defended. Mrs Kolisko: 'From then on there was always a certain opposition to my work'.

What Mrs Kolisko saw in her blood smears and described as 'regulators' were also known to clinical haematologists. They were described as forms of thrombocytes. Heinrich Zeller, cited by Kolisko (Deutsch med. Wochenschr. No.18, 5.5.21), also described the ring form of thrombocytes. But the connection with the rhythm of nourishment was discovered by Lilly Kolisko. Finally the time was ripe to test and clarify these sidelined issues in a clinic. This was a fruitful thus pleasant task, quite apart from the fact that the necessary outlay in time and expense was not great. Looking back, one can see that that was the beginnings of practical chronobiological research. Today it forms its own broad field of science but at that time in the Biological Institute it was just beginning.

When Steiner spoke at Whitsun 1924 at Koberwitz of the new preparations for agriculture he also gave Lilly Kolisko an assignment connected with them. To the objection that she knew nothing about agriculture, he said, 'But then the farmers do not have your skilful hands'. Mrs Kolisko devoted herself to this assignment too (see Bibliography).

In 1927 Eugen Kolisko went to a major Homeopathy Conference in London and gave a lecture on his wife's potentisation experiments. In the published English proceedings of this conference the incredible amount of work, the tremendous selflessness and the unsurpassable exactitude of the experimentation was emphasised. It was considered that the work would 'gain the support of other schools of medicine for homeopathy when they see how carefully and scientifically such work is carried out and how its exactitude is beyond reproach.' (Goetheanum 8 (1), 1.1.28)

In 1938 Mrs Kolisko was invited to a conference of Indian homeopaths. Dr Munkacy said in his address that it was a great moment to be able to welcome a pupil of Rudolf Steiner, a man whom he would have chosen as his guru. In Madras she spoke about the Moon and her audience was very enthusiastic.

Eugen Kolisko's report from the London homeopathy conference (1927) was republished in Beiträge zu ein Erweiterung der Heilkunst 1977, 2. This reprinting was appropriate because the doctors of the anthroposophical and homeopathic schools had in 1976 renewed exchange of their experiences and ideas.

Leading homeopaths today know the value of the Kolisko experiments. 'The other school of medicine,' i.e. the allopathic one has gone in directions which makes it look improbable that it will ever find its way out of the labyrinth. Medical science's claim to be scientific is based on nothing other than certain indispensable models which are postulated as already understood (gravitation, magnetic fields etc.) which, as we know, is not true. In this context Steiner makes higher demands and calls for a more precise attitude to science. Under Steiner's direction it was possible for Lilly

Kolisko to reveal experimentally the supersensible workings of the spirits immanent in matter. The point at which ordinary science comes up against a boundary is the point where the boundary is crossed. This is the boundary of the influence of matter, which, as in seeds, is taken over by the activity of the vitalisation process or the etheric.

The new experiments and the development of anthroposophy

If we look at Steiner's development of anthroposophy we can see that it was just at that time in 1920 when Mrs Kolisko began her work in Stuttgart that he was giving the lectures in Dornach on Thomas Aquinas. And just as Thomas saw himself placed with his thinking between the higher intelligence of the cosmos and the lower intelligence of earth's creation, the experiments in Stuttgart began to reveal precisely the same constellation of spiritual and material. A 'transformation of Thomism into science' took place (Steiner 1920). It was accomplished by none other than Rudolf Steiner! And Lilly Kolisko was predestined for this. She worked through her experiments at a historic moment: science was once again being imbued with spirit. Her experiments led the transformation that meant science could now deal with the working of spirit in matter. Thus a threshold was crossed. She fulfilled the expectation of her teacher to establish new scientific facts.

Steiner writes in his autobiography that materialism 'looks at matter but is unaware that it is really spirit that it is looking at, only it is appearing in material form' (Chapter 23). To appear as matter, spirit has to be metamorphosed. In the experiments, the descending metamorphosis is itself metamorphosed into one which is ascending to the spirit. As the autobiography was being written, Lilly Kolisko's key text was being published (1923). How can we picture the two metamorphoses of downwards and upwards? The original spirit of matter condensed; this condensation is like a densification, in the densest state the hitherto supersensible matter is at the limit of visibility; if it takes on physical substance it is fixed as earthly substance and cannot, apart from in the realm of the living, return to the spiritual. The three stages of condensation, densification and fixation have corresponding opposites. To fixation there is dissolving, to densification shaking and to condensation dispersal in the medium giving rise to a change in its structure. At this point the medium contains the spiritual formative force of the substance that it had before its condensation.

Here I should like to draw attention to a fundamental epistemological attitude to experimentation that we can deduce from the foregoing. The questions asked in the experimentation arose from the intuitive knowledge which was poured into the work. That way it was also possible to arrive at a satisfactory answer: experimentation has to be balanced by the quest for knowledge of the spirit (Anthroposophy and Science: Observation; Experiment; Mathematics, 8 lectures, GA 324, 1921. Mercury Press, NY, 1991). 'But unless a person has spiritual intuition to put aside their dead experiments and instead draw from living nature its real essence so as to pour it into their experiments, they will be unable to gain anything that is at all valid for living nature.'

After it has become largely detached from the human being, the experiment has to be reconnected to the totality of knowledge. In this respect too we can learn something crucial from the research institute, namely that one half of the work is first examining the questions from all angles and the other is the answer found in the experiment.

It is wrong to think that things become so much simpler when a clairvoyant is involved. A clairvoyant is necessary neither for the questions nor can they dispense with experience. This is absolutely clear. Both Goethe and Steiner regarded thinking and experience as necessary for scientific knowledge. 'Performing experiments in manifold ways is thus the prime duty of every researcher' (Goethe). 'By making a number of observations we discover amongst them something objective that stands above them and becomes for us a higher observation (primal phenomenon) amongst our observations…If

we can manage to place side by side a series of experiments, we then only need to recreate the interconnection and the natural law will once again express itself.' (Steiner)

We can be sure that work at the Goetheanum Research Institute was carried out in the spirit of Goethe. A primal phenomenon is revealed in the rhythm of the potentisation curves. Indeed, Goethe's spirit clears the way to the future of medicine! The rhythmic primal phenomenon is an example of this (Steiner 1920, GA[5] 314).

Rudolf Steiner's reports
Steiner spoke in many lectures about the results at the research laboratory (1923), not only in Dornach, where he dealt with the Christmas Imagination, but also in Penmaenmawr, London and The Hague. Perhaps the most precise picture was published in his initiation knowledge lecture cycle at Penmaenmawr. He described the experiments as finding the spiritual in the physical. By diluting in a ratio of one to one trillion, the 'functions' of substances were made effective. Substances 'crossed over into the spiritual'. What was just mere belief in homeopathy was 'raised to the level of a science' by the experiments.

Now we know when we must use allopathy and when homeopathy.
At Penmaenmawr, several paragraphs dealt in depth with medicine, taking the experiments as the starting point. 'If the results of this research are estimated rightly (*inter alia* as a boundary stone between allopathy and homeopathy), the laws of nature in future will no longer be sought only in the present atomistic way, by measuring and weighing; it will be recognised how in all material things there is a rhythm, and how in the rhythm of events in nature the rhythm of the cosmos is expressed. Thus, as with human beings we can turn from the metabolic system to the rhythmic system, 'it is possible in nature, also, to find in a quite exact, scientific way its rhythmic system' (Steiner, R., Penmaenmawr, 30.8.23, GA 227. Published in English as 'The Evolution of Consciousness', Rudolf Steiner Press, 1991).

He presented the same results to the builders in Dornach on 31 October 1923. After thoroughly explaining the dilution method and the wheat grains growing in the dilutions he presented the results of the experiments: 'The effect of the smallest amounts of substance is rhythmic'. Certain dilutions are stronger, further dilutions are weaker and further dilutions again give stronger growth in the plants.

As early as his first medical lecture cycle in March 1920 Steiner presented his pre-experimental intuitive finding about the properties of substances arising from the rhythmic nature of matter with its 'zero points' and 'oppositions', as later illustrated in the minima and maxima of the potentisation curves.

If we put beside this just one of many of Steiner's comments made 15 years previously when he said 'We need the will to get to the primal causes … rhythm is implanted in matter by the spirit …' (Lecture on 21.12.08, GA 117), then we can sense how satisfying it must have been for him that the experiments were successful. They were suggested by him and Lilly Kolisko had now penetrated to the primal causes. In contrast to this, the work on the spleen is like a brief, microcosmic prelude. Steiner had long since prepared the question. In The Hague lectures there is a comment pointing to Steiner's self criticism in these experiments and what he had in mind. We know that the rhythmic function of the spleen had already been thoroughly dealt with in the Prague lectures on occult

[5] Note added by the translator: 'GA' refers to Rudolf Steiner's Gesamtausgabe each volume of which bears a GA number assigned by the publishers. For a complete catalogue, contact Rudolf Steiner Verlag, Haus Duldeck, Postfach 135, CH-4143 Dornach 1, Switzerland. The contents of a particular GA volume are not necessarily reproduced in full in individual publications of Rudolf Steiner's work in English.

physiology in 1911. 'The irregularity that must necessarily arise through food intake is corrected by the balancing effect of the spleen. That is what I realised at that time. But now in our Biological Institute the experiments on spleen function have fully confirmed this using methods which are just as precise as clinical methods in general are today, even if in some of the details there are justifiable criticisms.' These results of work in a normal clinic have made a big impression, but that they 'have arisen in an anthroposophical context still remains largely unknown' (GA 319). 'But the beginnings of this, which people do not talk about, were made in our Anthroposophical Society. I would not like to bet on how many of our members really realise the full significance of this! So it's no wonder then that when the Anthroposophical Society began to take no notice of what we were doing, this had repercussions outside the Society. In fact we are working not only without the involvement of the public but also without the interest of the Anthroposophical Society!' (GA 218, p.81).

This warning was unsuccessful because after Steiner's death in 1925, Lilly Kolisko was unable to publish his suggested plan for an appeal to the members for financial support of the Goetheanum Research Institute.

Steiner's report at The Hague ended with the comment, 'But after this, we must go even further'. In 1920 Steiner's ideas regarding experimentation were obviously underpinned by rhythms within the human being and in the cosmos. Modern chronobiology has uncovered the inner Sun-rhythm as a circadian cycle in many processes. But it has not yet arrived at the idea of there being rhythmical systems in both cosmos and man.

On 22.4.1812 Goethe was in Döbereiner's lab where metal oxides and pure silver were on show. They spoke of 'the modern day dynamic view' – the origins of the periodic system of the elements. In the afternoon Döbereiner visited again and they discussed the chemistry of plants. Goethe noted in his diary: 'Symbolic expression of the higher organisation used by the lower. It will eventually happen that the atomistic and mechanical way of thinking will be completely banished from good minds and all phenomena will appear dynamic and chemical, evermore confirming the spiritual life of nature.' In that the primal causes speak out of the rhythmical curves it is the spiritual life of nature. In that cosmic rhythms reveal themselves in matter it is the higher organisation manifesting itself in the lower.

Capillary dynamolysis

Lilly Kolisko has written in several publications about the origins of capillary dynamolysis. In the first issue of Natura (July 1926) we read: 'I was able to present the pictures during a visit by Dr Steiner to the Biological Institute. He studied them thoroughly and was satisfied with the method'. She wanted to know 'whether this method had potential for studying the shaking process' (1959). She had published the germination experiment, presented before the capillary dynamolysis experiments, but did not go into the method itself there. But with the first pictures the question arose as to the method used, i.e. the chromatograms (cf. the first edition of Entitäten 1923, p.44, with its reference to Friedrich Goppelsroder 1904: Kapillaranalyse etc.). Steiner 'was satisfied with the method, but considered the shaking to be still insufficient' (1959, p.10). 'You must shake them until you get a horizontal line (on the rising extract), then the substance is homogenous' (Natura 1926, Issue 1). (From the differences in how far the rising progressed in the pictures according to different shaking times and from looking for a horizontal line, she ascertained the optimal time for the shaking process.) From Lilly Kolisko's writings it is clear that Steiner had a different attitude to the germination experiments than to those with capillary dynamolysis.

As reports differ from one another we cannot exactly discover the circumstances that led Steiner in 1923 to suggest, by means of a sketch, that the plant saps should be extracted and drops of the extract placed on filter paper. Lilly Kolisko verbally and in writing reported his request that she

'study the formative forces' – using the pictures formed in this way. In the Mitteilungen des biologischen Instituts No. 1934 it says 'Let the extract rise in a filter paper strip, according to the customary method of capillary analysis, then the various plants (earlier, for the drop method, Steiner mentioned several by name) will be clearly differentiated from one another'. Thus they abandoned the drop method because it 'was unable clearly to differentiate the different plants'. Metal salts (iron and copper sulphate, gold chloride etc) 'enable forms to be developed' (Mitteilungen 1, 1934).

The experimenter was now satisfied that she could see formative forces. With this a method was evolved which enabled cosmic formative forces for the various constellations to be made visible. The cosmic rhythms of the potentisation curves were now extended to pictures by the constellations.[6]

In 1966 Theodor Schwenk adopted the drop method in a modified form. 'Dropping was retained but the filter paper surface was replaced by an elastic medium, namely water.' The flow forms of water which arose in this way were made visible optically (Bewegungsformen des Wassers, 1967, p.16). In this way the quality of water could be assessed. Agnes Fyfe published her results of capillary dynamolysis research as Die Signatur des Mondes im Pflanzenreich ('The signature of the Moon in the plant kingdom' published in English as 'Moon and Plant', Stuttgart, (2nd ed. 1975)). Magda Engquist published her work on the capillary dynamolysis method as an indicator for life processes in plants in Die Steigbildmethode, ein Indikator für Lebensprocesse in der Pflanze (Klostermann Verlag, 1977). Breda and E. v. Wistinghausen used the capillary dynamolysis method to carry out quality testing in agriculture.

Workings of the stars in earthly substances

Lilly Kolisko published an article with the above title and its foreword is dated 30.3.1927. In the same year the series of articles appeared in Natura with the title 'The Mystery of Matter'. The two are intimately connected. Lilly Kolisko took as her starting point Steiner's indication, 'While a substance is in the solid condition it is subject to the forces of the earth. But as soon as a substance enters the fluid state, planetary forces have an effect on it…' She had rock solid faith! After a few preliminary daytime and night time experiments with various solutions of metal salts, on 21 November 1926 at 6 p.m. during a Sun-Saturn conjunction she allowed silver, iron and lead salts to rise in filter papers. She was amazed to discover that the usual forms in the pictures disappeared. 'An invisible hand had blotted out the working of the lead in my solution. (…) The Sun had stood before the planet Saturn and here below on Earth the lead could not manifest its activity. When the Stars speak man must stand still in silent awe.'

That was the foundation stone of a metallic bridge whose further development with various metals and planets was pursued through decades of work between Earth and cosmos. As the Moon reveals its movements on Earth in water, there arose the fundamental work on the Moon and plant growth with many varieties of wheat (1926-1932 and subsequently). The annual cycles with various Moon phases, the experiments with animal substances (e.g. urine) and the planet studies all went on in parallel in her laboratory – a busy schedule!

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[6] Werner Kaelin (1965) wrote: 'L. Kolisko developed the method published by F. F. Runge in 1855. He let metal salt solutions spread out on horizontal filter papers. Paper chromatography then developed from this. Lilly Kolisko made no reference to it. However she referred in 1923 to Über Kapillaranalyse by Hugo Platz (1922), Pharmacist and manager at the firm of Dr W. Schwabe. Platz attributed his method to Goppelsroeder: Paper strips hang from racks in small cylindrical glass containers and dip into plant juice which rises up them. The resulting differences in colour enabled Platz to distinguish, for example, adulteration of *Rhizoma imperatoriae* with *Radix gentianae*. He studied many plant juices as well as bread, flour, urine and drinks. Lilly Kolisko rolled up the paper strips into cylinders which fitted into the glass cylinders dipping into the plant juice. Metal salts were added to the juices.'

The Mitteilungen des biologischen Institutes am Goetheanum (1-5) were published every year. These reported results for the crystal formative forces and observations with capillary dynamolysis through four eclipses of the Sun.

Crystallisations were carried out during the daily and annual cycle of several years at 17 levels from that of the laboratory down to 16 metres below the Earth's surface. At night, crystallisation happened earlier. In February there was a maximum in the monthly weight of crystals, also at night, and in August there was a minimum.

In Stuttgart, Steiner set the task of showing through crystallisation with plant poisons 'the transition from mineral to plant formative force'. Lilly Kolisko carried out these experiments too. Hans Krüger has seen unpublished pictures of these (see also GA 321 and 327).

Amongst all the capillary dynamolysis experiments the one of 9 October 1933, during a meteor shower, is particularly notable. 'By chance' Lilly Kolisko had prepared more silver nitrate pictures than necessary. 'I just had the feeling that they might be needed for something today. At 8 p.m. we were again on the way to the laboratory and looked up at the starry heavens. A beautiful meteor came down, drawing a broad arc of light behind it.' Then it rained, causing quite a stir. She hurried to the lab and applied metal solutions to the already prepared experiments, particularly iron sulphate prepared from meteoric iron.

The cylinders were orientated to the north, south, east and west. A rise in the iron forces was observed experimentally during this unusual performance in the heavens. The effect also showed with other metals. This work was published in 1935 in issue number four of the Mitteilungen. It was as if heavens had lent a hand in advance so as to help its language be expressed experimentally. Where else in the whole world can we find such pictures and such a destiny? The Spirits of the Elements became laboratory assistants!

Monographs were published under the titles Das Silber und der Mond, Der Jupiter und das Zinn and finally Saturn und Blei (1952). This last major work completed a circle and resulted in the publication of a book. An attempt was made to make an overview of the chemistry, astronomy and physiology (with a contribution from Eugen Kolisko). And this work too meant a pioneering deed in its own way. In the postscript thanks are directed to Dr A. Leroi; other helpers with the publication of potential interest being R. Abecassis, Hans and Martha Kleemann, who had always been of loyal assistance both at the beginning and later, likewise Julietta Leroi and M. Muller of Ascona and W. Rollvink, Dr P. von Siemens and Dr H. C. H. Voith of Heidenheim.

Life and work are one

This work meant a lot to Lilly Kolisko. On 9 December 1956 she told me, when I asked for her personal assessment of it, 'If you go from the spleen function (1922) to lead (1952) then you have my autobiography'. The cause is more important than the person. The planet with its 30-year orbit became the symbol for the life and work of Lilly Kolisko. The work of her star shaped her life's work on Earth. She meant that she had begun with the Saturn organ and finished with its corresponding metal. From Saturn she drew her constancy and perseverance, her strong will in an otherwise delicate body; from it too came the supra-personal conduct of her life with its devotion to the work and to the deep seriousness in every deed. At Easter 1934 she wrote while on a short holiday in Wengen to the first lab assistant Wilhelm Kaiser: 'Here it is very beautiful, – today it is even snowing. You'll be amazed how we (Eugen Kolisko was there) look when we return, fatter with red and brown faces! But I do have a bad conscience about the missed work…We shall probably not return until the end of this week. Don't let anyone into the lab during my absence. Best wishes, L. Kolisko'.

She wrote from Brussa in Turkey where in 1936 a solar eclipse was about to be followed experimentally: '…my room has a balcony facing due east so I can watch the sunrise. I hope everything works.'

It was the stars mirrored in substance that the conscience of Lilly Kolisko the researcher was responding to. She became a model for present day and future generations of researchers; a figure of warning with a powerful conscience while she directed her research, to save the Earth and the life on it. The lingering effects of the dark age and its science saw in Lilly Kolisko a spiritual sunrise on the horizon.

If we cast our saturnine memories back then we see that both methods she used are signs. The seed germination experiments seem permeated with the chthonic Eleusinian mysteries of substance. At that time were not the grains of the ears the great sign at sunrise? The pictures painted by the cosmic planetary forces seem like reawakened memories of Ephesus. At that time people saw by inner vision the statue of Artemis transported into the ether. Did Steiner indicate this when she met him the second time? He had known her a long time. And she accepted his assignment and devoted herself to it, making it her duty.

The effects of her work spread first of all to the doctors and pharmacists; thereafter to the farmers and to the cancer researchers (mistletoe). It was tested and confirmed by H. Junker, Th. Schwenk, W. Pelikan and Basold. Currently (1978), Christa Krüger is using the germination technique. Thus new discoveries must always be verified under different conditions and modified. The spirituality in matter has lit a way into the future like a bright light. Following the way is a duty which we owe to both it and its originators. At the same time it would enliven anthroposophy which, as a spiritual science, is dependent upon vigorous research.

The Goetheanum Biological Institute

At the end of Steiner's second lecture cycle on science (GA 321) the 'Kommenden Tag AG' was founded. It combined economic and cultural enterprises and included a laboratory. In the lecture cycle, Steiner gave indications for research topics. He took the initiative of a research institute: '…our research institutes will have to be founded on such things…' in order to add to the conventional instruments 'new ones by which we shall be able to show that certain processes going on in the earth, particularly the gaseous and fluid earth, happen differently by night than by day'. The way is from the daily cycle to the cycle of the year.

The shareholders [of Kommenden Tag] also supported Mrs Kolisko's work financially. 'It was a lucky gift not to find myself in an already full room.' The research questions took precedence, not ready-made apparatus, not to mention a whole building. The room in question was called, according to the 1921 assignment, the 'Epidemic Department', later, when as foot and mouth disease receded, the 'Biology Department'. When the Anthroposophical Society received its new impetus in 1923, Steiner changed the name into the Goetheanum Biological Institute. He discussed it with Ita Wegman, Eugen and Lilly Kolisko in his Dornach studio.

Steiner: 'You would like to be fully connected with the Goetheanum in Dornach?' He had always regarded Mrs Kolisko as 'belonging to the Goetheanum'. Ita Wegman suggested moving the Institute to Dornach. But on account of Eugen Kolisko's job as teacher and school doctor at the Waldorf school in Stuttgart, Steiner said that unfortunately this was not possible. There were to be laboratories in the second Goetheanum in Dornach where certain preparative work could be done for further development in Stuttgart. In The Hague the idea was to 'go even further' (see above). The discussion appears very significant because it shows that Steiner had planned further work with Lilly Kolisko. She later confirmed this view word for word: 'The Biological Institute arose in a healthy way.

It grew out of the work. Full rooms for which we had to find people were not there at the outset, but the work was there and we had to start working and then out of the work itself the thing grew more and more. The Biological Institute had a healthy start and will be able to flourish again'.

The death of Rudolf Steiner came as a heavy blow to all his closest colleagues. Nevertheless, the main threads of the work were already laid out and tried and tested. Without doubt he would have given further indications for experiments. Two will be mentioned here. On 11 September 1923 (Rhythmen im Kosmos und im Menschenwesen) Steiner addressed the Dornach building workers: 'Now we have founded our Institute in Stuttgart, one of our first tasks is to demonstrate that where there is a star there is nothing; that nothing is shining there. Because round it there is something, we can see a kind of light where there is really nothing'. Is not this one of the many research topics which at that time were not taken up? But who has any idea of how to investigate this? Anyway Steiner was accustomed to confirm experimentally in the sense world what he had discovered by spiritual science (clairvoyantly) about the composition of the stars and Sun. Discoveries arise from that form of science which can help people to deal with the destructive destiny of their time. Lilly Kolisko was clear about this when she said in a lecture on 30 October 1949 that the disintegration of earthly substance and its effects has a positive counterimage in potentisation effects.

Establishing new topics for research of this kind one needs the greatest impartiality. Externally, this is exemplified by the empty room. Steiner recommended a drastic remedy: 'an empty room with a match box'. It came from that time. And in 1925 Ehrenfried Pfeiffer started Weleda in a garret in Arlesheim.

Another research topic concerned the fact that human proteins behaved differently in the day time compared with the night. At night they are subject to the working of the whole cosmos but during the day they are influenced by the consciousness. A chemist wanting to investigate this would need an understanding of spiritual as well as terrestrial chemistry (GA 219). Here we again see the concept of rhythm and how the experimental approach is developed out of the whole human being.

A. Strakosch reported on the continued work of the research institute in Lebenswege mit Rudolf Steiner (Vol. 2, Dornach 1952, published by A. Strakosh).

The death vigil and loneliness

At the last meeting with Rudolf Steiner his corpse lay in the studio before the statue of Christ. Ita Wegman, Count Keyserlingk and Lilly Kolisko held a vigil through the night. They spoke of the 'living majestic image' of his face, 'so much alive, that it was if he was starting to breathe again'. 'Now we alone shall have to take full responsibility for all work.' Many difficult hours passed. 'When something gets too difficult, why don't you turn to the Spirit of the Institute; indeed, without it, it would not have its name.' These were the consoling words he had given them. Lilly Kolisko remembered how she asked Steiner at 4 am. on the night of the destruction of the Goetheanum by fire prior to her lecture the following day: 'Do I have to speak today?' Steiner answered only, 'I'm speaking too.' Thus he for his part had learnt to bear the burden.

The researcher, famous and admired in the Anthroposophical Society, was finally alone in Stuttgart. When she emigrated to England in 1936 there were two people on the railway platform to say goodbye to her: Martin Borchart and his wife Elisabeth, priests of the Christian Community.

In England, unerring Saturn had in store hard times for her leaving a bitter residue at the end of her life. First, in 1939, came the sudden death of Eugen Kolisko just as they both intended to begin new work together. She then translated many of his lectures into English and published them through Kolisko Archive Publications. She supported herself by working from home making bags.

She continued the capillary dynamolysis experiments. When I visited Miss Gladys Knapp, her closest supporter, in December 1970 she said, 'Experiments in the morning, experiments in the evening, experiments at night, two hours sleep, this was her life'. As I parted from Mrs Kolisko at her garden gate (19 December 1970) she said, 'This will probably be the last time that we shall meet'. The myriad of lines on her face creased into a smile.

Lilly Kolisko was alone. From 1970 onwards her bodily sufferings began to tell. Her spirit was unbowed, only its instrument was out of tune. We can re-encounter the being of Lilly Kolisko free from all discordance in the class lessons of the School of Spiritual Science. In 1924 she was the first to be asked by Steiner to read them in the Stuttgart college of teachers. She continued to read them in Stuttgart between 1950 and 1969.

During these lessons she seemed to grow in stature; at that time she had a powerful voice and yet she could speak quite intimately. Emil Leinhas was deeply moved and, not concealing it, said, 'That's exactly how Rudolf Steiner spoke to us in these lectures'.

Lilly Kolisko began her life in dark, oppressive circumstances; she found the light of spiritual science; helped by Steiner she enhanced it with new scientific discoveries. Nothing like it had been done before. And finally under the eye of Michael she pointed out the way of the spirit that seeks the light in the darkness of the senses. Norbert Glas, who looked after her for many years, included at the end of his book *Lichtvolles Alter* dedicated to Lilly Kolisko, the poem Saturn-Chronos which she included as a postscript to her book Saturn und Blei (Saturn and Lead). Its last lines read:

'The road is long –
Time stretches to eternity
But never let up with your inner growing.'

These lines succinctly encapsulate her biography. She came a long way; she found the eternal light in the Earth's being, because she continued to grow. And if we allow the memory pictures of this individuality to pass before our minds we can sense how even now they continue to grow for new impulses on the altar of scientific endeavour.

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